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An Operational Description of the Naval Oceanographic Raw Data Analysis Processing System (NORDAPS)

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Foreword

This report is an operational description of the Naval Oceanographic Raw Data Analysis Processing System. This software was originally developed in support of the South Atlantic Field Exercise sponsored by the former Surveillance Environmental Acoustics Support Program Office, NORDA Code 520. The system may be used directly in conjunction with Naval Oceanographic Office Fast Easy Binary formatted American Standard Coding for Information Exchange tapes and, with slight modification to the data input modules, all conductivity-temperature-depth, and bathythermograph type data sets.

Some standard Navy historical data sets (i.e., sound speed profiles) were not available in the South Atlantic Field Exercise area. It was therefore necessary to develop new data sets and techniques to utilize nonstandard available information. In the future, NORDAPS will be upgraded to utilize the appropriate standard Navy data sets.



A. C. Esau, Captain, USN
Commanding Officer, NORDA

Executive summary

The Naval Oceanographic Raw Data Analysis Processing System (NORDAPS) is an interactive software package that processes and displays field exercise data. The exercise environmental data is typically obtained from oceanographic platforms using conductivity-temperature-depth (CTD) and/or expendable bathythermograph (XBT) sensors. The data is initially recorded on analog tape, which is then processed by a shore facility that produces the digital data tapes used by NORDAPS. The raw exercise data is read, reformatted, thinned, filtered, and written to direct access data bases. NORDAPS provides an interactive, menu-driven system for analyzing, editing, extracting, plotting and displaying the data.

The primary function of NORDAPS is to provide oceanographic input (sound speed profiles) to acoustic models. NORDAPS is used to quality control the raw data, to make appropriate changes, and to create sound speed profiles from shallow data that extend from the surface of the ocean to the sea floor.

Many of the functions normally performed by the oceanographer to create acoustic model inputs have been automated, thereby reducing turnaround time. Graphics are used extensively throughout the system. The oceanographer is therefore able to view the results of each procedure.

The eventual goal of NORDAPS is to completely automate the production of sound speed profiles obtained from oceanographic/acoustic exercises so that acoustic model oceanographic inputs, if required, can be created by the most efficient and accurate methods available.

Some of the functions of NORDAPS are to extend CTD temperature, salinity, and sound speed profiles to the bottom of the ocean; to attach salinity to XBT temperature profiles; to calculate sound speed; to merge XBT temperature profiles with deeper temperature and salinity profiles; to group oceanographic stations into transects; to plot profiles in numerous ways; to extract profiles along great circle paths; to provide interactive editing and displaying of the data; and to perform retrievals of selected data sets for numerical model inputs. NORDAPS can also be interfaced to a relational data base system (INGRES), which provides ad hoc query capabilities. Interfaces are also provided for updating the RSVP and AUTO OCEAN data bases, along with capabilities to interface with the NAMOS and EAIDS systems.

This document introduces the new user to NORDAPS. It instructs the user on how the system operates and how he can interact with NORDAPS. The manual displays all interactive dialogues and sample plots.

Some of the menu items appearing in this document are not available for use at the present time. These menu items are indicated by an asterisk (*) to the right of the menu item. No description of such menu items is provided in the text.

Acknowledgments

The software was designed, developed, documented, implemented, and managed principally by the Acoustic Modeling and Analysis Branch, NORDA Code 223.

Planning Systems, Inc., provided technical management support and made substantial contributions to the design and implementation of filtering software used in the input modules.

Ocean Data Systems, Inc., provided additional management support and reviewed procedures for quality assurance.

Science Applications, Inc., provided the initial version of the between-profile interpolation program (commonly referred to as rho fielding). This version was not applicable in the South Atlantic Ocean and was therefore modified by NORDA Code 223.

The basic profile merging algorithm was originally developed by SYSCON, Inc., and was modified slightly by NORDA Code 223.

B-K Dynamics provided consultation services in support of the overall project.

Other principal project personnel included Dr. David B. King, NORDA Code 223; Dr. Eugene Molinelli, Planning Systems, Inc.; and Mr. John Locklin and Mr. Gil Jacobs, Ocean Data Systems, Inc.

This work was funded by Program Element 63785N, Mr. Gerald A. Gotthardt, Program Manager.

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An Operational Description of the Naval Oceanographic Raw Data Analysis Processing System (NORDAPS)

1.0 Introduction

This document provides user operating instructions for the Naval Oceanographic Raw Data Analysis Processing System (NORDAPS), as it is implemented on Naval Ocean Research and Development Activity's Digital Equipment Corporation VAX 11/785 minicomputer. All information for executing NORDAPS is included in this manual; you need no other reference.

2.0 User interaction

User interaction with NORDAPS occurs through a continuing dialogue under your control. You will choose a function from the NORDAPS menus, and the system will perform the indicated task. The process continues until you exit from NORDAPS. Normal exiting is done through the first NORDAPS Menu or by entering EXIT for the option number selection for any menu.

3.0 Program execution

You need to define the logical names SA, TR, EX and, optionally, DEF in your login command file before executing NORDAPS. Place the statement

```
$@USR$223:[COMMON.OG.NORDAPS]NORDAP.COM
```

in your login command file to define these names.

Directory SA contains the data files for NORDAPS, directory TR contains the transect data files, and directory EX contains the extending profile data files. Directory DEF contains the user-defined default file, NORDAP.DEF. DEF:NORDAP.DEF is optional. If you want to use the program-defined defaults, the DEF logical name is not needed.

You can run NORDAPS by executing the command NDP. NDP is a global symbol previously defined in the command file, NORDAP.COM, as \$SA:NORDAP.EXE.

The NORDAPS manager can update NORDAPS logical names simply by changing the NORDAP.COM File. This action would update the logical names for all users.

4.0 NORDAPS dialogues

NORDAPS dialogues consist of a user-friendly, menu-driven dialogue. Enter the desired selection and any inputs

that might be needed. The system output is displayed on your terminal monitor or is outputted to a printer or plotter device.

4.1 Dialogue standards

—Your input is prompted by a statement for some type of response.

—The input may be entered as numeric data or character data, depending on the specification.

—If you return without entering data, a default value will be used.

—The maximum size for numeric data specifying minimum and maximum values is 10 digits.

—Character data can be entered in either upper or lower case.

—With character replies, you are not required to enter the full word. Only the first few letters of the word need to be entered.

—If you enter an incorrect reply, an error message is displayed and you will be asked to re-enter the reply.

—For the retrieval specifications, you may enter one station identifier (ID) or a series of station IDs.

—The station IDs may be entered individually, in a specified range, or grouped in a transect.

—The station identifiers consist of a data designator (C,A,S) and the profile number (at most, a six-digit identifier that corresponds to the relative record number of the header data). The data designator, C,A,S, corresponds to the data types CTD (Conductivity, Temperature, and Depth), AXBT (Air-dropped Expendable Bathythermograph), or SXBT (Ship-dropped Expendable Bathythermograph), respectively.

—The transect identifier consists of a T followed by a transect name and optionally the transect sequence numbers, which allow specifying a subset of a transect to be retrieved.

—Consecutive station IDs can be identified by specifying the beginning and ending of the station identifiers' range. For example, station identifiers C1, C2, C3, C4, and C5 can be specified by C1-C5. If you want to specify a range to the end of the data, use the word END as the ending range, i.e., C1-END.

4.2 NORDAPS' main menu

From the NORDAPS main menu, you can process Naval Oceanographic Office Fast Easy Binary (NAVOCEANO

FEB) file-formatted data tapes, maintain transect identifiers, analyze and generate profiles for CTD or XBT data, display or edit exercise data, search and extract exercise data, or alter NORDAPS operational defaults. You have the option to choose the functions you want to execute from the following menu. From this menu, press the return key or enter CONTROL Z (©Z), EX, EXIT, or STOP for normal termination.

Naval Ocean Research and Development Activity
Data Analysis Processing System
----- (NORDAPS) -----

(((MENU)))

1. Process FEB Formatted CTD Data Tapes.
2. Process FEB Formatted XBT Data Tapes.
3. Transect Identifier Maintenance.
4. CTD—Analysis and Profile Generation.
5. XBT—Analysis and Profile Generation.
6. Display or Edit Exercise Data.
7. Search and Extraction of Exercise Data.
8. Alter NORDAPS Operational Defaults.

*** Select option number →

Enter the option number you want to execute. If you enter an incorrect response, the menu is displayed again, an error message is written, and you are prompted for the correct reply. Thus, this menu is displayed:

(((MENU)))

1. Process FEB Formatted CTD Data Tapes.
2. Process FEB Formatted XBT Data Tapes.
3. Transect Identifier Maintenance.
4. CTD—Analysis and Profile Generation.
5. XBT—Analysis and Profile Generation.
6. Display or Edit Exercise Data.
7. Search and Extraction of Exercise Data.
8. Alter NORDAPS Operational Defaults.

*** ERROR: Option * is incorrect!

*** Select option number →

The first time you enter an option to the NORDAPS Main Menu, the program self-tests to check whether all the required NORDAPS files exist. If one or more of the files cannot be opened, the program is aborted. You need these files to execute NORDAPS: SA:CTDF.PRE, SA:AXBTF.PRE, SA:SXBTF.PRE, SA:CTDF.HDR, SA:AXBTF.HDR, SA:SXBTF.HDR, SA:CTDF.AUX, SA:AXBTF.AUX, SA:SXBTF.AUX, SA:CTDF.DAT, SA:AXBTF.DAT, and SA:SXBTF.DAT. These files are created by the NORDAPS manager and are defined in the data base directory SA.

If you should terminate NORDAPS from this menu, the following message is displayed:

*** MESSAGE: NORDAPS normal termination.

4.2.1 Process FEB formatted CTD data tapes

Option 1 of the NORDAPS Main Menu processes FEB-formatted CTD ASCII data tapes, which is the root process

for the NAVOCEANO CTD tape input routine. Raw data is read from tapes generated on the NAVOCEANO UNIVAC equipment in ASCII FEB format. The data is reformatted, thinned, and written to unformatted direct access files for archiving and further processing. Only NORDAPS managers can execute this process through the use of an appropriate authorization code.

*** RESPONSE REQUIRED: Enter authorization code:

If you enter an incorrect authorization code, you will be returned to the main menu, where you will see this message:

*** USER CODE ERROR: Access Denied!!

Otherwise, enter the number of files on the tape, and the following actions occur:

*** RESPONSE REQUIRED: Enter number of files on this tape: 1

*** CTD Information will be appended to existing data.

*** MESSAGE: Processing File Number 1

*** MESSAGE: 36 Stations Processed in 96 Records.

If the CTD File specified has already been processed, the following error messages occur and the program is aborted.

*** WARNING: This tape has already been processed!

*** MESSAGE: There were 10 records with the same TAPEID on file.

*** MESSAGE: TAPEID is 1084.

4.2.2 Process FEB formatted XBT data tapes

Option 2 of the NORDAPS Main Menu processes NAVOCEANO FEB-formatted ASCII XBT data tapes, the root process for NAVOCEANO-generated XBT data. Raw data is read from the tapes generated on NAVOCEANO UNIVAC equipment in ASCII FEB format. The data is reformatted, thinned, and written to unformatted direct access files for archiving and further processing. Only NORDAPS managers may execute this process through the use of an appropriate authorization code.

*** RESPONSE REQUIRED: Enter authorization code:

If you enter an incorrect authorization code, you will be returned to the main menu, where you will see this message:

*** USER CODE ERROR: Access Denied!!

Otherwise, enter the type of XBT data you are processing, either A for AXBT data or S for SXBT data. Then enter the tape identification, platform identification, and the number of files on the tape. You will see the following user interaction sequence:

*** RESPONSE REQUIRED: Enter (A) for AXBT or (S) for SXBT:S

*** RESPONSE REQUIRED: Enter Tape Identification: SXBT2

*** RESPONSE REQUIRED: Enter Platform Identification: WILKES

*** RESPONSE REQUIRED: Enter Number of Files on this Tape: 1

*** MESSAGE: XBT Information will be Appended to Existing Data.

*** MESSAGE: Processing File Number 1

*** MESSAGE: 42 Stations Processed in 60 Records.

If the specified XBT File has already been processed, the following error messages are displayed and the program is aborted.

*** WARNING: This tape has already been processed!
*** MESSAGE: There were 10 records with the same TAPEID on file.
*** MESSAGE: TAPEID is 1084.

4.2.3 Transect identifier maintenance

Option 3 of the NORDAPS Main Menu creates, deletes, edits, lists, and plots transects or ship tracks. Indicate which function to execute by responding to the Transect Maintenance Menu.

```
Naval Ocean Research and Development Activity
----- (NORDAPS) -----
((( TRANSECT MAINTENANCE )))
```

(((MENU)))

1. Create New Transect
2. Delete Transect Definition
3. Edit Transects
4. List Transects
5. List Known Transects
6. Plot Transect Locations.

*** Select option number →

If you enter a wrong option, the menu is redisplayed with the error message,

*** ERROR: Option * is incorrect!

You are then prompted to enter the correct response.

If you enter ©Z or return, control advances to the previous menu. If you enter EXIT or STOP, NORDAPS is terminated.

4.2.3.1 Create new transect.

Option 1 of the Transect Maintenance Menu creates a new transect.

You are prompted to enter the transect identifier's name and the station identifiers belonging to this transect. The station identifiers can be listed in any order and can be entered as explained in section 4.1. To exit from this process, enter ©Z or press the return key. For instance,

```
*** MESSAGE: Transect Create Routine.
*** RESPONSE REQUIRED: Enter Transect Identifier (©Z) to Exit:
tran1
*** RESPONSE REQUIRED: Enter Station Identifier, (©Z) to Exit:
1.c1
2.c4
3.c7
4.c2
5.©Z
```

As a result, the transect TRAN1 is created and contains the station identifiers c1, c4, c7, and c2. When you reference TRAN1 as a retrieval specification in plotting, it must be referred to as TTRAN1.

An error will occur if you try to create duplicate transects. The message,

*** ERROR: Duplicate Transect Identifier Specified!

is displayed, and you will be prompted for another transect identifier.

An error also occurs if you enter a station identifier incorrectly. The next error message is written:

*** ERROR: Illegal Station Identifier Syntax Detected!

You will be prompted to enter the correct station identifier.

4.2.3.2 Delete transect definition.

Option 2 of the Transect Maintenance Menu deletes a transect definition.

Enter the transect identifier; it will be removed from the files. To exit from the deletion routine, enter ©Z or press the return key. An example for deleting a transect is

```
*** MESSAGE: Transect Delete Routine.
*** RESPONSE REQUIRED: Enter Transect Identifier, (©Z) to Exit:
tran1
*** RESPONSE REQUIRED: Enter Transect Identifier, (©Z) to Exit:
©Z
```

The transect, TRAN1, is then deleted from all files.

If you enter a transect identifier that is not found the message,

*** ERROR: Transect not found.

appears and you will be asked to enter another identifier.

4.2.3.3 Edit transects.

Option 3 of the Transect Maintenance Menu edits transects.

You can add, delete, or modify station identifiers to the specified transect.

4.2.3.4 List transects.

Option 4 of the Transect Maintenance Menu lists the stations assigned to a particular transect.

Enter the transect identifier and the stations assigned to this transect are listed. To exit from this process, enter ©Z. To continue the process, press the return key. An example of a transect listing follows:

```
*** MESSAGE: Transect List Routine.
*** RESPONSE REQUIRED: Enter Transect Identifier, (©Z) to Exit:
tran1
```

TRANSECT NAME : TRAN1

STATIONS ASSIGNED

1. C1
2. C4
3. C7
4. C2

```
*** RESPONSE REQUIRED: Press RETURN to Continue, (©Z) to Exit:©Z
```

The station identifiers of TRAN1 are listed.

If you enter a nonexistent transect identifier, this message appears:

*** ERROR: Transect not found.

You are then prompted to enter an existing transect.

4.2.3.5 List known transects.

Option 5 of the Transect Maintenance Menu lists all of the known transects.

Enter the device you want to display or to print the transect listing on. You can display the transect list on the

terminal by specifying TT as the list device or you can print the list by specifying LP as the list device. To exit from this routine, enter ©Z, and to continue the routine, press the return key. A list of all of the transects is then created. An example of this procedure is

*** RESPONSE REQUIRED: Enter List Device (TT):

TRANSECT NAME

EXAM1
EXAM2
TRAN
TRAN1
TRAN2

*** RESPONSE REQUIRED: Press RETURN to Continue, (©Z) to Exit:©Z

Press the return key in response to the command to enter the list device, and the default value of TT will be used as the list device.

4.2.3.6 Plot transect locations. Option 6 of the Transect Maintenance Menu plots the transect locations. A longitude versus latitude plot is created by using the station identifiers located in a transect.

To create the plot, enter the transect identifier. To exit from this routine, enter ©Z.

*** MESSAGE: Transect Plot Routine

*** RESPONSE REQUIRED: Enter Transect Identifier, (©Z) to Exit: tran

Figure 1 is an example of a transect plot.

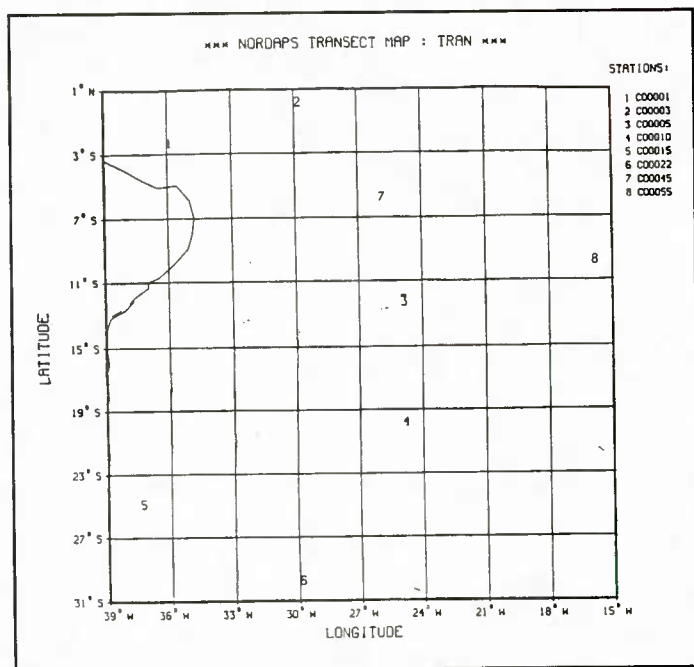


Figure 1. NORDAPS transect plot.

4.2.4 CTD—analysis and profile generation

Option 4 of the NORDAPS Main Menu analyzes and generates sound speed profiles from CTD data. This

process can perform a density inversion check, perform CTD profile extensions and sound speed profile generations, or perform oceanographic variable statistics on raw CTD data. You can select the option you want to execute by the following:

Naval Ocean Research and Development Activity

----- (NORDAPS) -----

(((CTD ANALYSIS)))

(((MENU)))

1. Perform Density Inversion Check.
 2. Perform CTD Extensions and Profile Generation.
 3. Calculate Raw CTD Oceanographic Variable Statistics
- *** Select option number →

If you enter a wrong option, the menu is redisplayed with the error message,

*** ERROR: Option * is incorrect!

4.2.4.1 Perform density inversion check. The density inversion check tests a given temperature-salinity profile set for density instabilities. A report is generated that indicates at which depths instabilities were found and the densities at these depths.

Enter the list device for the report. If you enter TT, the report is displayed on the terminal. If you enter LP, the report is printed. An example of this process follows:

*** RESPONSE REQUIRED: Enter List Device (TT):

*** MESSAGE: Density Inversion Check In Progress.

FOR EXERCISE SEAS83A **

AT LATITUDE -20.01500

LONGITUDE -24.97500

HEADER RECORD NUMBER C00010

THE FOLLOWING DENSITY INSTABILITIES WERE FOUND

*** DENSITY INVERSION BETWEEN DEPTHS 169. AND 179.

(DENSITY FROM 1.026987 TO 1.026616)

*** MESSAGE: Density Inversion Check Complete.

*** MESSAGE: Of 186 records scanned, 186 had not been previously checked.

*** MESSAGE: 1 records were found to have density inversions.

4.2.4.2 Perform CTD extensions and profile generation. The CTD Extension function allows you to use various techniques to extend profiles (salinity, temperature, and sound speed) to the bottom of the ocean.

The raw CTD data is not modified by this process. If use of a nearby station does not extend the temperature and salinity profiles to the bottom of the ocean, then a deep archival sound speed profile data base is used to provide the deeper sound speeds. The resulting merged sound speed profile and the sound speed profile(s) of any station(s) used to extend the shallow CTD are displayed in a plot. The station identifiers of these profiles appear on the right side of the plot. The first station identifier listed refers to the leftmost plotted profile, and the last station identifier listed refers to the rightmost plotted profile. This process may be performed using one of three methods:

—Interpolation of deeper data from two neighboring CTD stations.

—Direct use of a single deeper neighboring CTD station.

—Use of the deep archival sound speed data base to extend only the sound speed profile to the bottom.

You are prompted to enter the method by which to extend the CTD profile.

*** METHODS TO EXTEND CTD PROFILES ***

- (1) Extend using a nearby CTD
- (2) Extend using two adjacent CTD's

*** Enter method option:

If you enter option 1, the CTD profile is extended using a nearby CTD station such that the temperature and salinity (t-s) profiles from the single adjacent CTD are used for profile extensions. If both CTD station identifiers requested below are the same, then only the sound speed profile of the CTD is extended using a deep archival sound speed profile. Respond to the next message:

*** Enter the CTD Exercise Station Number to be Extended:

NOTES: Deep Historical Sound Speeds were derived using the equation of Wilson. . . . The sound speed profiles will be extended to a maximum depth determined from an examination of the bathymetry in 5 degree square areas throughout the exercise ocean Profiles using the deep sound speed data base for an extension must be at least 1000 meters deep.

*** Enter the CTD Exercise Station Number Used to Extend the CTD in Question:

If you enter 2 as the method to extend the CTD profile, the CTD profile is reprocessed by two adjacent CTD's. You are prompted to respond to the following:

*** Enter First End Point CTD Station Number:

*** Enter Second End Point CTD Station Number:

*** Enter In-between CTD Station Number:

For both CTD extension methods, respond to the following if you want to use the t-s values that may have been added to the extending CTD profiles through a previous extension:

*** Enter YES if you wish to use the temperature and salinity that may have been added to the extending CTD profile:

If you want to change the default parameters of the plot, the minimum and maximum sound speed and depth values of the profiles, answer YES to the next message:

*** Enter YES if want to change default parameters:

*** Enter the sound speed axis minimum (min):

*** Enter the sound speed axis maximum (max):

*** Enter the depth axis minimum (min):

*** Enter the depth axis maximum (max):

*** Enter the offset value for the sound speed profile (5.00):

*** Enter the offset value for the depth profile (100.00):

The CTD profiles are extended for both methods, and an offset plot of the extended sound speed profile and the sound speed profile(s) used to extend the CTD profile are plotted as seen in Figures 2 and 3. You can create a hardcopy of the plot by responding YES to the next message:

*** Enter YES if you wish to create a hardcopy of the plot:

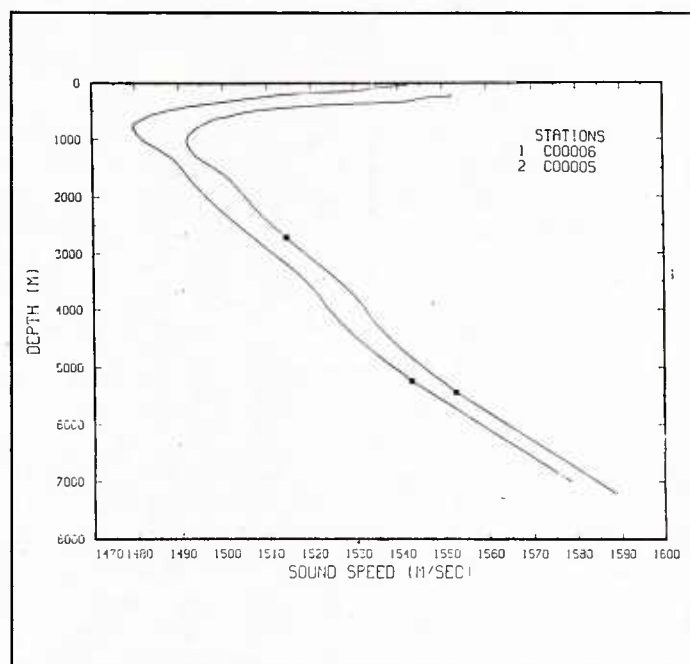


Figure 2. CTD extension using a nearby CTD.

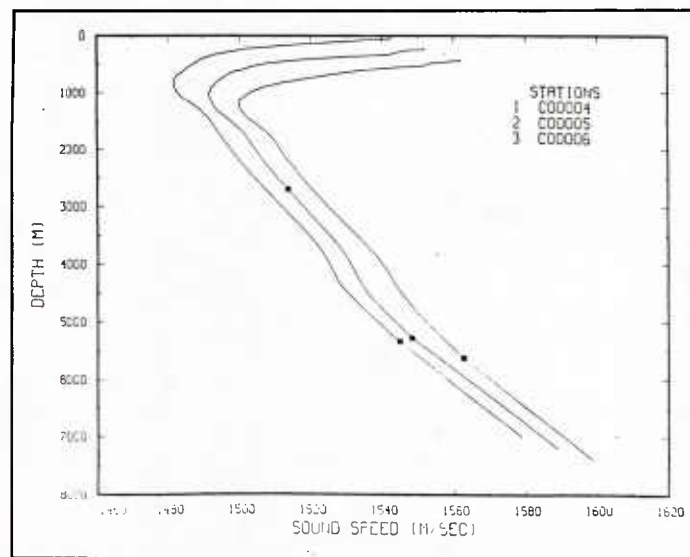


Figure 3. CTD extension using two adjacent CTDs.

If you want to permanently store the extended profile in the data files, reply YES to the next message:

*** Enter YES if you want to write the profile to the files:

Otherwise, press the return key.

4.2.4.3 Calculate raw CTD oceanographic variable statistics. The CTD Oceanographic Variable Statistic Module outputs a simple statistical summary of raw CTD data.

Select subsets of data by inputting an area and date range as follows:

*** Enter the Exercise Name for which statistics are to be calculated:

*** Enter the northwest corner latitude of desired area:

*** Enter the northwest corner longitude of desired area:

- *** Enter the southeast corner latitude of desired area:
- *** Enter the southeast corner longitude of desired area:
- *** Enter beginning date for extraction (YYMMDD):
- *** Enter ending date for extraction (YYMMDD):

The minimum, maximum, mean, and standard deviation of temperature, salinity, sound speed, and sigma-t at a series of standard depths are calculated. The statistics are used to create the report, EXSTAT.REP, which also lists standard deviation from the mean for each station, for each standard depth, and for each variable. This report can be used to identify questionable data by station and depth.

4.2.5 XBT—Analysis and profile generation

Option 5 of the NORDAPS Main Menu analyzes and generates sound speed profiles from XBT temperature data. In this process, attaching a salinity field to the XBT temperature profile, merging the XBT temperature data with a deeper temperature profile, calculating sound speed, plotting the resultant sound speed profile, and writing the resultant temperature, salinity and sound speed profile extensions to the master data base are accomplished. At present these functions can be performed by using historical data, a nearby CTD, or two adjacent CTDs. In the future this process may be automated (Option 1) to allow automatic processing of numerous CTD unsupported XBT profiles using a data base similar to the Integrated Carrier ASW Prediction System's (ICAPS) water mass history file (Fisher, 1978).

To execute these tasks, enter the corresponding option for the following:

```

Naval Ocean Research and Development Activity
----- (NORDAPS) -----
((( BT ANALYSIS )))
  
```

(((MENU)))

1. Automatically Process BT's. *
 2. Manually Process BT's by Historical Data.
 3. Manually Process BT's by a Nearby CTD.
 4. Manually Process BT's by 2 Adjacent CTD's.
- *** Select option number →

If you enter a wrong option, the menu is redisplayed with the error message,

*** ERROR: Option * is incorrect!

4.2.5.1 Automatically process XBTs (future addition).

4.2.5.2 Manually process XBTs by historical data.

You can process XBT data by using relationships developed between salinity and temperature in shallow depths (< 500 m) and historical temperature and salinity means at deeper depths. The shallow salinity field is derived by using regression relationships developed between temperature and salinity at standard depths (Kerr, 1984). You are then able to obtain salinity estimates at those depths sampled by the XBT where no supporting CTD data is available. The density instability check is automatically executed following the extension.

To execute the process, enter the XBT station to extend.

*** Enter the Station Number of the XBT to be Extended:

If the NORDAPS OPERATIONAL DEFAULT ontrack plot logical is true, a plot of the extended XBT is displayed (see Fig. 4). You can change the defaults of the plot by replying YES to the next message:

*** Enter YES if want to change default parameters:

If you want to create a hardcopy on the NORDAPS OPERATIONAL DEFAULT plotter type, reply YES to the next message:

*** Enter YES if you wish to create a hardcopy of the plot:

If you want to permanently store the extended profiles in the data files, reply YES to the next message:

*** Enter YES if you wish to write the profile to the files:

Otherwise, press the return key.

4.2.5.3 Manually process BTs by a nearby CTD.

By selecting Option 3 of the XBT Analysis Menu, you can use a nearby CTD station to create a sound speed profile from an XBT temperature profile. The entire CTD salinity profile is used for calculating sound speed, but use only the portion of the CTD temperature profile deeper than the XBT maximum sample depth. Smoothing at the temperature profile merge depth and a density instability check are executed during this process. A deep archival sound speed profile data base provides the sound speeds at depths deeper than the CTD.

You need to input the CTD and XBT station identifiers as follows:

*** Enter the XBT Exercise Station Number to be Extended:

NOTES: Deep Historical Sound Speeds were derived using the equation of Wilson. . . . The sound speed profiles will be extended to a maximum depth determined from an examination of the bathymetry in 5 degree square areas throughout the exercise ocean. . . . Profiles using the deep sound speed data base for an extension must be at least 1000 meters deep.

*** Enter the CTD Exercise Station Number Used to Extend the XBT in Question:

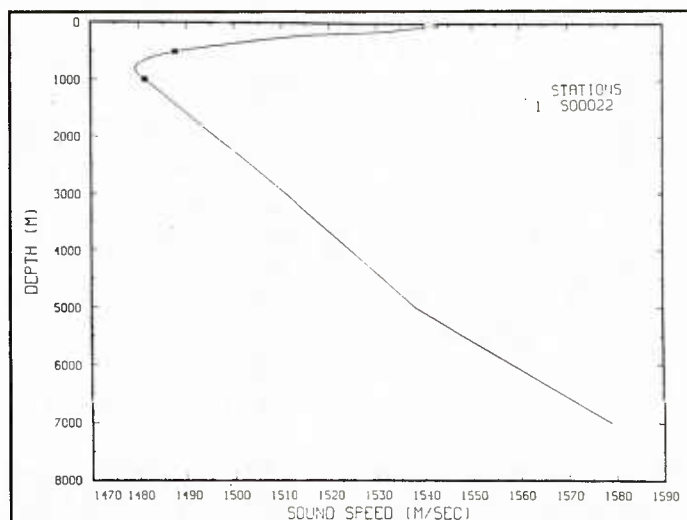


Figure 4. Extended XBT using historical data plot.

For this XBT extension method, you must indicate if you want to use the temperature and salinity values that may have been added to the extending CTD profiles through a previous extension by responding to the next statement.

*** Enter YES if you wish to use the temperature and salinity that may have been added to the extended CTD profile:

If the NORDAPS OPERATIONAL DEFAULT ontrack plot logical is true, a plot is created of the extended profile (Fig. 5). You can change plot's defaults by replying YES to the next message:

*** Enter YES if you want to change default parameters:

You can also create a hardcopy of the plot by replying YES to

*** Enter YES if you wish to create a hardcopy of the plot:

If you want to permanently store the extended profile in the data files, reply YES to the next message:

*** Enter YES if you wish to write the profile to the files:

Otherwise, press the return key.

4.2.5.4 Manually process BTs using two adjacent CTDs. In method 4, for the BT process, you will select two CTD stations at which salinity and temperature measurements were made. The interpolated salinity values are used at the XBT station location over a depth range scale of the stations neighboring the XBT. The interpolated temperature profile is merged to the bottom of the XBT temperature profile, and the density inversion check automatically follows the extension process. The original XBT data is not changed during this process.

Input the following information:

*** Enter the First End Point CTD Station Number:

*** Enter the Second End Point CTD Station Number:

*** Enter the In-between XBT Station Number:

For this XBT extension method, you must indicate if you want to use the temperature and salinity values that may

have been added to the extending CTD profiles through a previous extension by responding to the following:

*** Enter YES if you wish to use the temperature and salinity that may have been added to the extending CTD profiles:

If the NORDAPS OPERATIONAL DEFAULT ontrack plot logical is true, a plot is created of the extended profile (Fig. 6). You can change the plot's defaults by replying YES to the next message:

*** Enter YES if want to change default parameters:

You can also create a hardcopy of the plot by replying YES to

*** Enter YES if you wish to create a hardcopy of the plot:

If you want to permanently store the extended profile in the data files, reply YES to the next message:

*** Enter YES if you wish to write the profile to the files:

Otherwise, press the return key.

4.2.6 Display or edit exercise data

Option 6 of the NORDAPS Main Menu displays and plots CTD, AXBT, and SXBT temperature, salinity, and sound speed profiles, or variables derived from them. In addition, this option allows you access to an editing routine that can be used to modify data file contents and a routine that lists profile reports.

```

Naval Ocean Research and Development Activity
----- (NORDAPS) -----
((( DISPLAY .. EDIT )))
  
```

(((MENU)))

1. Generate Profile Report.
2. Generate Transect Report.*
3. Edit Profiles.
4. Plot Profiles.
5. Plot Profile Contours.
6. Plot Ontrack Profiles.
7. Plot Station and Transect Locations.

*** Select option number →

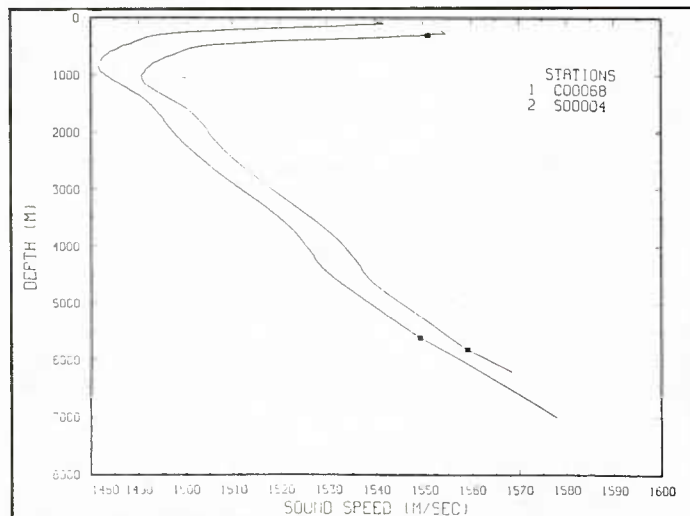


Figure 5. Extended XBT using a nearby CTD plot.

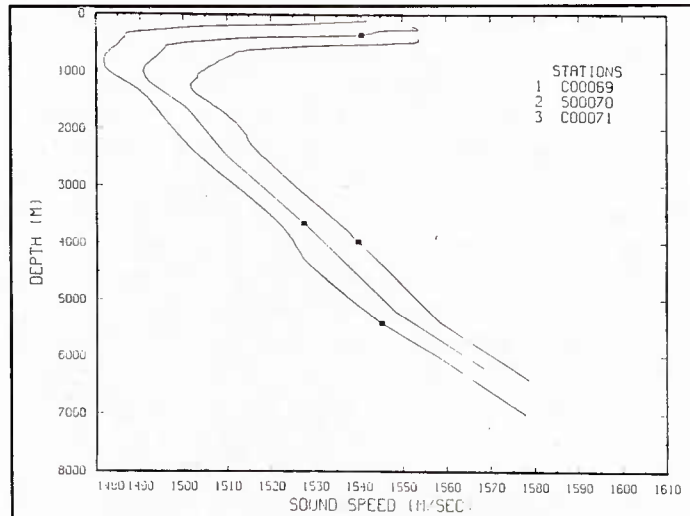


Figure 6. Extended XBT by two adjacent CTDs.

If you enter the wrong option, the menu will be reprinted and the error message,

*** ERROR: Option * is incorrect.

is displayed. You are then prompted to enter the correct response.

4.2.6.1 Generate profile report. Option 1 of the Display .. Edit Menu allows you to generate a profile report. The profile report consists of a listing of header file information, auxiliary file information, and the oceanographic data. The program's default originally specifies that every tenth element of the profile information (depth, temperature, salinity, and sound speed) be displayed. Other defaults give you the option to omit parts of the report, i.e., the profile header, the auxiliary header, and/or the profile data. You can redefine these defaults by altering the NORDAPS operational defaults (Option 8 of the NORDAPS Main Menu).

To display the report on the terminal screen or to make a hardcopy of the report, respond to the next message:

***Response Required: Enter List Device (TT):

If you enter TT or press the return key, the report will be displayed on the terminal screen. If you enter LP, the report will be printed on the Printronix, Inc., lineprinter.

Enter the station identifier codes (see section 4.1) you want to observe, and the profile report is created. Figure 7 is an example of a profile report generation.

4.2.6.2 Generate transect report (future addition).

4.2.6.3 Edit profiles. Option 3 of the Display .. Edit Menu allows the privileged user to edit the NORDAPS files. The privileged user can edit the profile header file, the auxiliary header file, and/or the profile data file. To enter into the editing module, a valid authorization code must be entered.

*** RESPONSE REQUIRED: Enter authorization code:

If the code is approved, you are entered into a new profile editing session. You must first enter the station identifier code of the profile to be edited. Then you are placed within the profile header file. The cursor is automatically moved to the fields that can be edited. Once you edit a field, you can either tab over to the next field or backspace to the previous field. Figure 8 is an example of the profile header file screen. To edit the auxiliary header file, enter keypad 2 during any part of the editing session. To edit the profile data file, enter keypad 3 during any part of the editing session. To return to the header file screen, enter keypad 1 during any part of the editing session. In the profile data screen, enter the depth value to be displayed. The default is 0.0. The data surrounding this depth is displayed. You can position the cursor to edit the depth, temperature, salinity, and sound speed fields by using the arrow keys, the tab key, and the backspace key. Figure 9 is an example of an auxiliary header data screen, and Figure 10 is an example of a profile data screen.

If you press the return key at any time during the editing session, the Editing Options Menu (Fig. 11) is displayed. If you enter option 1, the edited profile session is written permanently to the data base and a new editing session is initiated. If you enter option 2, a new editing profile session is initiated and the old editing session is disregarded. If option 3 is entered, the existing editing session continues and the you will be returned to the profile header screen. Option 4 returns you to the previous menu, the DISPLAY .. EDIT Menu, making no changes to the tables.

4.2.6.4 Plot profiles. Option 4 of the Display .. Edit Menu gives you a choice of plotting profile data in several different ways. The profile data may be plotted as an individual curve, as a series of offset curves, as a series of overplotted curves, or as a temperature versus salinity scatter plot. The depths at which extensions were made to the original data are indicated by a small block figure. The following menu is displayed:

Naval Ocean Research and Development Activity

----- (NORDAPS) -----

(((PROFILE DISPLAYS)))

(((MENU)))

1. Plot an Individual Profile.
2. Plot Offset Profiles.
3. Plot Overplotted Profiles.
4. Plot a T-S Scatter Plot.

*** Select option number →

If you enter an incorrect option, the menu is reprinted, the error message,

*** ERROR: Option * is incorrect.

is displayed, and you are prompted for a correct response.

If the default-defined terminal type does not have graphic capabilities, a hardcopy of the plot can be created. See section 4.2.8.7 for a full description of available plotting devices and instructions for their use. If your terminal is not a graphics terminal and if no plotter device is specified, the the plotting routines are aborted. The plotting device for the hardcopy can be defined either by you or as the program default plotter, the Printronix. These default parameters may be changed in option 8 of the NORDAPS Main Menu (8. Alter NORDAPS Operational Defaults).

4.2.6.4.1 Plot an individual profile. Option 1 of the Profile Displays Menu allows you to plot an individual profile. The data may be plotted as temperature versus depth, salinity versus depth, sound speed versus depth, temperature versus salinity, or sigma-t versus depth. The input consists of the single station identifier code.

Enter the profile to be plotted as defined in section 4.1, Dialogue standards, and then specify the type of plot you want to display.

*** RESPONSE REQUIRED: Enter Retrieval Specifications::

Specify which type of data you want to plot by responding to the following menu:

*** MESSAGE >>> Retrieval Specification Successfully Parsed.
 *** MESSAGE >>> Profile Report Generation in Progress.

*** <<< NORDAPS PROFILE LISTING >>> 9-JUL-86 15:19:48 ***

AREA DATA NAME:	SEAS83A	EVENT ID:	330283
DATE:	830312	RECORD NUMBER:	1
TIME:	19	DATA POINTS:	457
LATITUDE:	-2.56833	STATION NUMBER:	2001
LONGITUDE:	-36.06667	STATION ID:	C00001
SPARE CELL #1:			
SPARE CELL #2:			

FLAGS:	MARKED FOR DELETE:	F	DENSITY INVERSION:	F
	RSVP UPDATED:	T	PROFILE EXTENDED:	T
	DENSITY CHECKED:	T	AUTO OCEAN UPDATED:	F
	INGRES UPDATED:	F	PROFILE PROCESSED:	T
	UNASSIGNED:	F	UNASSIGNED:	F
	UNASSIGNED:	F	UNASSIGNED:	F
	UNASSIGNED:	F	UNASSIGNED:	F

***** <<< AUXILIARY HEADER INFORMATION >>> *****

FILE NAME:	SA:CTDF.DAT	RECORD SIZE:	4000	
PLATFORM ID:	WLKS	SONIC DEPTH:	3724	
SENSOR TYPE:	NB CTD	MARSDEN SQUARE:	303	
TAPE ID:	2404	PROBE DEPTH:	3702	
EDIT DATE:	29-AUG-83	BIN NUMBER:	25	
SSP METHOD:	WILSON	MERGE/EXT METH:	1	
EXT STATION 1:	C00001	TEMP/SAL PNTS:	457	
EXT STATION 2:		TOTAL SSP PNTS:	462	
MIN TEMP:	2.28737	MAX TEMP:	27.87100	
MIN SALINITY:	34.43343	MAX SALINITY:	36.62385	
MIN SOUND SPD:	1481.07910	MAX SOUND SPD:	1558.40002	
TRANSECT INFO:	LEG6- 1	LEG7- 1	MELS1- 1	MELS2- 7
	MELS3- 3	TRANS- 1	TRANS1- 1	LEG2- 1
	TR1- 1	TRAN- 1		

	DEPTH	TEMPERATURE	SALINITY	SOUND SPEED
	----	-----	-----	-----
1.	8.99133	27.86942	36.22436	1542.79614
101.	189.43417	12.27828	35.14913	1501.71887
201.	1181.56262	4.44557	34.72832	1487.93237
301.	2168.54297	3.39010	34.95415	1500.48950
401.	3150.92627	2.68817	34.91452	1514.36365

Figure 7. Profile report generation for station C00001.

*** PROFILE HEADER DATA ***

AREA DATA NAME:	SEAS83A	EVENT ID:	330283
DATE DATA COLLECTED:	- 830331	DIRECT ACCESS RECORD NUMBER:	13
TIME DATA COLLECTED:	529	NUMBER OF DATA POINTS:	662
LATITUDE:	-29.99500	STATION NUMBER:	21017
LONGITUDE:	-24.99833	STATION IDENTIFIER CODE:	C00013
SPARE CELL (1):			
SPARE CELL (2):			

FLAGS:			
MARKED FOR DELETE:	F	DENSITY INVERSION:	F
RSVP UPDATED:	T	PROFILE EXTENDED:	T
DENSITY CHECKED:	T	AUTO OCEAN UPDATED:	F
INGRES UPDATED:	F	PROFILE PROCESSED:	T
UNASSIGNED:	F	UNASSIGNED:	F
UNASSIGNED:	F	UNASSIGNED:	F
UNASSIGNED:	F	UNASSIGNED:	F

To Edit Enter: PROFILE (KEYPAD1), AUXILIARY (KEYPAD2), DATA (KEYPAD3) or RETURN

Figure 8. Profile header data screen.

*** AUXILIARY HEADER DATA ***

DIRECT ACCESS FILE NAME: SA:CTDF.DAT		DIRECT ACCESS RECORD SIZE: 4000	
PLATFORM ID:	WLKS	SONIC DEPTH (M):	5610
SENSOR TYPE:	NB CTD	MARSDEN SQUARE NUMBER:	000374
TAPE ID:	2404	PROBE DEPTH (M):	005649
RECORD EDIT DATE:	29-AUG-83	KERR'S BIN NUMBER:	000078
SSP CALCULATION METHOD:	WILSON	MERGE/EXTENSION METHOD:	01
EXTENSION STATION 1 ID:	C00013	TOTAL TEMP/SAL PTS:	000662
EXTENSION STATION 2 ID:		TOTAL SOUND SPEED PTS:	000663
MINIMUM TEMPERATURE:	1.2029	MAXIMUM TEMPERATURE:	24.9882
MINIMUM SALINITY:	34.2524	MAXIMUM SALINITY:	35.6944
MINIMUM SOUND SPEED:	1479.450	MAXIMUM SOUND SPEED:	1558.600
TRANSECT INFORMATION:			
TRANS3	- 10 LEG6	- 13 TR3	- 9 TR4
	- 0	- 0	- 0
			- 1
			- 0

To Edit Enter: PROFILE (KEYPAD1), AUXILIARY (KEYPAD2), DATA (KEYPAD3) or RETURN

Figure 9. Auxiliary header data screen.

***** PROFILE DATA *****

ENTER DEPTH VALUE TO DISPLAY: 100.000

NUMBER	DEPTH	TEMPERATURE	SALINITY	SOUND SPEED
96.	99.586	16.0449	35.5766	1512.987
97.	109.531	15.8588	35.5615	1512.559
98.	119.476	15.5907	35.5405	1511.866
99.	129.420	15.4743	35.5284	1511.652
100.	139.363	15.2901	35.5038	1511.208
101.	149.305	15.0514	35.4839	1510.595
102.	159.247	14.8891	35.4682	1510.226
103.	169.188	14.6602	35.4376	1509.622
104.	179.128	14.5428	35.4293	1509.399
105.	189.068	14.3969	35.4098	1509.069
106.	199.007	14.3524	35.4197	1509.101
107.	208.945	14.3369	35.4339	1509.232
108.	218.883	14.2718	35.4317	1509.182

To Edit Enter: PROFILE (KEYPAD1), AUXILIARY (KEYPAD2), DATA (KEYPAD3), OR RETURN

Figure 10. Profile data screen.

***** EDITING OPTIONS *****

1. Write profile data
2. Edit new profile
3. Continue with editing
4. Exit editing

***** ENTER OPTION: 4**

Figure 11. Editing options menu.

Naval Ocean Research and Development Activity
 ----- (NORDAPS) -----
 (((TYPES OF DISPLAY PLOTS)))

- (((MENU)))
1. Temperature VS Depth
 2. Salinity VS Depth
 3. Sound Speed VS Depth
 4. Temperature VS Salinity
 5. Sigma-T VS Depth
- *** Select option number →

If you enter an incorrect option number, the menu is redisplayed, an error message is written, and you are then prompted to enter the correct option.

*** ERROR: Option * is incorrect.

For the individual profile plot, you can use default values or define your own parameters for the plot axes. The default values consist of the minimum and maximum values of the data being plotted.

Calculate sound speed from the depth, temperature, and salinity data by using either the default method of Wilson (1960) or a method that you define.

Calculate sigma-t from the equation of the state of sea water.

4.2.6.4.1 Temperature versus depth. Option 1 of the Types of Plots Menu plots an X-Y plot of temperature versus depth for a single station. You have the choice of using the program defined defaults or of defining your own parameters. The program defaults use the temperature minimum, temperature maximum, depth minimum, and depth maximum values of the profile for the limits of the X-Y axes.

If you want to define your own defaults, reply YES to the following message:

*** Enter YES if want to change default parameters:

Then you have the option to redefine the following parameters:

- *** Enter the temperature axis minimum (min):
- *** Enter the temperature axis maximum (max):
- *** Enter the depth axis minimum (min):
- *** Enter the depth axis maximum (max):

If you are satisfied with the default values (in the parentheses), press the return key and the default values will be accepted. Otherwise, enter your own values.

The plot is then created as in Figure 12. If your terminal does not have graphics capabilities, you will be returned to the previous menu. If you are running NORDAPS on a graphics terminal, the plot is displayed and you have the following choices:

*** ENTER OPTION (H,R,W,E):

where

H creates a hardcopy of the plot. A hardcopy plot file is created for the plotter device specified in the defaults. If the plotter default is NONE, no hardcopy is created. The plotter default may be changed by Option 8, Alter NORDAPS Operational Defaults, in the NORDAPS Main Menu.

R regenerates the current plot. You are asked if you want to change the default values. If so, you can change the default parameters of the plot. The new plot is then created and displayed.

W is windows in a certain area of the plot. You can use this option only if your terminal accepts hardware characters. You are prompted to position the cross-hairs twice to form a window around a certain area. The area is then plotted and displayed.

E exits from the current plotting routines.

4.2.6.4.1.2 Salinity versus depth. Option 2 of the Types of Plots Menu plots salinity versus depth. You can use default parameters of the minimum salinity value, maximum salinity value, minimum depth value, and maximum depth value from the profile or you can define your own limits for the X-Y axes.

If you want to define your own defaults, reply YES to the following prompt:

*** Enter YES if want to change default parameters:

Then you have the option to redefine the following parameters:

*** Enter the salinity axis minimum (min):

*** Enter the salinity axis maximum (max):

*** Enter the depth axis minimum (min):

*** Enter the depth axis maximum (max):

If you are satisfied with the default values (in the parentheses), press the return key and the default values will be accepted. Otherwise, define your own axes limits.

The curve is plotted and if the terminal device has graphic capabilities, you can create a hardware copy of the plot, regenerate the plot, window in a certain area of the plot if the terminal accepts hardware characters, or exit from the plot. This is explained in section 4.2.6.4.1.1, Temperature versus depth. After exiting from the plot, you will be returned to the previous menu. Figure 13 is an example of a salinity versus depth plot.

4.2.6.4.1.3 Sound speed versus depth. Option 3 of the Types of Display Plots Menu plots sound speed versus depth. By default, sound speed is calculated using Wilson's

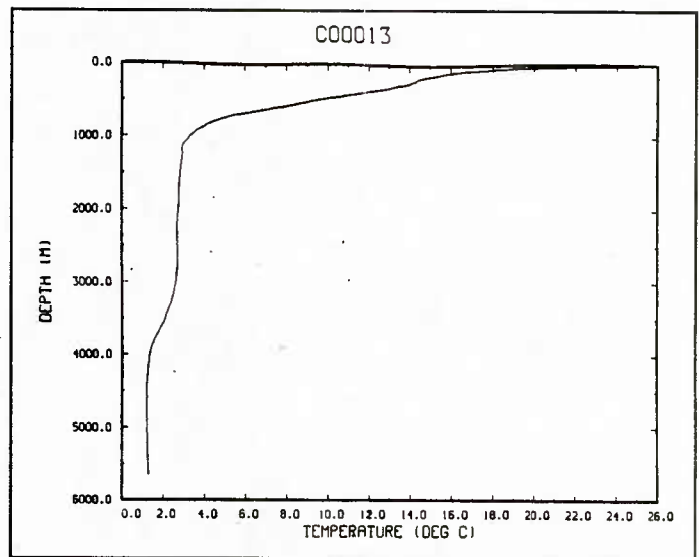


Figure 12. Temperature versus depth plot for one profile.

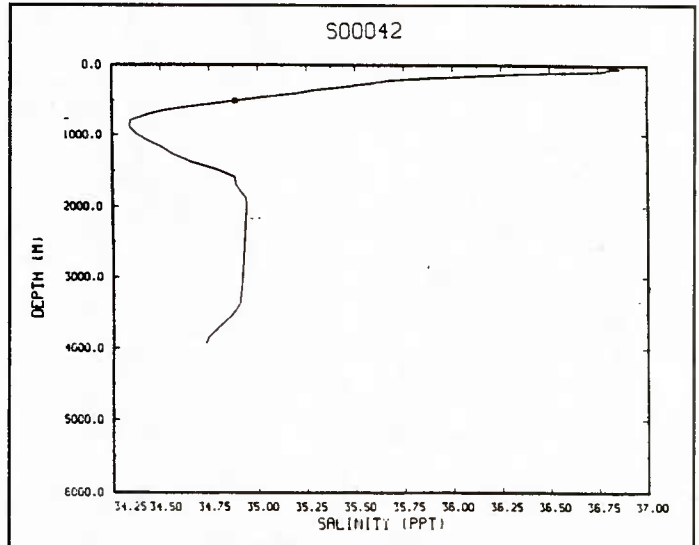


Figure 13. Salinity versus depth plot for one profile.

method. You can optionally specify the method to be that of Mackenzie (1981) or Leroy (1968). You can use default parameters of the minimum sound speed value, maximum sound speed value, minimum depth value, and maximum depth value from the profile or you can define your own limits for the X-Y axes.

If you want to define your own defaults, reply YES to the following prompt:

*** Enter YES if want to change default parameters:

You are then prompted to enter the type of method you want to use to calculate the sound speed profile.

*** Methods to Calculate Sound Speed Profile

- (1) Wilson's Method
- (2) Mackenzie's Method
- (3) Leroy's Method

*** Enter number of method:

Next, you have option to redefine the following parameters:

- *** Enter the sound speed axis minimum (min):
- *** Enter the sound speed axis maximum (max):
- *** Enter the depth axis minimum (min):
- *** Enter the depth axis maximum (max):

If you are satisfied with the default values (in the parentheses), press the return key and the default values will be accepted.

If the sound speed profile being processed is unextended, you are made aware of this by the following message:

*** MESSAGE: Plotting is continued on an unextended sound speed profile.

The plot is created (Fig. 14), and if the terminal device has graphic capabilities, you can create a hardware copy of the plot, redo the plot, window in a certain area of the plot if the terminal accepts hardware characters, or exit from the plot as seen in section 4.2.6.4.1.1, Temperature versus depth. After exiting from the plot, you will be returned to the previous menu.

4.2.6.4.1.4 Temperature versus salinity. Option 4 of the Types of Plots Menu plots temperature versus salinity. You can use default parameters of the minimum salinity value, maximum salinity value, minimum temperature value, and maximum temperature value from the profile, or you can define your own limits for the X-Y axes.

If you want to define your own plot defaults, reply YES to the following:

*** Enter YES if want to change default parameters:

Then you have the option to redefine the following parameters:

- *** Enter the temperature axis minimum (min):
- *** Enter the temperature axis maximum (max):
- *** Enter the salinity axis minimum (min):
- *** Enter the salinity axis maximum (max):

If you are satisfied with the default values (in the parentheses), press the return key and the default values will be accepted.

The plot is created, and if the terminal device has graphics capabilities, you can create a hardware copy of the plot, redo the plot, window in a certain area of the plot if the terminal accepts hardware characters, or exit from the plot as seen in section 4.2.6.4.1.1, Temperature versus depth. After exiting from the plot, you are returned to the previous menu. Figure 15 is an example of a sound speed versus depth plot.

4.2.6.4.1.5 Sigma-t versus depth. Option 5 of the Types of Plots Menu plots sigma-t versus depth. You can use default parameters of the minimum sigma-t value, maximum sigma-t value, minimum depth value, and maximum depth value from the profile, or you can define your own limits for the X-Y axes.

If you want to define your own defaults, reply YES to the following prompt:

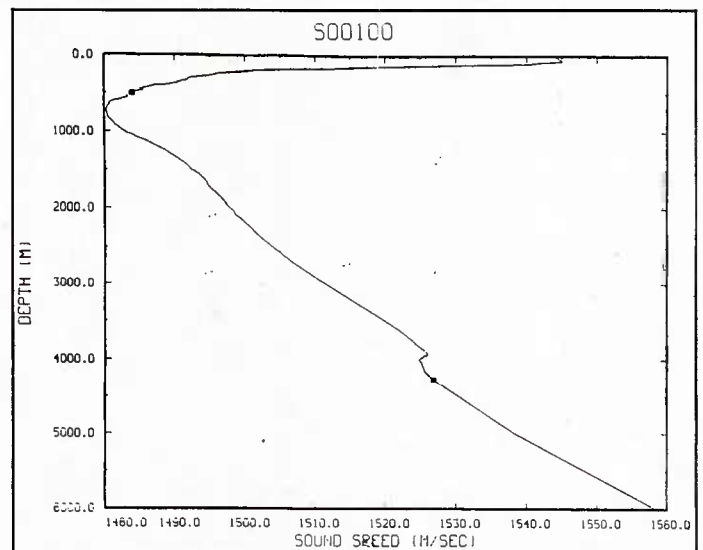


Figure 14. Sound speed versus depth plot for one profile.

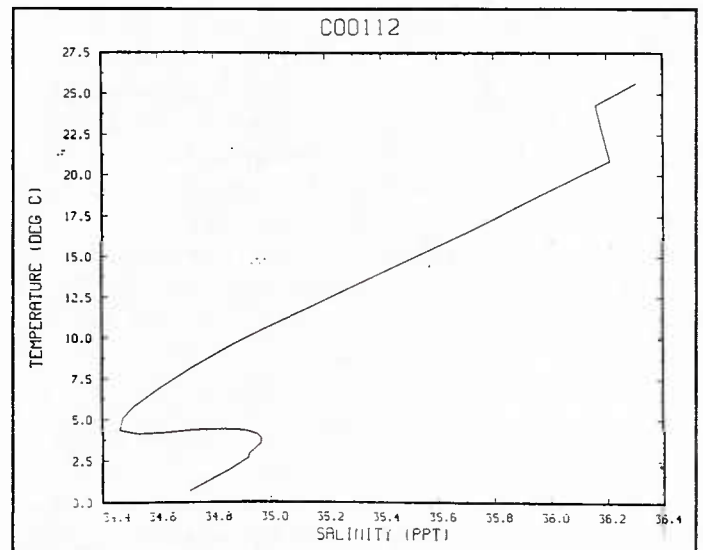


Figure 15. Salinity versus temperature plot for one profile.

*** Enter YES if want to change default parameters:

Then you have the option to redefine the following parameters:

- *** Enter the sigma-t axis minimum (min):
- *** Enter the sigma-t axis maximum (max):
- *** Enter the depth axis minimum (min):
- *** Enter the depth axis maximum (max):

If you are satisfied with the default values (in the parentheses), press the return key and the default values will be accepted.

The plot is created as in Figure 16 and if the terminal device has graphic capabilities, you can create a hardware copy of the plot, redo the plot, window in a certain area of the plot if the terminal accepts hardware characters, or exit from the plot as seen section 4.2.6.4.1.1, Temperature versus depth. After exiting from the plot, you will be returned to the previous menu.

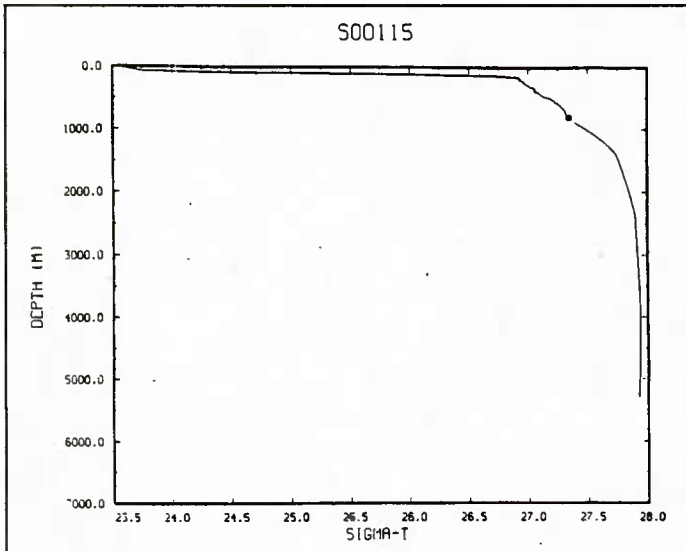


Figure 16. Sigma-t versus depth plot for one profile.

4.2.6.4.2 Plot offset profiles. Option 2 of the Profile Displays Menu allows you to plot several offset curves. You can plot from 1 to 25 curves. The profiles are plotted from left to right in the order of the station identifier entries. The data may be plotted as temperature versus depth, salinity versus depth, sound speed versus depth, temperature versus salinity, or sigma-t versus depth.

Input consists of 1-25 station identifiers codes. Enter the stations to be plotted as defined in section 4.1, Dialogue Standards, and then specify the type of data you want to display.

*** RESPONSE REQUIRED: Enter Retrieval Specifications::

Indicates which plots to offset by responding to the following menu:

```

Naval Ocean Research and Development Activity
----- (NORDAPS) -----
((( TYPES OF OFFSET LOTS )))

```

(((MENU)))

1. Temperature VS Depth
2. Salinity VS Depth
3. Sound Speed VS Depth
4. Temperature VS Salinity
5. Sigma-T VS Depth

*** Select option number →

If you enter an incorrect option number, the menu is reprinted, an error message is written,

*** ERROR: Option * is incorrect.

and you are then prompted to enter a correct reply.

You can use default values or define your own parameters for the plot axes. The default values are the minimum and maximum values of the profile data and the offset values for the data.

You can calculate sound speed from the depth, temperature, and salinity data by using the default method of Wilson (1960) or by an optional method, which you define.

You can calculate sigma-t by using the equation of the state of seawater.

4.2.6.4.2.1 Temperature versus depth. The offset temperature versus depth plot draws 1-25 offset temperature profiles. See section 4.2.6.4.1.1 for information concerning temperature versus depth plots. You can also specify the x/y offset values for the temperature and depth axes. If you want to define the offset values, respond to the next prompt:

*** Enter the offset value for the temperature profile (2.00):

*** Enter the offset value for the depth profile (100.00):

Otherwise, use the default values of 2.00°C for the temperature offset and 100.00 m for the depth offset. Figure 17 illustrates a temperature versus depth offset plot.

4.2.6.4.2.2 Salinity versus depth. The offset plot of salinity versus depth draws from 1 to 25 offset salinity profiles. See section 4.2.6.4.1.2 for information concerning salinity versus depth plots. You can also specify the x/y offset values for the salinity and depth axes. If you want to define the offset values, respond to the the next prompt:

*** Enter the offset value for the salinity profile (1.00):

*** Enter the offset value for the depth profile (50):

Otherwise, use the default values of 1.00 ppt for the salinity offset and 50.00 m for the depth offset.

4.2.6.4.2.3 Sound speed versus depth. The sound speed versus depth offset plot draws from 1 to 25 offset sound speed profiles. See section 4.2.6.4.1.3 for information concerning sound speed versus depth plots. In addition to this section, you can also specify the x/y offset values for the sound speed and depth axes. If you want to define the offset values, respond to the next prompt:

*** Enter the offset value for the sound speed profile (5.00):

*** Enter the offset value for the depth profile (100.00):

Otherwise, use the default values of 5.00 m/sec for the sound speed offset and 100.00 m for the depth offset.

4.2.6.4.2.4 Temperature versus salinity. The offset plot of temperature versus salinity draws from 1 to 25 t-s curves. See section 4.2.6.4.1.4 for information concerning temperature versus salinity plots. You can also specify the x/y offset values for the temperature and salinity axes. If you want to define the offset values, respond to the next prompt:

*** Enter the offset value for the temperature profile (2.00):

*** Enter the offset value for the salinity profile (1):

Otherwise, use the default values of 2.00°C for the temperature offset and 1.00 ppt for the salinity offset.

4.2.6.4.2.5 Sigma-t versus depth. Sigma-t versus depth offset plot draws from 1 to 25 sigma-t profiles. See section 4.2.6.4.1.5 for information concerning sigma-t versus

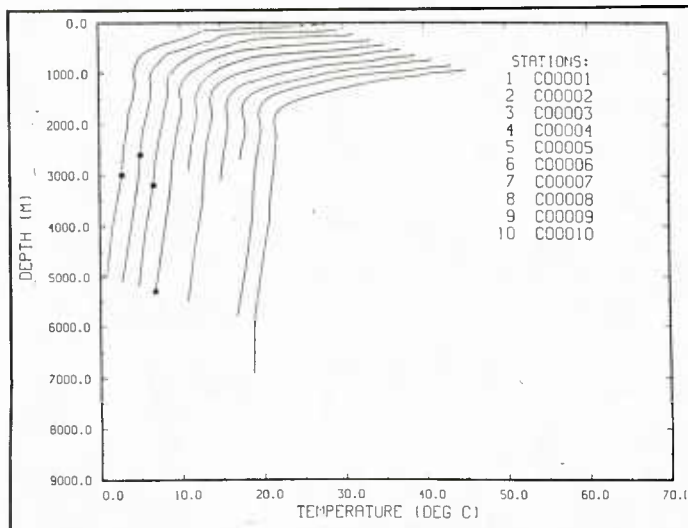


Figure 17. Temperature versus depth offset plot.

depth plots. You can also specify the x/y offset values for the sigma-t and depth axes. If you want to define the offset values, respond to the next prompt:

*** Enter the offset value for the sigma-t profile (5.00):

*** Enter the offset value for the depth profile (50.00):

Otherwise, use the default values of 5.00 for the sigma-t offset and 50.00 m for the depth offset.

4.2.6.4.3 Plot overplotted profiles. Option 3 of the Profile Displays Menu allows you to overplot profiles on the same axes. You can overplot from 1 to 25 curves. The following data may be plotted as temperature versus depth, salinity versus depth, sound speed versus depth, temperature versus salinity, and sigma-t versus depth.

Input consists of 1-25 station identifier codes. Enter the stations to be plotted as defined in section 4.1, Dialogue standards, and then specify the type of data you want to display.

*** RESPONSE REQUIRED: Enter Retrieval Specifications::

You can overplot one of these plots by responding to the following menu:

Naval Ocean Research and Development Activity
 ----- (NORDAPS) -----
 (((TYPES OF OVERPLOT PLOTS)))

(((MENU)))

1. Temperature VS Depth
2. Salinity VS Depth
3. Sound Speed VS Depth
4. Temperature VS Salinity
5. Sigma-T VS Depth

*** Select option number →

If you enter an incorrect option, the menu is redisplayed, an error message,

*** ERROR: Option * is incorrect.

is written, and you are prompted for a correct reply.

Use default values or define your own parameters for the plot axes. The default values consist of the overall minimum and maximum values of the profile data.

Calculate sound speed from the depth, temperature, and salinity data by using either Wilson's default method or by a method you define.

Calculate sigma-t by using the equation of the state of seawater.

4.2.6.4.3.1 Temperature versus depth. The overplot of temperature versus depth plots from 1 to 25 temperature profiles on the same axes. Section 4.2.6.4.1.1 describes how each curve is plotted; Figure 18 is an example.

4.2.6.4.3.2 Salinity versus depth. The overplot of salinity versus depth plots from 1 to 25 salinity profiles on the same axes. See section 4.2.6.4.1.2 for information on how each curve is plotted.

4.2.6.4.3.3 Sound speed versus depth. The overplot of sound speed versus depth plots from 1 to 25 sound speed profiles on the same axes. Section 4.2.6.4.1.3 describes how each curve is plotted.

4.2.6.4.3.4 Temperature versus salinity. The overplot of temperature versus salinity plots from 1 to 25 t-s curves on the same axes. Section 4.2.6.4.1.4 describes how each curve is plotted.

4.2.6.4.3.5 Sigma-t versus depth. The overplot of sigma-t versus depth plots from 1 to 25 sigma-t profiles on the same axes. Section 4.2.6.4.1.5 describes how each curve is plotted.

4.2.6.4.4 Plot a t-s scatter plot. Option 4 of the Profile Displays Menu allows you to scatter plot temperature versus salinity. For the plotting, enter the station identifiers (see section 4.1) and a depth. Temperature and salinity at the depth specified will be determined through linear interpolation. If you attempt to extrapolate data to depths

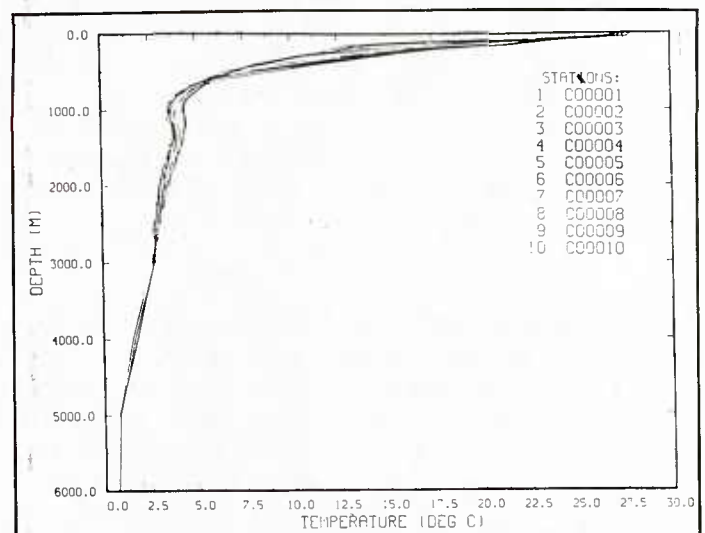


Figure 18. Temperature versus depth overplot.

deeper than those recorded in the data files, an error condition will result. You must enter more than one station identifier to produce a scatter plot.

*** RESPONSE REQUIRED: Enter Retrieval Specifications::

Next, you must enter the depth in meters for the t-s scatter plot as follows:

*** Enter the depth value (m):

If the depth entered exceeds the maximum profile depth for any station, you will receive the following error message:

*** ERROR: The depth value of 2000. is not included in the profile C00001.

You are then again prompted to define a new depth. Alternatively you can press the return key and be returned to the previous menu. From this location you can redefine the stations to be included in the plot and can omit the error producing the shallow station.

If you enter a nonnumeric response, the message

*** ERROR: Answer ** is incorrect!

is displayed, and you are again prompted for a new depth.

You can use default values or define your own parameters for the plot axes. You can also define whether you want to use station identifier codes or blocks for the points on the scatter plot. If you want to change the default value, reply YES to the next prompt:

*** Enter YES if want to change default parameters:

If you enter YES, then respond to the following:

*** Enter YES if you wish to use station id numbers for the scatter plot:

*** Enter the salinity axis minimum (min):

*** Enter the salinity axis maximum (max):

*** Enter the temperature axis minimum (min):

*** Enter the temperature axis maximum (max):

If you entered YES for the first response, the scatter plot uses station identifier numbers for the points. Otherwise, blocks are used for the scatter points. If you are satisfied with the default values (values in parentheses), press the return key and the default values will be accepted.

The t-s scatter plot is then created and displayed (see Fig. 19). If your terminal has graphic capabilities, you can create a hardcopy of the plot, redo the plot, window in a certain area of the plot, or exit from the plot. See section 4.2.6.4.1.1 for explanations.

4.2.6.5 Plot profile contours. Option 5 of the Display .. Edit Menu does contour plotting for horizontal slices, isovalue depths, or vertical slices of the stored data fields. In addition, acoustic variables such as layer depth and depth of the deep sound channel axis may be contoured. The National Center for Atmospheric Research (NCAR) graphics package (McArthur and Henderson, 1983) was used as the source of all contouring routines.

Enter one of the following options to initiate contouring.

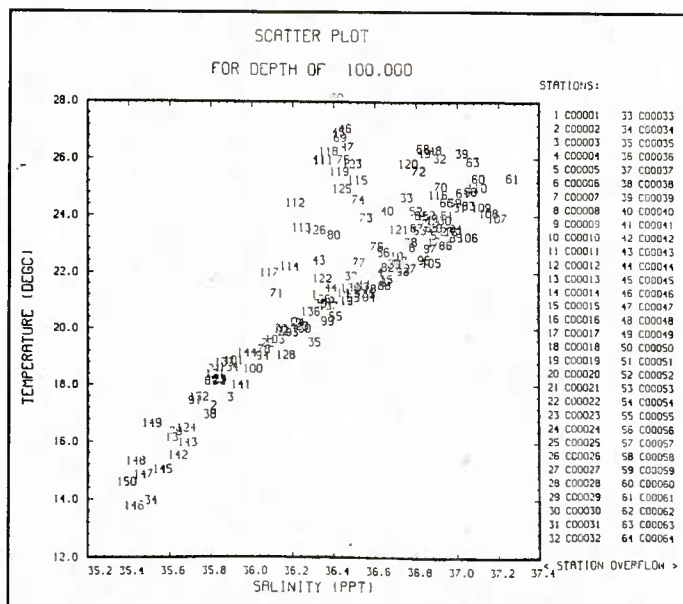


Figure 19. Temperature-salinity scatter plot.

Naval Ocean Research and Development Activity

----- (NORDAPS) -----

(((CONTOUR PLOTTING)))

(((MENU)))

1. Horizontal Slice Contouring.
2. Acoustic Variable Contouring.
3. Iso-value Depth Contouring.
4. Vertical Slice Contouring.

*** Select option number →

If you enter a wrong option, the menu is redisplayed with the error message,

*** ERROR: Option * is incorrect!

You are then asked if the contour data file has been created by a previous extraction or by a previous contouring.

*** Enter YES if the contouring data file has been created:

If you answer YES but no data file is found, the error message appears and you will be returned to the Contour Plotting Menu.

*** ERROR: EXTAB.REP Data File Cannot Be Opened!

If you enter NO or press the return key, the control is transferred to the respective option of the Contour Plotting Menu. The contour plot file is then created for plotting.

A contour plot cannot be created unless the contour data file, EXTAB.REP exists. If a prior extraction of acoustic parameters was made, then you can select to contour any of the variables to the right of the (/) in the menu below. If you made a prior extraction of oceanographic variables, then select those variables on the left of the (/) for contouring. Make your selection from the following variable list:

*** CONTOUR PARAMETERS ***

- 1 = Temperature/Deep SND CHN Axis Depth
- 2 = Salinity/Sound Speed Min
- 3 = Sigma-T/Layer Depth
- 4 = Sound Speed/SND Speed at Layer
- 5 = Default/Critical Depth

*** Enter number of option:

*** Enter YES if you wish to display input data on a separate plot:

*** Enter YES if you wish to change the p.der. number of points:

*** Enter YES if you wish to change grid density:

If you want to change the number of partial derivatives used in constructing the contours, enter the number of partial derivative (p.d.) points. The default is 4.

*** Enter the number of p.d. points that is greater than 2 (default is 4):

If you want to change the grid density (or contour tension), enter the new density factor. The default is 40.

*** Enter the density factor, a number between 1 and 200 (default is 40):

The contour plot file is created using the NCAR plotting package, and the file IOP020.DAT can now be plotted.

4.2.6.5.1 Horizontal slice contouring. Option 1 of the Contour Plotting Menu creates a horizontal slice contour data plot file. In the horizontal slice contouring, you can choose from three sets of data.

*** HORIZONTAL SLICE CONTOURING ***

Variables: temperature,salinity,sound speed,sigma-t

- 1. Use Raw and Processed CTD Data.
- 2. Use Raw CTD Data Only.

Variable: temperature

- 3. Use Raw CTD/XBT Data.

*** Enter number of option:

For all the horizontal slice contouring options, define the following parameters:

- *** Enter the Exercise Name for which statistics are to be calculated:
- *** Enter the Northwest Corner Latitude of the desired area:
- *** Enter the Northwest Corner Longitude of the desired area:
- *** Enter the Southeast Corner Latitude of the desired area:
- *** Enter the Southeast Corner Longitude of the desired area:
- *** Enter Beginning Date for Extraction (YYMMDD):
- *** Enter Ending Date for Extraction (YYMMDD):
- *** Enter depth for which data is to be extracted:

The contouring data file, EXTAB.DAT, is created in your current directory, and the contour plotting is initiated (as seen in the previous section). Figure 20 shows a horizontal slice contour plot.

4.2.6.5.2 Acoustic variable contouring. Option 2 of the Contour Plotting Menu creates an acoustic variable contour data file. The following message is displayed:

*** ACOUSTIC VARIABLE CONTOURING ***

Variables: deep sound channel axis depth and speed, layer depth and speed, critical depth.

NOTE: Use processed CTD Data Only.

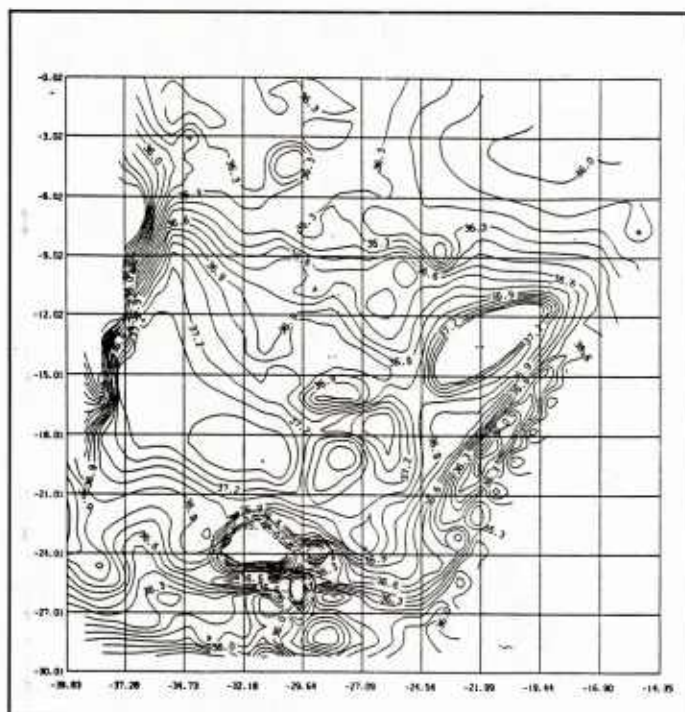


Figure 20. Horizontal slice contour with raw CTD data.

Define the following parameters for the contouring:

- *** Enter the Exercise Name for which statistics are to be calculated:
- *** Enter the Northwest Corner Latitude of the desired area:
- *** Enter the Northwest Corner Longitude of the desired area:
- *** Enter the Southeast Corner Latitude of the desired area:
- *** Enter the Southeast Corner Longitude of the desired area:
- *** Enter Beginning Date for Extraction (YYMMDD):
- *** Enter Ending Date for Extraction (YYMMDD):
- *** Enter depth for which data is to be extracted:

The contour data file, EXTAB.REP, is created in your current directory, and the plot file is produced as described in the previous section. Figure 21 shows an acoustic variable contour plot.

4.2.6.5.3 Isovalue depth contouring. Option 3 of the Contour Plotting Menu creates an isovalue depth contour data file. You will see the following message when entering option 3.

*** ISO-VALUE DEPTH CONTOURING ***

Variables: isotherm depth, isohaline depth, isotach depth, isopycnal depth.

NOTE: Use processed CTD Data Only.

Define the following parameters for the contouring:

- *** Enter the Exercise Name for which statistics are to be calculated:
- *** Enter the Northwest Corner Latitude of the desired area:
- *** Enter the Northwest Corner Longitude of the desired area:
- *** Enter the Southeast Corner Latitude of the desired area:
- *** Enter the Southeast Corner Longitude of the desired area:
- *** Enter Beginning Date for Extraction (YYMMDD):
- *** Enter Ending Date for Extraction (YYMMDD):
- *** Enter depth for which data is to be extracted:

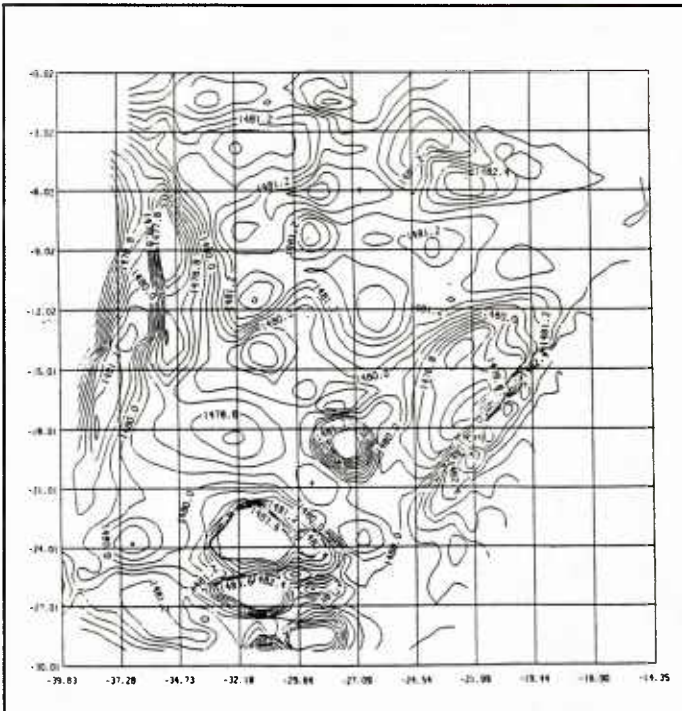


Figure 21. Acoustic variable contour with CTD data.

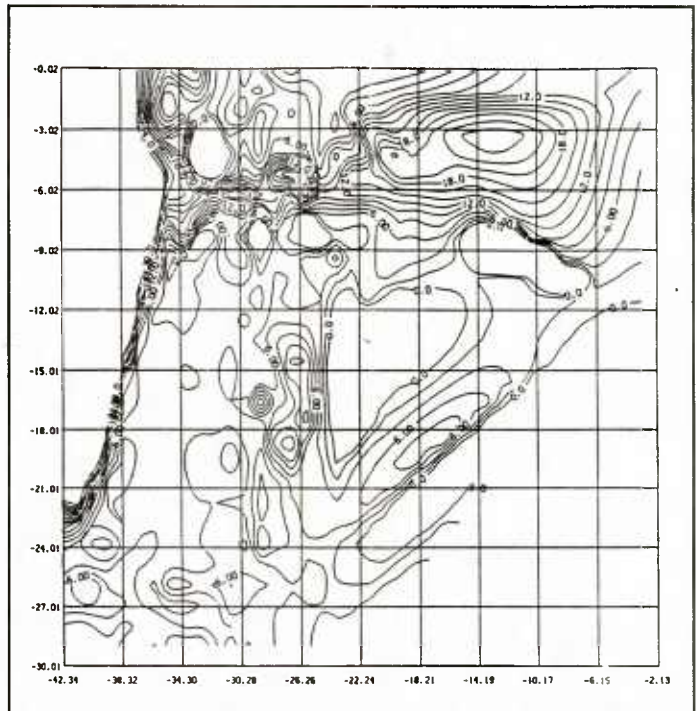


Figure 22. Isovalue depth contour with processed CTD data.

Indicate if you want to include extension data in the extraction.

*** Enter YES if you wish to include extension data:

Also indicate which extraction depths to use, the depth for which data is extracted, and the minimum depth accepted.

*** EXTRACTION DEPTHS ***

1 = Isotherm depth

2 = Isohaline depth

3 = Sigma-t depth

4 = Isospeed depth

*** Enter number of option:

*** Enter the depth for which data is to be extracted:

*** Enter the minimum depth to accepted:

The contour data file, EXTAB.REP, is created in your current directory, and the contouring routine is initiated as described in the previous section. Figure 22 shows an isovalue depth contour plot.

4.2.6.5.4 Vertical slice contouring. Option 4 of the Contour Plotting Menu produces a vertical slice contour data file. You will see the following message:

*** VERTICAL SLICE CONTOURING ***

Variables: temperature, salinity, sigma-t, sound speed

NOTE: Uses Processed CTD Data.

You must define the following parameters to execute the extraction of data for the contour plotting.

*** Enter the First Exercise Station Number Along the CTD Track:

*** Enter the Last Exercise Station Number Along the CTD Track:

*** Enter the Beginning Year-Month of Acceptable Data (YYMMDD):

*** Enter the Ending Year-Month of Acceptable Data (YYMMDD):

*** Enter the distance (nautical miles) that other stations will be accepted away from the great circle path between the two previous stations:

The data files, ONTRACK.REP, ONTRACK.DAT, and ONTRACKST.DAT are created in your current directory. ONTRACK.REP is used for the contour plotting. The others are data files that can be used as input to other models. Figure 23 is an example of a vertical slice contour. The contour plotting is done the same way as the previous sections.

4.2.6.5.5 Plot ontrack profiles. Option 6 of the Display .. Edit Menu plots profiles extracted along great circle paths. The plot file, ONTRACK.DAT (option 1) or ONTRACK1.DAT (option 2), must exist for plotting to be done. If the appropriate file does not exist, then you must enter the Profile Search and Extraction Menu, option 1, Extract Sound Speed Profile Along GCP, before an ontrack profile can be plotted. To initiate ontrack plotting, first enter the type of plot file to open.

*** Type Of Ontrack Data File to Open ***

(1) Use the CTD Ontrack Data File

(2) Use the CTD & XBT Ontrack Data File

*** Enter number of option:

If you cannot open the file, the following error message appears and you are returned to the previous menu.

*** ERROR: ONTRACK.DAT Cannot be found. Need to create file under the Profile Search & Extraction Menu.

Once the plot file is opened, you have the option to plot several different parameters.

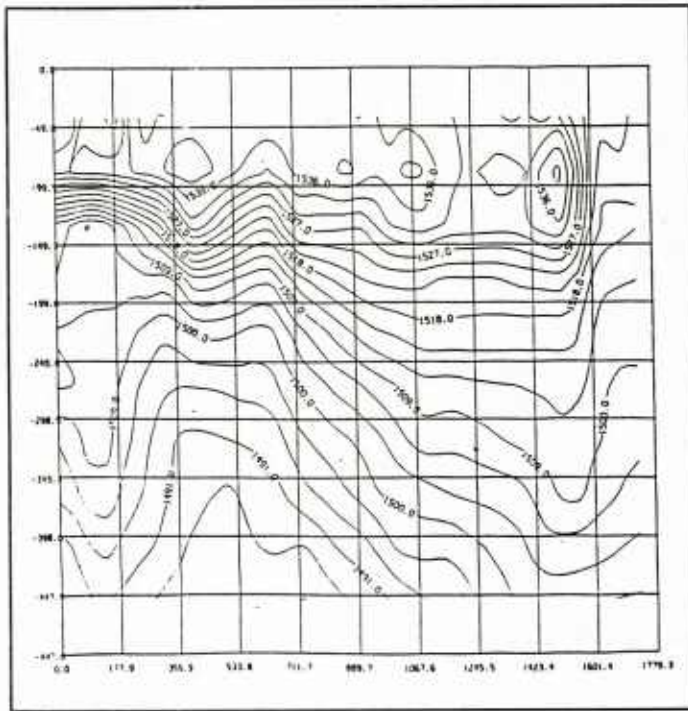


Figure 23. Vertical slice contour with processed CTD data.

*** Type of Ontrack Plots ***

- (1) Sound Speed and Range Versus Depth Plot
- (2) Salinity and Range Versus Depth Plot
- (3) Temperature and Range Versus Depth Plot

*** Enter number of option:

After the plot is completed, you can create a hardcopy of the plot and/or do another plot by replying answering YES to the next prompt.

*** Enter YES if you wish to create a hardcopy of the plot:

*** Enter YES if you wish to do another plot:

Figures 24-26 are examples of the different ontrack plots.

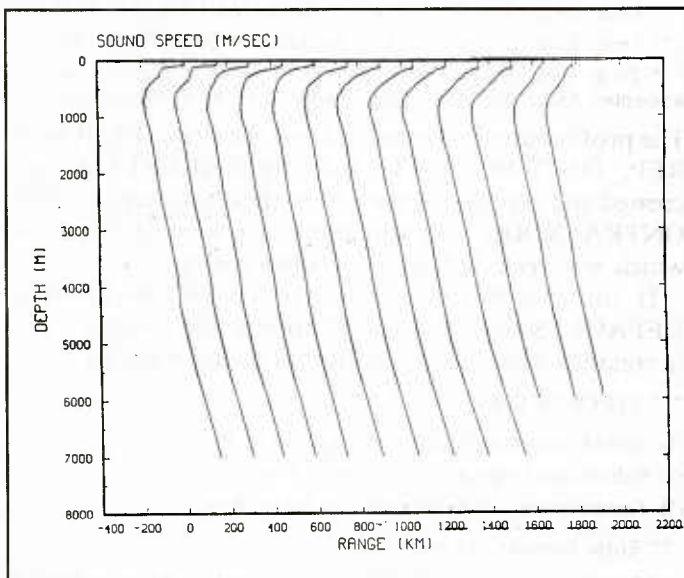


Figure 24. Sound speed and range versus depth ontrack plot.

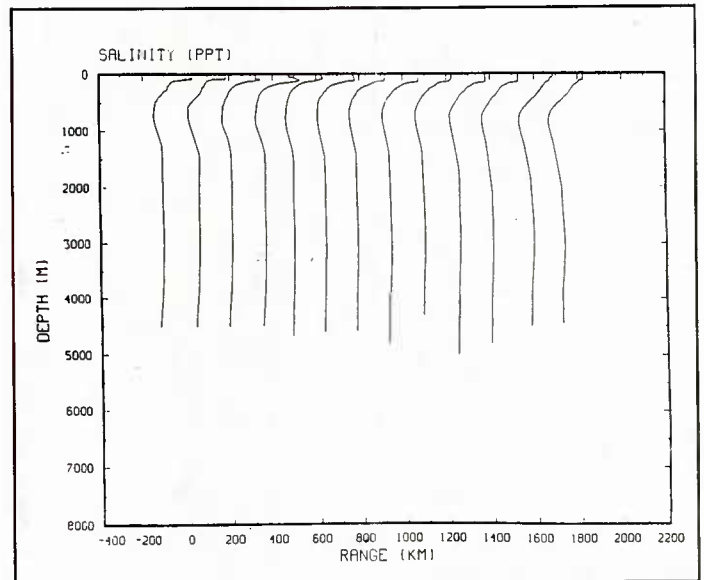


Figure 25. Salinity and range versus depth ontrack plot.

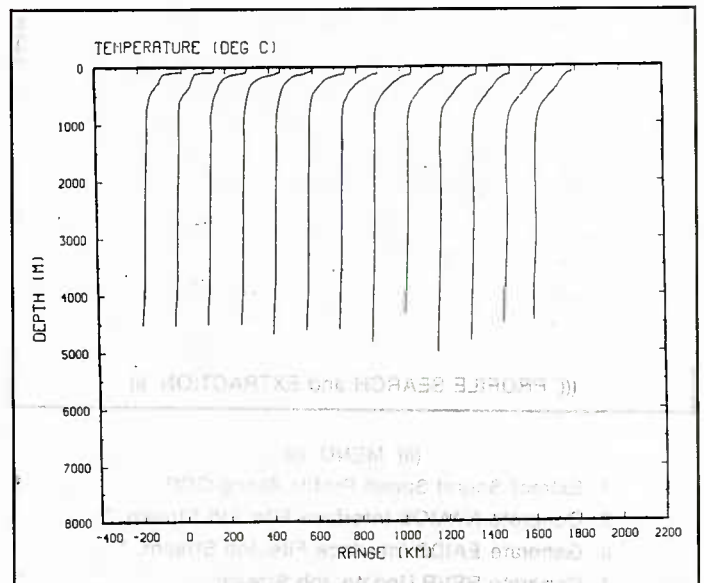


Figure 26. Temperature and range versus depth ontrack plot.

4.2.6.6 Plot station and transect locations. Option 7 of the Display .. Edit Menu plots CTD and/or SXBT station locations by longitude and latitude and/or time interval. You specify the station type to plot, the longitudes and latitudes defining the plot area and, optionally, a time interval. A plot is created by using these parameters. The following interaction occurs:

*** DATA TYPES WHICH CAN BE PLOTTED ***

- (1) CTD Data Type
- (2) SXBT Data Type
- (3) CTD & SXBT Data Type

*** Enter number of option:

Define the longitude and latitude of the northwest and southeast corners of the plot.

- *** Enter the longitude of N.W. corner of plot:
- *** Enter the latitude of N.W. corner of plot:
- *** Enter the longitude of S.E. corner of plot:
- *** Enter the latitude of S.E. corner of plot:

If you want to plot by a range of dates, reply YES to the following:

- *** Enter YES if you wish to plot data within certain dates:
- *** Enter beginning date (YYMMDD):
- *** Enter ending date (YYMMDD):

A plot is created. Figure 27 is an example of a station and transect locations plot.

If you define plotting parameters that define no valid data, an error occurs.

*** ERROR: No data read from file!

You can create another station location plot by replying YES to the following:

- *** Enter YES if you wish to do another plot:

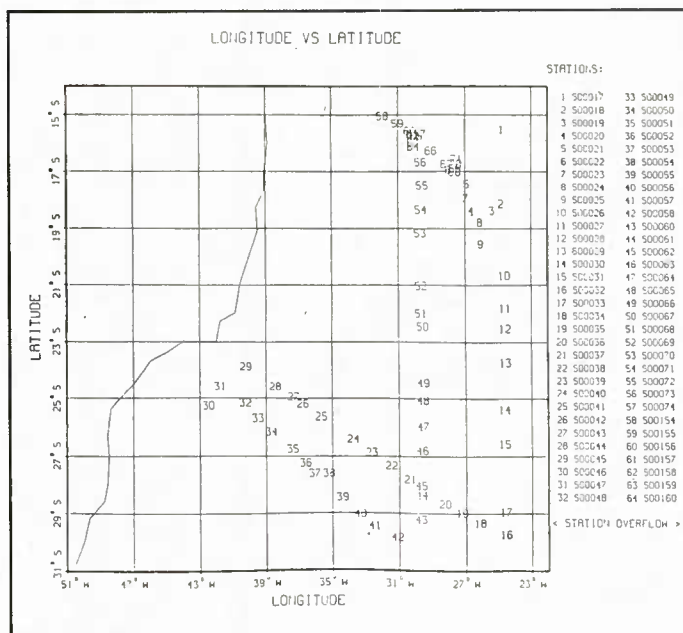


Figure 27. Station and transect locations plot

4.2.7 Search and extraction of exercise data

Option 7 of the NORDAPS' Main Menu searches and extracts profile exercise data. You can extract selected profiles from the data base, generate NAMOS or EAIDS interface file job streams, generate RSVP or AUTO OCEAN update job stream, or update the INGRES exercise data base. You can select which function you want to execute by responding to the following menu:

```

Naval Ocean Research and Development Activity
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((( PROFILE SEARCH and EXTRACTION )))
  
```

(((MENU)))

1. Extract Sound Speed Profile Along GCP.
2. Generate NAMOS Interface File Job Stream. *
3. Generate EAIDS Interface File Job Stream. *
4. Generate RSVP Update Job Stream.
5. Generate AUTO OCEAN Update Job Stream. *
6. Update INGRES Exercise Data Base. *

*** Select option number →

If you enter an incorrect option, the menu is redisplayed, an error message,

*** ERROR: Option * is incorrect.

is written, and you are prompted for a correct reply.

4.2.7.1 Extract sound speed profiles along great circle path.

Option 1 of the Profile Search and Extraction Menu extracts selected sound speed profiles from the data base along the great circle path. In addition to sound speed, both the temperature and salinity are extracted for use in plotting temperature and salinity profiles along the great circle path. The extraction process uses spherical geometry to test, select, and move profiles to locations along the great circle path connecting any two stations.

To execute the process, enter what type of data you want to extract, either CTD data or CTD and XBT data.

*** EXTRACTION METHODS ***

- (1) Extract Sound Speed Profile Using CTD data.
- (2) Extract Sound Speed Profile Using CTD and XBT data.

*** Enter number of option:

To execute the process, enter the first and the last station along the track, the data range, and the acceptable distance from the great circle path as follows:

*** Enter the First Exercise Station Number Along the CTD (XBT) Track:

*** Enter the Last Exercise Station Number Along the CTD (XBT) Track:

*** Enter Beginning Year-Month of Acceptable Data (YYMMDD):

*** Enter Ending Year-Month of Acceptable Data (YYMMDD):

*** Enter Distance (nautical miles) that other Stations will be Accepted Away from the GCP between the Two Previous Stations:

The profiles are then extracted and the files, ONTRACK.REP, ONTRACK.DAT, and ONTRACKST.DAT are created and contain the data from these extracted profiles. ONTRACK.REP lists which profiles were accepted and which were rejected, and for what reason.

If you specified in the NORDAPS OPERATIONAL DEFAULTS that you wanted to plot the results, a plot is created. You can create the following types of plot:

*** TYPES OF ONTRACK PLOT ***

- (1) Sound Speed and Range Versus Depth Plot
- (2) Salinity and Range Versus Depth Plot
- (3) Temperature and Range Versus Depth Plot

*** Enter number of option:

If you are using a graphics terminal, a plot is created and the option of creating a hardcopy of the plot is given. Otherwise, a hardcopy is automatically created.

*** Enter YES if you wish to create a hardcopy of the plot:

Another plot can be created by replying YES to the following:

*** Enter YES if you wish to do another plot:

If so, you are returned to the Types of Ontrack Plot Option Menu. If no plotting is desired, the program continues.

Note that the output files from this module can be used to do contour plotting in the Plot Profile Contours Option in the Display .. Edit Menu.

4.2.7.2 Generate NAMOS interface file job stream (future addition).

4.2.7.3 Generate EAIDS interface file job stream (future addition).

4.2.7.4 Generate RSVP update job stream. Option 4 of the Profile Search and Extraction Menu generates an RSVP update job stream. This process creates a run stream file, RSVPUP.UPD File, for execution on a CDC Cyber Computer. The run stream contains all the job control language, software, and data required to update the RSVP data files resident on the target system. No user input is needed to generate the job stream. The following messages are displayed to you:

*** MESSAGE: RSVP Update File Generation in Progress.
*** MESSAGE: RSVP UPDATE File being created.
*** MESSAGE: File ID: RSVPUP.UPD
*** MESSAGE: Of 120 records scanned, 53 were transferred to the output file.

4.2.7.5 Generate AUTO OCEAN update job stream. Option 5 of the Profile Search and Extraction Menu generates an AUTO OCEAN update job stream. This process creates an AUTO OCEAN update file, AUTOUP.UPD File, which is inserted into a NORDAPS CYBER JCL stream file used to perform the AUTO OCEAN update on the CYBER Computer.

To generate the job stream, enter the year, month, and day for the profile selection and the Greenwich Mean Time as follows:

*** MESSAGE: AUTO OCEAN Update File Generation In Progress.
*** MESSAGE: AUTO OCEAN UPDATE File being created.
File ID: AUTOUP.UPD.
*** MESSAGE: Enter YYMMDD For Profile Selection ...
Where: YY = Year, MM = Month, DD = Day,
(©Z) If finished.
*** RESPONSE REQUIRED: Enter YYMMDD:830323
*** RESPONSE REQUIRED: Enter The Greenwich Mean Time
(HHMM):834
*** MESSAGE: Profile Located and Extracted.
*** RESPONSE REQUIRED: Enter YYMMDD: ©Z
*** MESSAGE: AUTO OCEAN Update File Generation Complete.
*** MESSAGE: Of 4 records scanned, 1 was transferred to the output file.

An error occurs if the profile cannot be located by the date and time that you defined.

*** MESSAGE: Profile NOT FOUND !

Also, an error occurs if the data specified has already been processed by the AUTO OCEAN update.

*** MESSAGE: Profile had been previously selected for AUTO OCEAN Update and was not extracted.

4.2.7.6 Update INGRES exercise data base (future addition).

4.2.8 Alter NORDAPS operational defaults

Option 8 of the NORDAPS Main Menu enables you change the defaults for the NORDAPS Program. The current NORDAPS Operation Defaults are displayed to you and you are asked to enter the default you want to change. To exit from this process, either press the return key or enter ©Z to respond to the following:

(((NORDAPS OPERATIONAL DEFAULTS)))	
1. PROFILE HEADER: T	8. SCATTER NUMBER POINTS
2. AUXILIARY HEADER: T	9. EXTRACT PLOTS
3. PROFILE DATA: T	10. ONTRACK PLOTS
4. DATA INCREMENT: 10	
5. MENU HEADER: T	
6. TERMINAL: DEC VT102	
7. PLOTTER: PRINTRONIX	

*** Enter the number of the default you wish to change:

You can save the updated defaults in the file, DEF:NORDAP.DEF, if it exists, or it can be used only for the current run of NORDAPS. If the file DEF:NORDAP.DEF does exist, then you have the option to save the defaults in the file permanently by entering YES to the next prompt:

*** Enter YES if you wish to SAVE the updated defaults:

If you enter YES, a new version of the file, DEF:NORDAP.DEF, is created and contains the present defaults. However, if the DEF:NORDAP.DEF File cannot be opened, the following warning is given:

*** WARNING: Could not open DEF:NORDAP.DEF FILE. Updated defaults only used for this run.

4.2.8.1 Profile header default. If you enter 1 for the default to change, the profile header default is altered. The profile header default indicates whether or not to include headings in the profile report. Respond to the following prompt:

*** Enter YES if you wish to include profile header information:

If you enter YES, the profile header information is included in the profile report. If you press the return key, the profile header information is excluded from the profile report.

4.2.8.2 Auxiliary header default. If you enter 2 for the default to change, the auxiliary header default is altered. The auxiliary header default indicates whether or not to include the auxiliary header in the profile report.

4.2.8.3 Profile data default. If you enter 3 as the default to alter, the profile data default is changed. The profile data default indicates whether or not to include the data in the profile report. Respond to the next prompt:

*** Enter YES if you wish to include profile data:

If you enter YES, profile data is included in the profile report. If you press the return key, profile data is excluded from the profile report.

4.2.8.4 Data increment default. If you enter 4 as the default to alter, the data increment default is modified. The data increment default is an integer value that specifies which data element to display. You will see this message:

*** Enter the increment value for the profile data (10):

4.2.8.5 Menu header default. If you enter 5 as the default to change, the menu header default is altered. The menu header default indicates whether or not to include the menu headers in NORDAPS. Respond to the next message:

*** Enter YES if you wish to have menu headers:

If you enter YES, menu headers are included in displaying the NORDAPS menus. If you press the return key, NORDAPS menu headers are excluded.

4.2.8.6 Terminal default. If you enter 6 as the default to alter, the terminal default is changed. The terminal default is the terminal device you are using. The terminal device is used to display all your interactions and the system plotting if the terminal has graphics capabilities. When the terminal default is altered, all the qualifiers of that particular terminal device need to be defined. The following user interaction occurs:

***Terminal Types ***

Tektronix
Retrographic
DEC

*** Enter the terminal device you are using:

4.2.8.6.1 Tektronix terminal. If you enter "Tektronix" as the terminal device, the following message appears:

*** Enter Desired Model:

The following models are valid: 4006, 4010, 4012, 4014, 4015, 4016, 4025, 4027, 4051, 4052, 4054, 4081, 4112, 4113, 4114, 4115, 4116, 4117, 8888.

*** Enter Linespeed (characters per second):

The following linespeeds are valid: 15, 30, 60, 120, 200, 240, 360, 480, 720, 960.

*** Enter option (0 = Def, 31 = 8 Pens on 4662, 32 = Paperfeed on 4663):

You must enter 0 for this case.

*** Enter Resolution Mode (0 = Low):

The following resolutions are valid: 0,1,2, where 0 is low and 2 is high.

4.2.8.6.2 Retrographic terminal. If you enter "Retrographic" as the terminal device you are using, define the following qualifiers:

*** Enter Desired Model (1 = VT640, 2 = GENII):

If you enter 1 as the Retrographic terminal model, respond to the following prompt:

*** Enter Linespeed (characters per sec):

The following linespeeds are valid: 15, 30, 60, 120, 200, 240, 360, 480, 720, 960.

If you enter 2 as the Retrographic terminal model, this message is displayed:

*** The Retrographic GENII Terminal mimics the Tektronix Models 4010 or 4027.

*** Enter desired model:

You must enter 4010 or 4027 as the model to mimic.

4.2.8.6.3 DEC terminal. If you enter DEC as the terminal device, answer the following.

*** Enter Desired Model(1 = LA100, 2 = LA120, 3 = VK100, 4 = VT52, 5 = VT102, 6 = VT125, 7 = VT131):

If you enter model number 3 or 6, specify the following:

*** Enter Desired Monitor Type (0 = Monochrome, 1 = Color):

If you enter 1, the monitor is a monochrome monitor. If you enter 2, the monitor is a color monitor.

4.2.8.7 Plotter default. If you enter 7 as the default you want to change, the plotting device you want to use is altered. The plotting device default is used to make the hardcopies plot files of the plots created in NORDAPS. When the plotting device is altered, you will be prompted to specify all the plotter's qualifiers. Respond to the next user interaction.

*** Plotter Types ***

Benson
Calcomp
Lasergrafix
Printronic
TEK4662
TEK4663
Versatec
Zeta
None

*** Enter the print device you wish to use:

4.2.8.7.1 Benson Plotter. If you enter "Benson" as the default plotter, define the next qualifier.

*** Enter desired model:

The valid Benson models are: 9111, 9115, 9122, 9211, 9215, 9222, 9322, 9336, 9344, 9424, 9436, 9444.

4.2.8.7.2 Calcomp or Versatec plotter. If you enter "Calcomp" or "Versatec" as the default plotter, define the following qualifiers:

*** Enter buffer address:
*** Enter buffer length:
*** Enter output unit:

where the buffer address is the address of a buffer used by the driver software, the buffer length is the length (in words) of the buffer used by the driver, and the output unit is the unit used to direct the output to the appropriate FORTRAN logical unit number.

4.2.8.7.3 Printronix plotter. If you enter "Printronix" as the default plotter, no qualifiers are needed. The output file, FOR032.DAT, is created when a plot is made.

If a contour plot file, IOP020.DAT, containing NCAR Graphics is created, you must execute the next command file to create the file on the Printronix.

```
$ PLOT
DEVICE
LPA0:
READ IOP020
PLOT
EXIT
```

4.2.8.7.4 Lasergrafix plotter. If you enter "Lasergrafix" as the default plotter, no qualifiers are needed. The graphic output file is INTSCRT3.TMP and can be printed on the Lasergraphic 1200 Printer.

If a contour plot, IOP020.DAT, is created, you must execute the next command to create a plot on the Lasergrafix printer.

```
$ PLOT
DEVICE QMS
READ IOP020
PLOT
EXIT
```

4.2.8.7.5 TEK4662 Or TEK4663 Plotter. If you enter TEK4662 or TEK4663 as the default plotter, define the following parameters.

*** Enter Linespeed (characters per second):

The following linespeeds are valid: 15, 30, 60, 120, 200, 240, 360, 480, 720, 960.

*** Enter Option (0 = Def, 31 = 8 Pens on 4662, 36 = Paperfeed on 4663):

*** Enter Resolution Mode (0 = Low):

The following resolution are valid: 0,1,2, where 0 is low and 2 is high.

4.2.8.7.6 Zeta Plotter. If you enter "Zeta" as the default plotter, define the following:

*** Enter desired model:

The valid Zeta models are: 8, 53, 1453, 3653.

*** Enter Y plotter dimension:

The following Y axis plotting width (in inches) dimensions are valid: 0, 11, 33.

*** Enter desired output unit:

The output device is used to direct the output plot to the appropriate FORTRAN logical unit number.

4.2.8.7.7 No plotter defined. If you enter NONE as the default plotter, no hardcopies of the NORDAPS plots or displays will be created.

4.2.8.8 Scatter numbered points default. If you enter 8 as the default to alter, the scatter numbered points default is changed. The scatter numbered points default indicates whether station identifier numbers or blocks will be used for the scatter points on the temperature versus salinity plots. Respond to the next prompt:

*** Enter YES if you wish to use station id numbers for the scatter plot:

If you enter YES, station numbers are used for the scatter points in the t-s scatter plot. If you press the return key, blocks are used for scatter points in the t-s scatter plot.

4.2.8.9 Extend plots default. Option 9 of the defaults changes the default to display extended profile plots or not. If you respond YES to the following, the extended profile is displayed. Otherwise, no extended plot is created.

*** Enter YES if you wish to create extended plots:

4.2.8.10 Ontrack plots default. Option 10 default indicates if an ontrack plot is created after the data is processed. If a plot is to be displayed, reply YES to the following prompt. Otherwise, press the return key and no ontrack plot is created.

*** Enter YES if you wish to create ontrack plots:

5.0 Project bibliography

The following documents provide more background information about NORDAPS.

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