U.S. DEPARTMENT OF THE INTERIOR / U.S. GEOLOGICAL SURVEY

U.S. GEOLOGICAL SURVEY DIGITAL DATA SERIES DDS-13

International Phase of Ocean Drilling Seismic Line 1 Demultiplexed Data Cape Hatteras to Mid-Atlantic Ridge

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International Phase of Ocean Drilling
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README.1ST

INTRODUCTION

This CD-ROM is part of a 39 disc collection containing the demultiplexed seismic data from a 3400-km-long multichannel seismic-reflection profile extending from Cape Hatteras, N.C., to the rift valley of the Mid-Atlantic Ridge. The data were collected in 1974 as part of the International Phase of Ocean Drilling (IPOD) which was jointly funded by the U.S. Geological Survey (USGS) and the National Science Foundation's Deep Sea Drilling Project (DSDP). Each disc in the collection contains:

* Binary files of SEG-Y format demultiplexed seismic data for a portion of the profile.

* Graphic image files of the original observers' logs kept during data acquisition.

* A text file of shotpoint locations and a graphic image of a figure illustrating those locations.

* DOS-based software allowing:

  - interactive display of the SEG-Y demultiplexed data.
  - interactive display of the observers' logs graphic images.
  - interactive SEG-Y data review and editing.

* Documentation.

Please see OVERVIEW.TXT in the DOCFILES subdirectory for more information.

This CD-ROM has been produced in accordance with the International Standards Organization (ISO) 9660 standard. The data and text files can be read by any platform having CD-ROM driver software that supports this standard.

DOS SOFTWARE INSTALLATION

The software on disc may be used from the DOS command line or through a menu system which may be installed. To run the software from the command line, use the programs as described by the appropriate documents. Please see SOFTWARE, below. In order to install the menu system:

* Place the CD-ROM in the CD-ROM reader.
* Make the CD-ROM reader the current working directory.
* Type INSTALL.

This will place a file named DDS13.BAT in a user-specified directory which will execute the menu system. To use the menu system, make that user-specified directory the current working directory, and type "DDS13" at the DOS command line.

This information is repeated in the documentation file GETSTART.TXT.

MINIMUM DOS SYSTEM REQUIREMENTS

The minimum DOS system requirements to use the data and display software are as follows:

* IBM or compatible personal computer, having an 80286 or higher numbered processor. An 80386 or higher is recommended.
* 512 kb RAM.
* MS- or PC-DOS version 3.1 or later.
* Microsoft MSCDEX version 2.1 or later.
* CD-ROM drive with ISO 9660 software driver.
* EGA, VGA, or Hercules graphics system.

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README.2ND

DOCUMENTATION FILES EXPLANATION

.TXT: ASCII text files.
.DOC: Microsoft Word V6.0 files.

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OVERVIEW

INTRODUCTION

This CD-ROM is part of a 39 disc collection containing the demultiplexed seismic data from a 3400 km-long multichannel seismic-reflection profile extending from Cape Hatteras, N.C., to the rift valley of the Mid-Atlantic Ridge. The data were collected in 1974 as part of the International Phase of Ocean Drilling (IPOD) which was jointly funded by the U.S. Geological Survey (USGS) and the National Science Foundation's Deep Sea Drilling Project (DSDP). Each disc in the collection contains:

* Binary files of SEG-Y format demultiplexed seismic data for a portion of the profile. Please see DATA, below, for a description of the data on disc.

* Graphic image files of the original observers' logs kept during data acquisition. Please see OBLOGS, below, for more information.

* A text file of shotpoint locations and a graphic image of a figure illustrating those locations. Please see NAVIGATION, below, for more information.

* DOS-based software allowing:

  - interactive display of the SEG-Y demultiplexed data.
  - interactive display of the observer's logs graphic images.
  - interactive SEG-Y data review and editing.

Please see SOFTWARE, below, for more information.

* Documentation. Please see DOCUMENTATION, below, for more information.

This CD-ROM has been produced in accordance with the International Standards Organization (ISO) 9660 standard. The data and text files can be read by any platform having CD-ROM driver software that supports this standard.

DOS SOFTWARE INSTALLATION

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The software on disc may be used from the DOS command line or through a menu system which may be installed. To run the software from the command line, use the programs as described by the appropriate documents. Please see SOFTWARE, below. In order to install the menu system:

* Place the CD-ROM in the CD-ROM reader.
* Make the CD-ROM reader the current working directory.
* Type INSTALL.

This will place a file named DDS13.BAT in a user-specified directory, which will execute the menu system. To use the menu system, make that user-specified directory the current working directory and type "DDS13" at the DOS command line.

This information is repeated in the documentation file GETSTART.TXT.

MINIMUM DOS SYSTEM REQUIREMENTS

The minimum DOS system requirements to use the data and display software are as follows:

* IBM or compatible personal computer, having an 80286 or higher numbered processor. An 80386 or higher is recommended.
* 512 kb RAM.
* MS- or PC-DOS version 3.1 or later.
* Microsoft MSCDEX version 2.1 or later.
* CD-ROM drive with ISO 9660 software driver.
* EGA, VGA, or Hercules graphics system.

DISC DIRECTORY STRUCTURE

Each disc has the following directory structure:

AVIION	contains DUMPSEGY compiled for a Data General Aviion work station.

DOCFILES	contains ASCII text files of documentation.
NAV	contains an ASCII text file of shotpoint information and a graphic image of a shotpoint location figure.
OBLOGS	contains graphic image files of observers' logs for the data on disc.

SEGY	contains binary SEG-Y format seismic data files.
SOFTWARE	DOS-based data display and utility software.

DATA

Each file of seismic data is the disc-image of a SEG-Y format tape output during the demultiplexing of the original field data. The data were written to tape using the 32 bit IBM floating point format (Barry and others, 1975). As the data were copied bit-for-bit to the CD-ROM file, this format was preserved. Each file of sesimic data is named IPD{number}, where {number} is the first shotpoint in the file. Please see PROCESS.TXT for a description of the demultiplexing process and the magnetic tapes created.

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OBLOGS

The original observers' logs kept during data acquisition were scanned into graphic image files, so those documents could be perserved abd distributed along with the data. Each disc contains, scanned into digital form, the appropriate sheets of the observers' logs for the data on that disc. Each file represents one sheet of the observers' logs. Each file is named OB{number}.{format}, where {number} is the first shotpoint on that sheet and {format} is the graphics format used. Each sheet of the observers' logs is stored in 3 different graphic image formats: PCX, TIFF, and GIF. Files are named OB{number}.PCX, OB{number}.TIF, and OB{number}.GIF. Included on disc is a DOS-based PCX image viewer. Please see OBPLOT.TXT for a description of the DOS-based PCX image viewer.

NAVIGATION

Shotpoint locations for the entire IPOD Seismic Line 1 are given in decimal degrees, 6 digit precision, in an ASCII text file named NAV.TXT in the NAV subdirectory. Location information starts with the first shotpoint of the line and is then given for every 10th shotpoint.

SOFTWARE

PLOTSEIS is a DOS display program allowing the user to review the actual SEG-Y data and obtain hard copy using the DOS Print Screen function. In order to run PLOTSEIS, either start it from the menu system provided, or change directory to the SEGY subdirectory and type PLOTSEIS, and respond to the program's prompts. The user may accept the default values presented by PLOTSEIS or enter new ones. Please see PLOTSEGY.TXT and PSGYNEWS.TXT in the DOCFILES subdirectory for a description of program usage.

DUMPSEGY is a DOS seismic data utility allowing the user to examine all the components of the SEG-Y data files: the EBCDIC

and binary headers, the individual data-trace headers, and the hexadecimal SEG-Y samples composing a data trace, or their actual floating-point values. In order to run DUMPSEGY, change directory to the SEGY subdirectory and at the DOS prompt type DUMPSEGY followed (after a space) by the file name desired and any program options. Typing DUMPSEGY by itself will display a usage screen informing the user how to use the program. Please see DUMPSEGY.TXT and DSGYNEWS.TXT in the DOCFILES subdirectory for a description of program usage.

OBPLOT is a DOS utility to view and manipulate PCX format graphic image files. This utility allows displaying the PCX format observers' logs and shotpoint location figure on this disc.

Please see OBPLOT.TXT in the DOCFILES subdirectory for a description of program usage.

DOCUMENTATION

Documentation files on disc:

A_README.TXT	A short description of this data set.
ACKNOWL.TXT	Acknowledgments to people helpful in creating his data set.
AUTHORS.TXT	Authors of this data set.
CONTACTS.TXT	Contacts for more information the data and software included in this data set.
DISCnn.TXT	Description of specific seismic data and observers' logs on each individual disc. The "nn" represents the disc number of the data set, 1 to 39.
DISCLAIM.TXT	USGS disclaimer.
DUMPSEGY.TXT	Documentation for the seismic data utility DUMPSEGY.
DSGYNEWS.TXT	DUMPSEGY update to the original documentation described above.
GETSTART.TXT	A brief description of installing the DOS-based menu system.

NAV.TXT ASCII text file of shotpoint location information.

OBPLOT.TXT documentation for the DOS observers' logs viewing program.

OVERVIEW.TXT This file.

PLOTSEGY.TXT Documentation for the DOS seismic data viewing program PLOTSEIS.

PSGYNEWS.TXT PLOTSEIS update to the original documentation described above.

PROCESS.TXT Description of the demultiplexing of the original field data.

REFERENC.TXT References used in all documnetation files.

TITLE.TXT Title of this data set.

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REFERENCES

Barry, K.M., Cavers, D.A., and Kneale, C.W., 1975, Recommended standards for digital tape formats: Geophysics, v. 40, p. 344-352.

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TECHNICAL INFORMATION
MINIMUM DOS SYSTEM REQUIREMENTS

This CD-ROM was produced in accordance with the ISO 9660 standard; however, it is intended for use only on DOS-based computer systems. The minimum system requirements to use the data with the software provided on this disc are as follows:

DOS

* IBM or compatible personal computer, having an 80286 or higher numbered processor. An 80386 or higher is greatly suggested.
* 512 kb RAM.
* MS- or PC-DOS version 3.1 or later.
* Microsoft MSCDEX version 2.1 or later.
* CD-ROM drive with ISO 9660 software driver.
* EGA/VGA/Hercules graphics system.
* Hard disk drive

To get started: DOS users should make the CD-ROM drive the active drive; then type INSTALL<RETURN>.

End of text; press the Escape key to continue.

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GETTING STARTED

INTRODUCTION

The data on this disc are accessible from any computer system having a CD-ROM reader capable of reading discs recorded using the ISO 9660 standard. The application software on this disc is for DOS-based computer systems, and may be run from the DOS command line or through an installable menu system. Installation of the menu system is described below.

Please see A_README.1ST for a description of the contents of this disc, as well as a description of appropriate documentation.

DOS SOFTWARE INSTALLATION

The software on disc may be used from the DOS command line or through a menu system which may be installed. To run the software from the command line, use the programs as described by the appropriate documents. Please see SOFTWARE, below. In order to install the menu system:

* Place the CD-ROM in the CD-ROM reader.
* Make the CD-ROM reader the current working directory.
* Type INSTALL.

This will place a file named DDS13.BAT in a user-

specified directory, which will execute the menu system. To use the menu system, make that user-specified directory the current working directory and type "DDS13" at the DOS command line.

MINIMUM DOS SYSTEM REQUIREMENTS

The minimum DOS system requirements to use the data and display software are as follows:

* IBM or compatible personal computer, having an 80286 or higher numbered processor. An 80386 or higher is recommended.
* 512 kb RAM.
* MS- or PC-DOS version 3.1 or later.
* Microsoft MSCDEX version 2.1 or later.
* CD-ROM drive with ISO 9660 software driver.
* EGA, VGA, or Hercules graphics system.

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DISC ¯01

Demultiplexed Seismic Data

Each file of seismic data is the disc-image of a SEG-Y format tape output during the demultiplexing of the original field data. The data were written to tape using the 32 bit IBM floating point format (Barry, and others, 1975). As the data were copied bit-for-bit to the CD-ROM file, this format was preserved. Each file of sesimic data is named IPD{number}, where {number} is the first shotpoint in the file. NOTE: FFID indicates the Field File Identifacation Number assigned each shot as it was recorded.

file: ¯IPD101.SGY
sample rate: 4000.0 microsec
samples per trace: ¯2250
data length: ¯9000 msec
bytes per trace: ¯9240
bytes in file: ¯143824200
traces in file: ¯15565
first trace: ¯1/1 FFID/trace
last trace: ¯252/3 FFID/trace

file: ¯IPD228.SGY
sample rate: 4000.0 microsec
samples per trace: ¯2250
data length: ¯9000 msec
bytes per trace: ¯9240
bytes in file: ¯220793400
traces in file: ¯23895
first trace: ¯256/36 FFID/trace

last trace: ¯643/60 FFID/trace

file: ¯IPD422.SGY
sample rate: 4000.0 microsec
samples per trace: ¯2250
data length: ¯9000 msec
bytes per trace: ¯9240
bytes in file: ¯144905280
traces in file: ¯15682
first trace: ¯643/61 FFID/trace
last trace: ¯897/56 FFID/trace

```
          file: ¯IPD549.SGY
     sample rate:  4000.0 microsec
samples per trace: ¯2250
     data length: ¯9000 msec
  bytes per trace: ¯9240
    bytes in file: ¯58492800
   traces in file: ¯6330
     first trace: ¯897/57 FFID/trace
      last trace: ¯999/62 FFID/trace
```

Observer Logs

The following files are digitized versions of the original observer's log sheets. Each file is named OB{number}.{format}, where {number} is the first shot point on the page, and {format} is the graphic format of the file: PCX, TIF, or GIF. No {format} extensions are shown with the file names given below.

OB101
OB101G
OB151
OB201
OB251
OB311
OB311G
OB361
OB411
OB461
OB511
OB561

REFERENCE

Barry, K.M., Cavers, D.A., and Kneale, C.W., 1975, Recommended standards for digital tape formats: Geophysics, v. 40, p. 344-352.

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==========
========== DUMPSEGY V2.0 ==========
==========

DUMPSEGY V2.0
Changes to the Program Version 1.0

DUMPSEGY V2.0 will determine which type of SEG-Y data is present using the SEG-Y defined "data sample format code" read from bytes 3225-3226 of the binary coded file header. The SEG-Y defined data sample format codes are shown below:

FORMAT CODE	DATA SAMPLE FORMAT
1	32 bit IBM floating point
2	32 bit fixed point
3	16 bit fixed point
4	16 bit fixed point with gain code

U.S. DEPARTMENT OF THE INTERIOR

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DUMPSEGY V1.0: A Program to Examine the Contents of SEG-Y Disk-Image Seismic Data

by F.N. Zihlman

This is a digital copy of a document originally published as
U.S. Geological Survey Open-File Report 92-590

CONTENTS

TABLES

FIGURES

DUMPSEGY V1.0

ABSTRACT

DUMPSEGY is a character-based interactive program written in C and designed to display the header information and hexadecimal and floating point sample values of digital seismic data stored in industry-standard SEG-Y format. DUMPSEGY is started at the system command line prompt, and requires at a minimum the SEG-Y data file path and name. Up to eight display options may be included on the command line following the data file name. DUMPSEGY, invoked with no options, will display information about

the SEG-Y file opened, prompt the user for the sequential trace number of the seismic data trace to be displayed, directly access that trace, and display the hexadecimal values of the samples comprising that trace.

DUMPSEGY options allow: 1) displaying the SEG-Y EBCDIC header, 2) displaying the binary header, 3) displaying the individual data trace header information of the user-selected trace, 4) displaying the individual samples that comprise a trace translated from the SEG-Y format into their floating point values, 5) displaying only the file information and or header information, with no display of the individual samples, for selected data traces, 6) specifying a file to receive the output, 7) specifying a sequential range of traces to display, including an increment between sequential traces, and 8) copying portions and components of the input file in binary format allowing the construction of a new SEG-Y file from the original.

If started without specifying a trace range, DUMPSEGY will prompt the user for other data traces to display until the user enters 0 to exit the program

INTRODUCTION

The combination of low cost, powerful personal computers (PC's) possessing hard disk drives with hundreds of megabytes of storage allows a "mainframe" level of computing on a user's desk. Desktop PC's have increased in processing power to the point that an Intel 80486 processor-based DOS PC running at 25 Mhz was able to execute a computationally intensive seismic data processing algorithm 50% faster than the same source code running on a VAX 11/780 with an attached array processor (Miller, 1992, personal communication). This increase in desktop computing power and disk storage has made the PC-based real-time display of seismic data a practical reality.

DUMPSEGY uses the seismic data stored in industry-standard SEG-Y format. A typical amount of seismic data occupies many megabytes of storage space and thus, for practical purposes, a hard disk or CD-ROM is necessary. PLOTSEGY (Zihlman, 1992) provides a means of real-time display of SEG-Y seismic data in the DOS environment. DUMPSEGY provides a method of examining the

SEG-Y header information and sample values of the seismic data

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DUMPSEGY V1.0

and as such may be seen as a companion program to PLOTSEGY. Like PLOTSEGY, DUMPSEGY was written for operating systems which internally store floating point numbers using the IEEE format, such as DOS or UNIX (see DATA SAMPLE CONVERSION, below).

DUMPSEGY was written in ANSI C allowing the source code to be compiled and used in any operating system environment, such as DOS or UNIX, having compilers supporting the ANSI standard.

SYSTEM REQUIREMENTS

DUMPSEGY was developed in C using Borland C/C++ 3.0 on an ALR BusinessVEISA with a 33 Mhz Intel 80386 processor, an 80387 math coprocessor, and MS-DOS 4.01.

DOS ENVIRONMENT

DUMPSEGY has the following DOS hardware and software requirements:

* Intel 80286 or higher processor.
* DOS 3.0 or later.
* A hard disk drive or CD-ROM containing the input file(s).
* A math coprocessor is NOT required, but will be used if available and is strongly recommended.

Please refer to the EBCDIC Header Display section below for source code compilation information concerning that display.

UNIX ENVIRONMENT

DUMPSEGY has the following UNIX software requirement:

* Source code must be compiled using an ANSI compliant

compiler.

Please refer to the EBCDIC Header Display section below for source code compilation information concerning that display.

PROGRAM FUNCTION

DUMPSEGY is started at the system command line prompt by typing

DUMPSEGY <input file> -e -b -t -c -v -n -f <output file> -r first:last:increment

A description of each of the options is given in Table 1. The <input file> is required. DUMPSEGY and the <input file> must be separated with at least one space. Options may be entered in any order and in either upper or lower case. The hyphen (-)

before each option is required and no blanks are allowed between the hyphen and the option character. All options must be separated from one another and from the any file name with at least one or more spaces. Option "-f" must have at least one space separating it and the following <output file> name, which must be a valid file name for the operating system in use. Option "-r" must have at least one space separating it and the starting and stopping trace range following it. The trace range must be given as starting trace number:ending trace number, where the starting and ending trace number are integer values representing the sequential seismic data trace numbers in the file. The starting and ending trace numbers must be separated with a colon (:). Optionally, a trace increment may be included following the ending trace number and separated from it by a colon (:). No spaces between the starting trace number, the ending trace number and the trace increment are allowed.

Entering DUMPSEGY without an <input file> will display information on how to use the program as shown in Figure 1.

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DUMPSEGY V1.0

DUMPSEGY OVERVIEW

A SEG-Y file, whether on tape or disk, is composed of a 3200 byte EBCDIC-format header, followed by a 400 byte binary header, which in turn is followed by individual data traces. Each data trace is composed of a 240 byte trace header followed by the 4 byte SEG-Y samples comprising the actual data for that trace.

DUMPSEGY uses a library of C routines, SEGYLIB.C, designed to read SEG-Y files and originally written for the DOS SEG-Y display program PLOTSEGY (Zihlman, 1992). Currently, the routines in that library allow a maximum of 6000 samples per trace. Data sets having more than 6000 samples per trace may cause DUMPSEGY to fail and should be resampled to have 6000 samples per trace or less.

Starting DUMPSEGY with no command line options will produce the default display as described below. The "-e" and/or "-b" options will display the EBCDIC header and/or the binary header following the File Information display, the "-v" option will translate the SEG-Y data samples into their actual floating point values, the "-n" option will display file and header information only, the "-f" option will direct output to a disk file, and the "-r" option will display a user-defined range of traces, the "-c" option will output the data in binary form.

If the "-f" option is used without the "-c" option, the output file is opened as an ASCII text file and DUMPSEGY will decode the binary information of the input file into ASCII text before writing it to the output file. If the "-f" option is used with the "-c" option, the output file is opened as a binary file and the information requested using the command line options will be written to the output file in binary form.

The "-v" and "-c" options are mutually exclusive and starting DUMPSEGY specifying both on the command line will cause DUMPSEGY to display the program usage information and exit.

FILE INFORMATION DISPLAY

After successfully opening the file specified on the command line, DUMPSEGY will determine and return the following file information:

* File name.
* Sample interval, in microseconds.
* Number of samples per seismic trace.
* Maximum time value per seismic trace, in milliseconds.
* Bytes per seismic trace.
* Bytes in the file.
* Number of seismic traces in the file.

If the "-c" or "-f" options have not been used, this information will remain on the screen until the user presses <CR> or X<CR>. If the "-f" option has been included on the command line, DUMPSEGY will direct the output to the specified file. If the "-c" option has been included on the command line no file information is output by DUMPSEGY. Figure 2 is an example of the File Information Display.

DEFAULT DISPLAY

Starting DUMPSEGY with no options will produce a default display composed of the SEG-Y file information, as discussed

above, followed by a prompt for a sequential trace number to display. Enter 0 (zero) to exit the program. Enter a value between 1 and the sequential number of the last trace in the SEG-Y file to display the hexadecimal value of each sample within that trace. The hexadecimal values displayed are the untranslated SEG-Y samples, not their actual floating point values (see Floating Point Sample Display, below). Four samples (16 bytes) are displayed per line as a series of eight, 2 byte (four digit) hexadecimal numbers, separated from each other by a blank. The byte number of the first byte displayed and the byte number of the last byte displayed, relative to the first byte of the SEG-Y FILE, are displayed within square brackets on the left at the start of each line. All samples comprising the data trace are displayed without pause to the end of that trace. After the last sample has been displayed, the user is prompted for another trace number. Figure 3 is an example of the default sample display.

EBCDIC HEADER OPTION: -e or -E

The "-e" or "-E" option directs DUMPSEGY to process the SEG-Y file EBCDIC header. If the "-c" and "-f" options have not been included on the command line this option will display the 3200 byte EBCDIC header, translated to ASCII, as a series of 40 lines of text 80 characters in length. DUMPSEGY will stop at the end

of 20 lines of text and prompt the user to continue the display by pressing <CR>, or to exit the program by pressing X<CR>. Figure 4 is an example of an ASCII translation of the EBCDIC header.

The "-c" option directs DUMPSEGY to copy the EBCDIC header in binary form.

The "-f <output file>" option directs DUMPSEGY to output the EBCDIC header information to that file.

The ASCII translation of the EBCDIC header is displayed differently on DOS and UNIX systems, depending on how the DUMPSEGY source code is compiled. On DOS systems, the EBCDIC header information is displayed as 40 text strings of 80 characters each, with no "new line" character at the end. As the default DOS display is 80 characters per line, the display will "wrap" around to the following line at the end of each 80 character string.

UNIX systems will display the EBCDIC header as a series of 40 text strings, 80 characters each, with a "new line" character at the end.

The source code must be compiled for the desired operating system with the appropriate "define" value ("DOS_SYSTEM" or "UNIX_SYSTEM") defined and the other commented out. If the wrong one is "defined" the EBCDIC header information will be displayed inappropriately. If both "DOS_SYSTEM" and "UNIX_SYSTEM" are defined each line of the EBCDIC header will be displayed twice. If neither are defined no EBCDIC header information will be displayed. Please refer to the source code file DSGYMAIN.C for more information.

BINARY HEADER OPTION: -b or -B

The "-b" or "-B" option directs DUMPSEGY to process the 400 byte SEG-Y file binary header. Only the first 60 bytes of the binary header are defined by the Society of Exploration Geophysics (SEG) (Barry, et al., 1975), and if the "-c" option is not used only those 60 bytes are processed. If the "-c" and "-f" options have not been included on the command line, each SEG-defined header value is displayed, one header value per display line, and is composed of four items: the header value's starting and ending location, in bytes, relative to the first byte of the file, the header value's name, the header value's decimal value, and the header value's actual hexadecimal value. The header value's starting and ending byte locations are enclosed in square brackets. DUMPSEGY will stop after 22 lines of text and prompt the user to continue the display by pressing <CR>, or to exit the program by pressing X<CR>. Pressing <CR> will display the remaining SEG-defined header values, and again prompt the user to continue the display by pressing <CR>, or to exit the program by

pressing X<CR>. Table 2 is a list of SEG-defined binary header values, the byte location in the header where they may be found, and how many bytes comprise those header values. Figure 5 is an example of the binary header display.

The "-c" option directs DUMPSEGY to copy the full 400 byte binary header in binary form.

The "-f <output file>" option directs DUMPSEGY to output the binary header information to that file.

TRACE HEADER OPTION: -t ot -T

The "-t" or "-T" option directs DUMPSEGY to process each data trace header. Only the first 180 bytes of the 240 byte data trace header are defined by the Society of Exploration Geophysics (Barry, et al., 1975), and if the "-c" option has not been used, only those 180 bytes are processed. If the "-c" and "-f" options have not been used, each SEG-defined header value is displayed, with one header value per display line and is composed of four items: the header value's location within the file, the header value's name, the header value's decimal value, and the header value's actual hexadecimal value. The header value's starting and ending byte locations, relative to the first byte in the file, are enclosed in square brackets. DUMPSEGY will stop after 22 lines of text and prompt the user to continue the display by pressing <CR>, or to exit the program by pressing X<CR>. Pressing <CR> will display another 22 line set of SEG-defined header values, and again prompt the user, until all SEG-defined trace header values have been displayed or the user exits the program. Table 3 describes the starting and ending byte locations and the definition of each SEG-defined trace header value. Figure 6 is an example of the trace header display.

The "-c" option directs DUMPSEGY to copy the full 240 bytes of each trace header in binary form.

The "-f <output file>" option directs DUMPSEGY to output the data trace header information to that file.

FLOATING POINT SAMPLE OPTION: -v or -V

The "-v" or "-V" option directs DUMPSEGY to process the individual SEG-Y samples into their floating point values. If the "-f" option is not used, DUMPSEGY will display four samples (16 bytes) per line, separated from each other by a blank. Actual calculation of the floating point number of each sample is given below (see DATA SAMPLE CONVERSION, below). The byte range, relative to the first byte of the SEG-Y FILE, of the four samples displayed is shown within square brackets on the left at the start of each line. All samples comprising the data trace are displayed without pause to the end of that trace. After the last

sample has been displayed, the user is prompted to enter another trace number. Figure 7 is an example of the floating point sample display.

The "-c" and "-v" options are mutually exclusive and including both on the command line will cause DUMPSEGY to display the program usage information and exit.

The "-f <output file>" option directs DUMPSEGY to output the SEG-Y samples floating point values to that file.

FILE AND/OR HEADER INFORMATION ONLY OPTION: -n or -N

The "-n" or "-N" option directs DUMPSEGY to process only the header information requested using the "-e", "-b", and "-t" options. No data samples are processed. This option was provided to allow the output of header information to a file without including the individual samples for the selected data traces.

If no header options are specified and the "-c" and "-f" options are not used, DUMPSEGY will display only information about the file specified (see FILE INFORMATION DISPLAY, above). Using the "-e" (see EBCDIC HEADER OPTION, above), "-b" (see BINARY HEADER OPTION, above), and "-t" (see TRACE HEADER OPTION, above) command line options will display the specified information as discussed above.

If the "-n" and "-v" options (see FLOATING POINT SAMPLE OPTION, above) are issued together, the "-n" option will disable the floating point sample option.

The "-c" option directs DUMPSEGY to copy any header information requested in binary form.

The "-f <output file>" option directs DUMPSEGY to output the information to that file.

TRACE RANGE OPTION: -r or -R

The "-r first:last:increment" or "-R first:last:increment" option directs DUMPSEGY tp process only those data traces within the range specified by "first:last". The value "first" is an integer number representing the sequential data trace number of the first trace to display, and the value "last" is an integer number representing the sequential data trace number of the last trace to display, relative to the first data trace in the SEG-Y file as trace number 1. The trace increment is an integer number which DUMPSEGY will use to step through the data. If no increment is included in the range option an increment of 1 is used.

If the value of "first" is less than "last" and the trace increment is a positive integer, DUMPSEGY will maintain the trace "direction", or order, of the input file. If the value of

"first" is greater than "last" and the increment is a negative integer, DUMPSEGY will output the data in reverse order relative to the input file. This allows DUMPSEGY to "reverse sort" the input data. If the value of "first" equals the value of "last", DUMPSEGY will process only that one data trace. Entering range information in a form other than described above will cause DUMPSEGY to behave unpredictably.

DUMPSEGY will exit to the system command line after processing the range of data specified. The output from DUMPSEGY for that trace range specified will be displayed on the user's terminal unless it has been directed to an output file (see FILE OUTPUT OPTION, below). If the output is displayed on the terminal, the user will have to respond to all the interactive prompts during the processing of traces within the specified range. If the output has been directed to a disk file, DUMPSEGY will not process any interactive prompts.

FILE OUTPUT OPTION: -f or -F

The "-f <output file>" or "-F <output file>" option directs DUMPSEGY to send the any output to the file specified by "file name". If DUMPSEGY can not open the file specified it will display a message to the user's terminal that it could not open "file name" and that output from the program will be redirected to the user's terminal. With the display of this message, the user may press <CR> to continue, or X<CR> to exit the program.

If this option is used without the "-r" option, DUMPSEGY will prompt the user for a data trace number, process that trace, and output all information to the specified file, and again prompt the user until a 0 (zero) is entered to exit the program. If the "-r" option is used, DUMPSEGY will process all the data traces in the specified range, output all information to the specified file, and exit the program.

The "-c" option directs DUMPSEGY to open the specified output file in binary mode. If no "-c" option is present, the output file is opened in text mode.

COPYING THE DATA IN BINARY FORM OPTION: -c or -C

The "-c" or "-C" option issued on the command line will "copy", or read, the specified input data in binary form. The "-c" and "-v" options are mutually exclusive and including both on the command line will cause DUMPSEGY to display the program usage information and exit. The user is recommended to specify an output file using the "-f" option. This option allows new SEG-Y

files to be created from portions of the original SEG-Y input file. See CREATING NEW SEG-Y FILES, below.

CREATING NEW SEG-Y FILES

New SEG-Y files may be created from the original SEG-Y input file using the appropriate command line options, as shown in a series of examples below.

Example 1: General form of creating a SEG-Y file.

```
DUMPSEGY <inputfile> -c -e -b -t -f <output file> {-r
        first:last:increment}
```

The "-c", "-e", "-b", "-t" options are necessary to copy the EBCDIC header, the binary header, all data trace headers, and the data trace samples to output a fully functional SEG-Y file. Optionally, a trace range and increment could be included.

Example 2: Creating a SEG-Y file which is a subset of the input file.

DUMPSEGY <inputfile> -c -e -b -t -f <output file> -r 1:500

A range may be specified to create a subset of the original SEG-Y file, creating a SEG-Y <output file> containing the first 500 traces of the <input file>.

Example 3: Creating a single channel SEG-Y file from a multichannel input file.

DUMPSEGY <inputfile> -c -e -b -t -f <output file> -r 30:480:30

DUMPSEGY may be used to create a single fold ("100 percent") SEG-Y file from multichannel SEG-Y data. If the <input file> consists of 30 channel (30 traces per "shot") demultiplexed seismic data having 6 auxilary traces followed by 24 data traces, where the 30th trace in each "shot" is the trace nearest to the energy source (the "near trace"), the above DUMPSEGY command would produce an <output file> consisting of 16 traces representing the near trace from the 451 traces processed: traces 30, 60, 90, ..., 480 from the <input file>.

Example 4: Creating a SEG-Y file having the reverse sort order of the input file.

DUMPSEGY <input file> -c -e -b -t -f <output file> -r 500:1:-1

This will create a SEG-Y <output file> containing the first 500 traces from the <input file> "reverse sorted" into the <output file>. Where the <input file> has a trace order starting with trace "1" and increasing, the <output file> will start with trace "500" of the <input file> and end with trace "1" of the <input file>.

Example 5: Creating a SEG-Y file from multiple input files.

```
DUMPSEGY <inputfile> -c -e -b -t -f <output file 1> -r 1:50
DUMPSEGY <inputfile> -c -t -f <output file 2> -r 101:150
DUMPSEGY <inputfile> -c -t -f <output file 3> -r 201:250
```

New SEG-Y files may be created from portions of the same or different SEG-Y files in a manner similar to shown above. The first call to DUMPSEGY will create a full SEG-Y <output file> consisting of the data from the <input file> for the trace range specified. The next two calls to DUMPSEGY will create <output files> having only the trace headers and sample values for the data trace range specified. These three files may be concatenated together using the appropriate operating system command(s) to produce a SEG-Y file consisting of traces 1 - 50, 101 - 150, and 201 - 250 from the same or different <input file>. An example of the DOS method of contatenation is shown below:

```
copy <file 1> /B + <file 2> /B + <file 3>    <new output file>
```

The /B option is necessary to process binary format files and ignore the control-Z end of file marker in all but the last of the files to be concatenated.

DATA SAMPLE CONVERSION

Each SEG-Y sample is stored as four consecutive bytes in IBM-compatible format as defined in IBM Form GA 22-6821 (Barry, et al, 1975). These four bytes form a 32 bit word as defined by the SEG Committee on Technical Standards for the SEG-Y format (Barry, et al., 1975). Since DOS and UNIX-based systems internally represent numbers using the IEEE format, reading the IBM-format sample will result in the byte order being changed. For example, a 32 bit sample value may have the hexadecimal value 459AEAEB in IBM-format representation. Reading this value and assigning it to a long integer variable will convert it into the IEEE-format resulting in a hexadecimal value of EBEA9A45. In

order to maintain the proper byte order, each byte of the four byte (32 bit) word must be read as an unsigned character and the sample built by "left-shifting" each byte into it's proper position.

Each 32 bit sample is then decomposed into a sign bit (Qs), a 7 bit characteristic (Qc) and a 24 bit fraction (Qf). The corresponding sample value may be calculated by the following:

sample value = Qs * 16^(Qc-64) * Qf

where 16^(Qc-64) is 16 raised to the (Qc-64) power.

SAMPLE DATA FILE

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Included with this software publication is SAMPLE.SGY, a DOS copy of the first 125 traces of the SEG-Y final stacked section for the seismic line 624-79, located in the Point Barrow region in the National Petroleum Reserve in Alaska. SAMPLE.SGY, requiring 783600 bytes of disk space, may be used as an input file name for DUMPSEGY.

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DISCLAIMER

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REFERENCE

Barry, K.M., Cavers, D.A., and Kneale, C.W., 1975, Recommended standards for digital tape formats, in Digital Tape Standards; Society of Exploration Geophysicists ["Recommended standards for digital tape formats" reprinted from Geophysics, v. 32, p. 1073 - 1084; v. 37, p. 36-44; v. 40, p. 344 - 352.] p. 22 - 30.

Zihlman, F.N., 1992, PLOTSEGY V1.0: A DOS graphics program to display SEG-Y disk-image seismic data; U.S. Geological Survey Open File 92-349A and 92-349B.

TABLES

Table 1: DUMPSEGY command line options.

-e.....Display the 40 line EBCDIC header.
-b.....Display the 60 SEG-defined bytes of
the binary header.
-t.....Display the 180 SEG-defined bytes
of each data trace header.
-v.....Display the floating point value
for each sample.
-n.....Display file and header information
only, no trace samples.

-f <output file>.....Send the output to a file. If the "-c" option is included, open the file as a binary file, else open it as a text file.
-r first:last:increment..Process a range of traces.
-c.....copy any requested information in binary format. If the "-f" option is included, open that file as a binary file.

Table 2: SEG-defined binary header values (Barry, et al., 1975).
An example of the default display format for data trace number 1 from the example data set. Byte 3841 is the first sample in the data trace. Byte 9840 is the last byte of the last sample of the data trace. There are 6000 bytes in this data trace, with 4 bytes per sample, for a total of 1500 samples per trace.

Byte Numbers	Header Value Description
3201 - 3204	Job identification number.
3205 - 3208	Line number.
3209 - 3212	Reel number.
3213 - 3214	Number of data traces per record.
3215 - 3216	Number of auxiliary traces per record.
3217 - 3218	Sample interval, microseconds, this file (reel).
3219 - 3220	Sample interval, microseconds, original field recording.
3221 - 3222	Number of samples per data trace, this file (reel).
3223 - 3224	Number of samples per data trace, original field recording.
3225 - 3226	Data sample format code: 1 = floating point (4 bytes) 2 = fixed point (4 bytes) 3 = fixed point (2 bytes) 4 = fixed point with gain code (4 bytes).

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NOTE: DUMPSEGY only works with data sample format code 1 data.

3227 - 3228 CDP fold.

3229 - 3230 Trace sorting code: 1 = as recorded (no sorting)
2 = CDP ensemble
3 = single fold continuous profile
4 = horizontally stacked

3231 - 3232 Vertical sum code: 1 = no sum
2 = two sum
...
N = N sum (N = 32,767)

3233 - 3234 Sweep frequency at start.

3235 - 3236 Sweep frequency at end.

3237 - 3238 Sweep length, ms.

3239 - 3240 Sweep type code: 1 = linear
2 = parabolic
3 = exponential
4 = other

3241 - 3242 Trace number of sweep channel.

3243 - 3244 Sweep trace taper length, ms, at start if tapered.

3245 - 3246 Sweep trace taper length, ms, at end.

3247 - 3248 Taper type: 1 = linear
2 = cos
3 = other

3249 - 3250 Correlated data traces: 1 = no
2 = yes

3251 - 3252 Binary gain recovered: 1 = yes
2 = no

3253 - 3254 Amplitude recovery method: 1 = none
2 = spherical divergence
3 = AGC
4 = other

3255 - 3256 Measurement system: 1 = meters
2 = feet

3257 - 3258 Impulse signal: 1 = Upward = negative number.
2 = Upward = positive

number.

3259 - 3260 Vibratory polarity code - seismic signal lags pilot signal by:

1 = 337.5 - 22.5 degrees

2 = 22.5 - 67.5 degrees

3 = 67.5 - 112.5 degrees

4 = 112.5 - 157.5 degrees

5 = 157.5 - 202.5 degrees

6 = 202.5 - 247.5 degrees

7 = 247.5 - 292.5 degrees

8 = 292.5 - 337.5 degrees

3261 - 3600 Unassigned - for optional information.

Table 3: SEG-defined data trace header values (Barry, et al., 1975).

Byte Numbers	Header Value Description
1 - 4	Trace sequence number within line.

5 - 8 Trace sequence number within file (reel).
9 - 12 original field record number.
13 - 16 Trace number within original field record.
17 - 20 Energy source point number.
21 - 24 CDP ensemble number.
25 - 28 Trace number within the CDP ensemble.
29 - 30 Trace identification code: 1 = seismic data
2 = dead
3 = dummy
4 = time break
5 = uphole
6 = sweep
7 = timing
8 = water break
9 = N, optional use, N = 32,767
31 - 32 Number of vertically summed traces yielding this trace.
33 - 34 Number of horizontally stacked traces yielding this trace.
35 - 36 Data use: 1 = production
2 = test
37 - 40 Distance from source point to receiver group.
41 - 44 Receiver group elevation - above sea level are positive, below sea level are negative.
45 - 48 Surface elevation at source.
49 - 52 Source depth below surface (positive number).
53 - 56 Datum elevation at receiver group.
57 - 60 Datum elevation at source.
61 - 64 Water depth at source.
65 - 68 Water depth at group.
69 - 70 Scalar to be applied to all elevations & depths, specified in bytes 41 - 68 to give the real value. Scalar = 1, +/-10, +/-100, +/-1000, or +/-10,000. If positive, scalar is used as a multiplier; if negative, scalar is used as a divisor.
71 - 72 Scalar to be applied to all coordinate specified in bytes 73 - 88 to give the real value. Scalar = 1, +/-10, +/-100, +/-1000, or +/-10,000. If positive, scalar is used as a multiplier; if negative, scalar is used as a divisor.
73 - 76 Source coordinate - X.
77 - 80 Source coordinate - Y.

81 - 84 Group coordinate - X.
85 - 88 Group coordinate - Y.
If the coordinate units are in seconds of arc, the X values represent longitude and the Y values represent latitude. A positive value designates the number of seconds east of Greenwich Meridian

or north of the equator and a negative value designates the number of seconds south or west.
89 - 90 Coordinate units: 1 = length (meters or feet)
2 = seconds of arc
91 - 92 weathering velocity.
93 - 94 Subweathering velocity.
95 - 96 Uphole time at source.
97 - 98 Uphole time at group.
99 - 100 Source static correction.
101 - 102 Group static correction.
103 - 104 Total static applied.
105 - 106 Lag time A. Time in ms between end of 240-byte trace identification header and time break. positive if time break occurs after end of header, negative if time break occurs before end of header. Time break is defined as the initiation pulse which may be recorded on an auxiliary trace or as otherwise specified by the recording system.
107 - 108 Lag time B. Time in ms between the time break and the initiation time of the energy source. May be positive or negative.
109 - 110 Delay recording time. Time in ms between initiation time of energy source and time when recording of data samples begins.
111 - 112 Mute time - start.
113 - 114 Mute time - end.
115 - 116 Number of samples in this trace.
117 - 118 Sample interval, in microseconds, for this trace.
119 - 120 Gain type of field instruments: 1 = fixed
2 = binary

3 = floating point
4 = --- N = optional use

121 - 122 Instrument gain constant.
123 - 124 Instrument early or initial gain (db).
125 - 126 Correlated: 1 = no
2 = yes
127 - 128 Sweep frequency at start.
129 - 130 Sweep frequency at end.
131 - 132 Sweep length, ms.
133 - 134 Sweep type: 1 = linear
2 = parabolic
3 = exponential
4 = other
135 - 136 Sweep trace taper length at start, ms.
137 - 138 Sweep trace taper length at end, ms.
139 - 140 Taper type: 1 = linear
2 = cos
3 = other
141 - 142 Alias filter frequency.
143 - 144 Alias filter slope.
145 - 146 Notch filter frequency.
147 - 148 Notch filter slope.
149 - 150 Low cut frequency.

151 - 152 High cut frequency.
153 - 154 Low cut slope.
155 - 156 High cut slope.
157 - 158 Year data recorded.
159 - 160 Day of year.
161 - 162 Hour of day (24 hour clock).
163 - 164 Minute of hour.
165 - 166 Second of minute.
167 - 168 Time basis code: 1 = local
2 = GMT
3 = other
169 - 170 Trace weighting factor - defined as 2-N volts for the least significant bit. (N=0, 1,...,32,767)
171 - 172 Geophone group number of roll switch position one.

173 - 174 Geophone group number of trace number one within original field record.

175 - 176 Geophone group number of last trace within original field record.

177 - 178 Gape size (total number of groups dropped).

179 - 180 Overtravel associated with taper at beginning or end of line:

1 = down (or behind)

2 = up (or ahead)

181 - 240 Unassigned - for optional information.

181 - 240

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FIGURES

USAGE: dumpsegy {file name} {-e} {-b} {-t} {-n} {-v} {-c} {-f file} {-r}

{file name} MUST be provided, all other parameters are optional.

-e: - display EBCDIC header record.
-b: - display BINARY header record.
-t: - display individual trace header per trace
selected.
-v: - display actual SEG-Y sample value in decimal.
-n: - display all information EXCEPT trace samples.
-c: - copy data to an output file in binary format.
This option may be used to create a SEG-Y
file containing a subset of the original SEG-Y
file.
-f {file name}: - redirect output to a file.
-r {start:stop:increment}: - sequential range of traces to display,
with an optional increment.

The -v and -c options are mutually exclusive and will cause DUMPSEGY to exit.

Optional parameters may be entered in any order.

Figure 1: Program usage information displayed to the user's terminal when DUMPSEGY is invoked with no parameters.

========== FILE INFORMATION =========

```
          file: SAMPLE.SGY

     sample rate: 4000.0 microsec
samples per trace:   1500
     data length:   6000 msec
  bytes per trace:   6240
    bytes in file: 3079920
   traces in file:    125
```

Figure 2: File information retrieved and displayed upon opening the specified SEG-Y input file.

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```
[ 3841 -  3856] 0000 0000 0000 0000 0000 0000 0000 0000
[ 3857 -  3872] 0000 0000 0000 0000 0000 0000 0000 0000
[ 3873 -  3888] 0000 0000 0000 0000 0000 0000 0000 0000
.
.
.
[ 9793 -  9808] 4788 e33a 474b c1b4 46cf 8a0f 4774 8e1f
[ 9809 -  9824] c632 662e c814 6b52 c7fb f665 47b8 af5f
[ 9825 -  9840] 4813 7b8b 474b c30c c72c e92d c612 dba9
```

Figure 3: An example of the default display format for data trace number 1 from the example data set. Byte 3841 is the first sample in the data trace. Byte 9840 is the last byte of the last sample of the data trace. There are 6000 bytes in this data trace, with 4 bytes per sample, for a total of 1500 samples per trace.

```
C1  NPRA LINE 624-79..CREATED 6/91..TAPE LIBRARY SLOT 12133
C2  GSI PARTY 1182..9.5 LINE MILES
C3  SPTS 1-57..DATA LENGTH 6000 MS..SAMPLE RATE 4 MS..6
```

```
FOLD...AGC 1000 MS
C4  SHOT POINT IN HEADER ESPNUM AT BYTE 17, 4 BYTES, INTEGER
C5  ------------------------------------------------------------
-----------
C6  NO WARRANTY EXPRESSED OR IMPLIED IS MADE BY THE U.S.
GEOLOGICAL SURVEY,
C7  DEPT OF THE INTERIOR, AS TO THE ACCURACY OF THE DATA &
RELATED MATERIALS
C8  PRESENTED HEREIN.  THE ACT OF DISTRIBUTION SHALL NOT
CONSTITUTE ANY SUCH
C9  WARRANTY, AND NO RESPONSIBILITY IS ASSUMED BY THE U.S.
GEOLOGICAL SURVEY
C10 IN THE USE OF THESE DATA AND RELATED MATERIALS.
C11 ------------------------------------------------------------
-----------
C
C
C
.
.
.
C
```

Figure 4: An example of the EBCDIC header display initiated by command line option "-e".

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```
[3201 - 3204] jobID                  241     000000f1
[3205 - 3208] lineNumber             623779     000984a3
[3209 - 3212] reelNumber               1     00000001
[3213 - 3214] tracesPerRecord          48     0030
[3215 - 3216] auxTracesPerRecord        0     0000
[3217 - 3218] sampleRateReel         4000     0fa0
```

```
[3219 - 3220] sampleRateOrig                0     0000
[3221 - 3222] samplesPerTraceReel          1500     05dc
[3223 - 3224] samplesPerTraceOrig          1501     05dd
[3225 - 3226] dataFormatCode                  1     0001
[3227 - 3228] CDPfold                        48     0030
[3229 - 3230] traceSortCode                   4     0004
[3231 - 3232] verticalSumCode                 1     0001
[3233 - 3234] sweepFreqStart                  0     0000
[3235 - 3236] sweepFreqEnd                    0     0000
[3237 - 3238] sweepLength                     0     0000
[3239 - 3240] sweepTypeCode                   0     0000
[3241 - 3242] sweepChannelTraceNumber         0     0000
[3243 - 3244] sweepTraceTaperLengthStart      0     0000
[3245 - 3246] sweepTraceTaperLengthEnd        0     0000
[3247 - 3248] taperType                       0     0000
[3249 - 3250] correlatedData                  0     0000
[3251 - 3252] binaryGainRecovered             0     0000
[3253 - 3254] amplitudeRecovery               0     0000
[3255 - 3256] measurementSystem               1     0001
[3257 - 3258] impulseSignalPolarity           0     0000
[3259 - 3260] vibratoryPolarityCode           0     0000
```

Figure 5: An example of the binary header display initiated by the command line option "-b".

DUMPSEGY V1.0

[3601 - 3604] traceSequenceNumberLine 1
00000001
[3605 - 3608] traceSequenceNumberReel 1
00000001
[3609 - 3612] origFieldRecordNumber 149
00000095
[3613 - 3616] fieldRecordTraceNumber 0
00000000
[3617 - 3620] energySourcePt 0
00000000
[3621 - 3624] cdpNumber 101
00000065
[3625 - 3628] traceCdpNumber 1
00000001
[3629 - 3630] traceIdNumber 1
0001
[3631 - 3632] verticallySummedTraces 1
0001
[3633 - 3634] horizontallyStackedTraces 1
0001
[3635 - 3636] dataUse 1
0001
[3637 - 3640] sourceToReceiver 0
00000000
[3641 - 3644] receiverElevation 0
00000000
[3645 - 3648] sourceSurfaceElevation 0
00000000
[3649 - 3652] sourceDepth 0
00000000
[3653 - 3656] receiverDatumElevation 0
00000000

[3657 - 3660] sourceDatumElevation 0
00000000
[3661 - 3664] sourceWaterDepth 0
00000000
[3665 - 3668] groupWaterDepth 0
00000000
[3669 - 3670] elevationScalar 1
0001
[3671 - 3672] coordinateScalar 1
0001
[3673 - 3676] sourceXCoordinate 0
00000000
[3677 - 3680] sourceYCoordinate 0
00000000
[3681 - 3684] groupXCoordinate 0
00000000
[3685 - 3688] groupYCoordinate 0
00000000
[3689 - 3690] coordinateUnits 1
0001
[3691 - 3692] weatheringVelocity 0
0000

[3693 - 3694] subWeatheringVelocity 0
0000
[3695 - 3696] sourceUpholeTime 0
0000
[3697 - 3698] groupUpholeTime 0
0000
[3699 - 3700] sourceStaticCorrection 0
0000
[3701 - 3702] groupStaticCorrection 0
0000
[3703 - 3704] totalStaticApplied 0
0000
[3705 - 3706] lagTimeA 0
0000
[3707 - 3708] lagTimeB 0

0000
[3709 - 3710] delayRecordingTime 0
0000
[3711 - 3712] muteTimeStart 0
0000
[3713 - 3714] muteTimeEnd 6000
1770
[3715 - 3716] numberOfSamples 1500
05dc
[3717 - 3718] sampleInterval 4000
0fa0
[3719 - 3720] gainType 0
0000
[3721 - 3722] gainConstant 0
0000
[3723 - 3724] initialGain 0
0000
[3725 - 3726] correlated 0
0000
[3727 - 3728] sweepFrequencyStart 0
0000
[3729 - 3730] sweepFrequencyEnd 0
0000
[3731 - 3732] sweepLength 0
0000
[3733 - 3734] sweepType 0
0000
[3735 - 3736] sweepTraceTaperStart 0
0000
[3737 - 3738] sweepTraceTaperEnd 0
0000
[3739 - 3740] taperType 0
0000
[3741 - 3742] aliasFilterFrequency 0
0000
[3743 - 3744] aliasFilterSlope 0
0000
[3745 - 3746] notchFilterFrequency 0
0000

```
[  3747 -   3748] notchFilterSlope              0
0000
[  3749 -   3750] lowCutFrequency               0
0000
[  3751 -   3752] highCutFrequency              0
0000
[  3753 -   3754] lowCutSlope                   0
0000
[  3755 -   3756] highCutSlope                  0
0000
[  3757 -   3758] yearRecorded                  0
0000
[  3759 -   3760] dayOfYear                     0
0000
[  3761 -   3762] hourOfDay                     0
0000
[  3763 -   3764] minuteOfHour                  0
0000
[  3765 -   3766] secondOfMinute                0
0000
[  3767 -   3768] timeBasisCode                 1
0001
[  3769 -   3770] traceWeightingFactor          10
000a
[  3771 -   3772] geophoneNumberRollSwitch1     0
0000
[  3773 -   3774] geophoneNumberTrace1          0
0000
[  3775 -   3776] geophoneNumberLastTrace       0
0000
[  3777 -   3778] gapSize                       0
0000
[  3779 -   3780] overTravel                    0
0000
```

Figure 6: An example of the data trace header display initiated by command line option "-t".

[3841 - 3856] +0.000000e+00 +0.000000e+00 +0.000000e+00
+0.000000e+00
[3857 - 3872] +0.000000e+00 +0.000000e+00 +0.000000e+00
+0.000000e+00
[3873 - 3888] +0.000000e+00 +0.000000e+00 +0.000000e+00
+0.000000e+00
.
.
.
[9777 - 9792] +2.087452e+08 +2.421491e+08 -6.184693e+07 -
4.641995e+07
[9793 - 9808] +1.435371e+08 +7.943661e+07 +1.360130e+07
+1.222169e+08
[9809 - 9824] -3.302958e+06 -3.425777e+08 -2.642018e+08
+1.936563e+08
[9825 - 9840] +3.268636e+08 +7.944211e+07 -4.709243e+07 -
1.235881e+06

Figure 7: An example of the floating point display format for data trace number 1 from the example data set. Byte 3841 is the first sample in the data trace. Byte 9840 is the last byte of the last sample of the data trace. There are 6000 bytes in this data trace, with 4 bytes

per sample, for a total of 1500 samples per trace.

U.S. DEPARTMENT OF THE INTERIOR / U.S. GEOLOGICAL SURVEY

U.S. GEOLOGICAL SURVEY DIGITAL DATA SERIES DDS-13

International Phase of Ocean Drilling Seismic Line 1 Demultiplexed Data Cape Hatteras to Mid-Atlantic Ridge

PROCESSING HISTORY

ABSTRACT

In an ongoing effort to reduce the amount of data loss due to old, deteriorating magnetic tapes, data from a 3400-km-long multichannel seismic-reflection line collected between Cape Hatteras and the Mid-Atlantic Ridge were demultiplexed, compressed, and output in an industry-standard SEG-Y format.

INTRODUCTION

A 3400-km-long multichannel seismic-reflection profile (Line 1) extending from Cape Hatteras to the rift valley of the Mid-Atlantic Ridge was recorded in 1974 by Digicon, Inc. Two small lines totaling 80 km (Lines A and B), connecting the main line to two coastal wells in North Carolina were simultaneously acquired. The experiment was part of the International Phase of Ocean Drilling (IPOD) and was jointly funded by the U.S. Geological Survey (USGS) and the National Science Foundation's Deep Sea Drilling Project (DSDP). The data were recorded from the marine vessel Gulf Seal using a Texas Instruments DFS III recording system. A tuned airgun array totaling 1,700 cubic inches was used to generate seismic source signals generally every 50 m, and a streamer with 48-nonlinearly spaced hydrophone groups was used to detect the returning seismic signals. A summary of the shooting and recording parameters is shown in table 1. Segments of the western half of the data totaling approximately 1,520 km, or slightly less than half of the line, were processed by Geophysical Services, Inc. (GSI), in the spring of 1975, and a geologic overview of this experiment can be found in Grow and

Markl (1977). Copies of the demultiplexed field tapes are currently stored at the USGS seismic data processing center in Denver, Colorado.

DEMULTIPLEXING AND COMPRESSION

Testing revealed that the data on the original field tapes were deteriorating. To prevent any further loss of data, we demultiplexed the original 631 field tapes and transfered the output to 183 new magnetic tapes at 6250 bpi in an industry standard SEG-Y format (Barry and others, 1975). Our efforts

yielded a data compression ratio of more than 3 to 1. Although some of the field tapes had segments in which the magnetic oxide had actually fallen off, we preserved as much of the data as possible. Close monitoring of the processing system during demultiplexing enabled the computer operators to prevent any further data loss (or misreading of data) due to parity read errors. When excessive parity errors were found on input tapes, operators either passed the tapes through a tape cleaner or, in more severe cases, made a bit-for-bit tape copy. Less than 0.2 percent of the original data could not be recovered during demultiplexing. Shown in appendix I are the slot numbers, shotpoint ranges, and field file ranges of all the output tapes. Slot numbers refer to storage-location numbers within the Denver tape library, and reel numbers refer to the database reference number of our processing system. Observers' notes are also archived at the Denver processing center and can be obtained from the authors.

REFERENCES

Barry, K.M., Cavers, D.A., and Kneale, C.W., 1975, Recommended standards for digital tape formats: Geophysics, v. 40, p. 344-352.

Grow, J.A., and Markl, R.G., 1977, IPOD-USGS multichannel seismic reflection profile from Cape Hatteras to the Mid-Atlantic Ridge: Geology, v. 5, p. 625-630.

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Table 1 -- Field parameters used in survey

DATA ACQUISITION RECORDING PARAMETERS

Instrument	DFS III
Near Offset Distance	346 m
Spacing: traces 48 - 25	50 m
Spacing: traces 25 - 24	75 m
Spacing: traces 24 - 1	100 m
Sample Rate	4 ms
Recording length	10 - 12 s
Fold Coverage	36
Gun Depth	9 m
Airgun Array Displacement	1700 cu. in.
Filter, 18dB/octave slope	6 - 12 Hz

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NOTE: CD-ROM VOL numbers may change during production.

APPENDIX I - USGS Tape Library Listing of IPOD Demultiplexed Tapes

Library Slot	Reel ID	Shot Points	Files	CD-ROM VOL
4567	IPOD1A	101-228	1-256	1
4566	IPOD1B	228-422	256-643	1
6453	IPOD1C	422-549	643-897	1
4565	IPOD1D	549-600	897-999	1
13244	IPOD-1	600-727	999-254	2
13245	IPOD-2	727-854	254-508	2
13246	IPOD-3	854-984	508-768	2
13247	IPOD-4	984-1102	768-4	2
13248	IPOD-5	1102-1229	5-258	3
13249	IPOD-6	1229-1356	258-512	3
13250	IPOD-7	1356-1482	512-764	3
13251	IPOD-8	1482-1575	764-950	3
13252	IPOD-9	1539A-1668	1-260	4
13253	IPOD-10	1668-1795	260-513	4
13254	IPOD-11	1795-1921	513-766	4
13255	IPOD-12	1921-2051	766-26	4
13256	IPOD-13	2051-2067	26-58	5
13257	IPOD-14	2068-2194	59-312	5
13258	IPOD-15	2194-2321	312-566	5
13259	IPOD-16	2321-2348A	566-98	5
13260	IPOD-17	2348A-2478	98-357	6
13261	IPOD-18	2478-2585	357-572	6
13262	IPOD-19	2586-2740	573-882	6
13263	IPOD-20	2740-2881	882-164	6
13264	IPOD-21	2882-3057	165-516	7
13265	IPOD-22	3057-3102	516-606	7
13266	IPOD-23	3103-3274	607-950	7
13267	IPOD-24	3274-3407	950-336	7
13268	IPOD-25	3407-3579	336-680	7
13269	IPOD-26	3579-3753	680-28	8
13270	IPOD-27	3753-3925	28-372	8
13271	IPOD-28	3925-3940	372-402	8
13272	IPOD-29	3940-4111	403-743	8

13273	IPOD-30	4111-4281	743-83	8
13274	IPOD-31	4281-4414A	83-10	9
13275	IPOD-32	4414A-4583	10-348	9
13276	IPOD-33	4583-4779	349-739	9
13277	IPOD-34	4779-4972	739-125	9
13278	IPOD-35	4972-5058	125-298	9
13279	IPOD-36	5059-5256	299-694	10
13280	IPOD-37	5256-5454	694-90	10
13281	IPOD-38	5454-5652	90-485	10
13282	IPOD-39	5652-5850	485-881	10
13283	IPOD-40	5850-6047	881-275	11
13284	IPOD-41	6047-6246	275-673	11
13285	IPOD-42	6246-6422	673-26	11
13286	IPOD-43	6422-6621	27-424	11
13287	IPOD-44	6621-6748	424-677	11
13288	IPOD-45	6748-6918	678-18	12

NOTE: CD-ROM VOL numbers may change during production.

APPENDIX I - USGS Tape Library Listing of IPOD Demultiplexed Tapes

Library Slot	Reel ID	Shot Points	Files	CD-ROM VOL
13289	IPOD-46	6918-7100	18-401	12
13290	IPOD-47	7100-7294	401-790	12
13291	IPOD-48	7294-7483	790-168	12
13292	IPOD-49	7483-7677	168-555	12
13293	IPOD-50	7677-7681	555-564	12
16597	IPOD-51	7682-7935	565-71	13
16598	IPOD-52	7935-8188	71-577	13
16599	IPOD-53	8188-8441	577-83	13
16600	IPOD-54	8441-8695	83-592	13
16601	IPOD-55	8695-8948	592-98	14
16602	IPOD-56	8948-8967	98-135	14
16603	IPOD-57	8967-9220	135-641	14
16604	IPOD-58	9220-9295	641-812	14
16605	IPOD-59	9296-9556	813-334	14
16606	IPOD-60	9556-9810	334-841	14
16607	IPOD-61	9810-10063	841-347	15
16608	IPOD-62	10063-10316	347-853	15
16609	IPOD-63	10316-10569	853-360	15
16610	IPOD-64	10569-10823	360-867	15
16611	IPOD-65	10823-10861	867-943	15
16612	IPOD-66	10861-11108	943-438	16
16613	IPOD-67	11108-11117	438-456	16
16614	IPOD-68	11118-11328	457-417	16
16615	IPOD-69	11328-11581	417-923	16
16616	IPOD-70	11581-11827	923-416	16
16617	IPOD-71	11827-12074	416-910	16
16618	IPOD-72	12074-12320	910-402	17
16619	IPOD-73	12320-12567	402-895	17
16620	IPOD-74	12567-12820	895-402	17
16621	IPOD-75	12820-12834	402-430	17
16622	IPOD-76	12835-13057	431-876	17
16623	IPOD-77	13057-13279	876-319	18
16624	IPOD-78	13279-13501	319-764	18

16625	IPOD-79	13501-13722	764-206	18
16626	IPOD-80	13722-13944	206-650	18
16627	IPOD-81	13944-14111	650-984	18
16628	IPOD-82	14112-14363	985-487	19
16629	IPOD-82B	14242-14258	246-277	19
16630	IPOD-83	14363-14616	487-993	19
16631	IPOD-84	14616-14867	993-496	19
16632	IPOD-85	14867-15120	496-1	19
16633	IPOD-86	15120-15371	1-504	20
16634	IPOD-87	15371-15624	504-10	20
16635	IPOD-88	15624-15875	10-512	20
16636	IPOD-89	15875-16128	512-17	20
16637	IPOD-90	16128-16249	17-259	20
16638	IPOD-91	16250-16454	260-229	21
16639	IPOD-92	16454-16706	229-733	21
16640	IPOD-93	16706-16959	733-240	21

NOTE: CD-ROM VOL numbers may change during production.

APPENDIX I - USGS Tape Library Listing of IPOD Demultiplexed Tapes

Library Slot	Reel ID	Shot Points	Files	CD-ROM VOL
16641	IPOD-94	16959-17212	240-746	21
16642	IPOD-95	17212-17465	746-252	21
16643	IPOD-96	17465-17717	252-755	22
16644	IPOD-97	17717-17970	755-261	22
16645	IPOD-98	17970-18222	261-765	22
16646	IPOD-99	18222-18475	765-271	22
16647	IPOD-100	18475-18726	271-773	22
16648	IPOD-101	18726-18979	773-279	23
16649	IPOD-102	18979-19197	279-716	23
16650	IPOD-103	19198-19420	717-161	23
16651	IPOD-104	19420-19643	161-607	23
16652	IPOD-105	19643-19865	607-51	23
16653	IPOD-106	19865-20087	51-496	24
16654	IPOD-107	20087-20309	496-939	24
16655	IPOD-108	20309-20531	939-383	24
16656	IPOD-109	20531-20753	383-827	24
16657	IPOD-110	20753-20970	827-262	25
16658	IPOD-111	20970-21180	262-682	25
16659	IPOD-112	21181-21403	683-128	25
16660	IPOD-113	21403-21626	128-573	25
16661	IPOD-114	21626-21847	573-16	26
16662	IPOD-115	21848-22053	17-427	26
16663	IPOD-116	22053-22276	427-874	26
16664	IPOD-117	22276-22498	874-317	26
16665	IPOD-118	22498-22719	317-759	27
16666	IPOD-119	22719-22941	759-204	27
16667	IPOD-120	22941-23128	204-257	27
16668	IPOD-121	23128-23346	257-694	27
16669	IPOD-122	23346-23567	694-135	28
16670	IPOD-123	23567-23730	135-462	28
16671	IPOD-124	23732-23954	465-910	28
16672	IPOD-125	23954-24173	911-347	28
16673	IPOD-126	24173-24391	348-784	28

16674	IPOD-127	24392-24614	785-229	29
16675	IPOD-128	24614-24836	229-673	29
16676	IPOD-129	24836-25057	673-115	29
16677	IPOD-130	25057-25101	115-204	29
16678	IPOD-131	25102-25325	205-651	29
16679	IPOD-132	25325-25544	651-90	30
16680	IPOD-133	25544-25767	90-535	30
16885	IPOD-134	25767-25989	535-979	30
16886	IPOD-135	25989-26210	979-422	30
16887	IPOD-136	26210-26432	422-866	31
16888	IPOD-137	26432-26647	866-296	31
16889	IPOD-138	26647-26870	296-741	31
16890	IPOD-139	26870-27091	741-184	31
16891	IPOD-140	27091-27314	184-630	32
16892	IPOD-141	27314-27536	630-74	32
16893	IPOD-142	27536-27759	74-520	32

NOTE: CD-ROM VOL numbers may change during production.

APPENDIX I - USGS Tape Library Listing of IPOD Demultiplexed Tapes

Library Slot	Reel ID	Shot Points	Files	CD-ROM VOL
16894	IPOD-143	27759-27766	520-533	32
16895	IPOD-144	27766-27988	533-977	32
16896	IPOD-145	27988-28211	977-423	33
16897	IPOD-146	28211-28433	423-867	33
16898	IPOD-147	28433-28655	867-311	33
16899	IPOD-148	28655-28878	311-757	33
16900	IPOD-149	28878-29100	757-201	34
16901	IPOD-150	29100-29322	201-646	34
16902	IPOD-151	29322-29544	646-90	34
16903	IPOD-152	29544-29768	90-537	34
16904	IPOD-153	29768-29886	537-774	35
16905	IPOD-154	29886-29911	774-824	35
16906	IPOD-155	29912-30133	825-269	35
16907	IPOD-156	30134-30356	269-713	35
16908	IPOD-157	30356-30580	713-162	35
16909	IPOD-158	30580-30803	162-608	36
16910	IPOD-159	30803-31026	608-53	36
16911	IPOD-160	31026-31244	53-490	36
16912	IPOD-161	31244-31467	490-936	36
16913	IPOD-162	31467-31688	936-378	36
16914	IPOD-163	31688-31912	378-825	37
16915	IPOD-164	31912-32133	825-268	37
16916	IPOD-165	32133-32355	268-711	37
16917	IPOD-166	32355-32576	711-153	37
16918	IPOD-167	32576-32798	153-598	38
16919	IPOD-168	32798-33019	598-40	38
16920	IPOD-169	33019-33241	40-484	38
16921	IPOD-170	33241-33463	484-927	38
16922	IPOD-171	33463-33686	927-374	39
16923	IPOD-172	33686-33909	374-819	39
16924	IPOD-173	33909-34110	819-222	39

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ABSTRACT

We have demultiplexed and compressed data from a 3400-km-long seismic-reflection line collected between Cape Hatteras to the Mid-Atlantic Ridge in a continuing effort to reduce the amount of data loss due to old, deteriorating magnetic tapes.

INTRODUCTION

In 1974, Digicon Inc. recorded a 3400 km-long multichannel seismic-reflection profile extending from Cape Hatteras to the rift valley of the Mid-Atlantic Ridge. Jointly funded by the U.S. Geological Survey (USGS) and the National Science Foundation's Deep Sea Drilling Project (DSDP), the experiment was part of the International Phase of Ocean Drilling (IPOD). The data were recorded from the marine vessel Gulf Seal using a Texas Instruments DFS III recording system. A tuned airgun array totaling 1700 in.3 was used as the seismic source and a streamer with 48-non-linearly spaced hydrophone groups as the antenna. Shotpoint locations, generally spaced every 50 meters, are shown in figures 1 and 2. A summary of the shooting and recording parameters is shown in table 1. Segments of the data totalling approximately 1520 km were processed by Geophysical Services, Inc. (GSI) in the spring of 1975. Copies of the field tapes, and seismic sections can be accessed through the National Geophysical and Solar Terrrestial Data Center in Boulder, Colorado (Grow and Mark, 1977). The 631 original unprocessed field tapes were stored at the USGS seismic processing center in Denver, Colorado.

DEMULTIPLEXING AND COMPRESSION

Testing revealed that the data on the original field tapes were deteriorating. In order to prevent further loss of data, we demultiplexed the original field tapes and transfered the output to 183 new magnetic tapes at 6250 bpi in SEG-Y format, an industry accepted standard (Barry and others, 1975) As a result, our efforts yielded a data compression ratio of more than 3 to 1. Although there were segments on some of the field tapes where the oxide had actually fallen off the tapes, every effort was made to preserve as much of the data as possible. Close monitoring of the processing system during demultiplexing enabled the computer operators to prevent any further loss or

misreading of data due to parity read errors. When exessive parity errors were found on input tapes, operators either ran the tapes through a tape cleaner or in more severe cases just did a tape copy. Shown in appendix I are the slot numbers, shotpoint and field file ranges of all the output tapes. Slot numbers refer to storage locations numbers within our tape library. Observer's notes are also archived at the Denver processing center and can be accessed through the Geophysics Group of the Branch of Petroleum Geology.

REFERENCES

Barry, K.M., Cavers, D.A., and Kneale, C.W., 1975, Recommended standards for digital tape formats: Geophysics, v. 40, p. 344-352.

Grow, J.A., and Markl, R.G., 1977, IPOD-USGS multichannel seismic reflection profile from Cape Hatteras to the Mid-Atlantic Ridge: Geology, v. 5, p. 625-630.

[PB]

[WS 8 in]

*Figure 1 --- Shotpoint Map of Survey Area (Main IPOD line)

[PB]

[WS 4 in]

*Figure 2 --- Shotpoint Map of IPOD close to Cape Hatteras showing lines A and B shot to tie the main IPOD line closer to wells (From Grow and Markl, 1977).

DFS-III Instrument

346 m Offset Distance

50 m Spacing between center of traces 48 through 25

75 m Spacing between center of trace 25 and trace 24

100 m Spacing between center of traces 24 through 1

4 ms Sample Rate

10-12 s Recording length

36 Fold Coverage

9 m Gun Depth

1700 in.3 Displacement of Airgun Array

*Table 1 --- Field parameters used in survey

[PB]

APPENDIX I

SLOT	PROJECT	LINE	REEL	SPTS	FILES	TYPE
15054	GULF SEAL	IPOD-A	A-1	263-135	1-256	DEMUX
15055	GULF SEAL	IPOD-A	A-2	135-83	257-362	DEMUX
8372	GULF SEAL	IPOD-B	B-1	700-578	1-246	DEMUX
8373	GULF SEAL	IPOD-B	B-2	577-453	246-495	DEMUX
8374	GULF SEAL	IPOD-B	B-3	454-329	494-743	DEMUX
8375	GULF SEAL	IPOD-B	B-4	329-203	743-996	DEMUX
8376	GULF SEAL	IPOD-B	B-5	203-151	996-99	DEMUX
8377	GULF SEAL	IPOD-B	B-6	151-83	99-235	DEMUX
4567	GULF SEAL	IPOD	IPOD1A	101-228	1-256	DEMUX
4566	GULF SEAL	IPOD	IPOD1B	228-422	256-643	DEMUX
6453	GULF SEAL	IPOD	IPOD1C	422-549	643-897	DEMUX
4565	GULF SEAL	IPOD	IPOD1D	549-600	897-999	DEMUX
13244	GULF SEAL	IPOD	IPOD-1	600-727	999-254	DEMUX
13245	GULF SEAL	IPOD	IPOD-2	727-854	254-508	DEMUX
13246	GULF SEAL	IPOD	IPOD-3	854-984	508-768	DEMUX
13247	GULF SEAL	IPOD	IPOD-4	984-1102	768-4	DEMUX
13248	GULF SEAL	IPOD	IPOD-5	1102-1229	5-258	DEMUX

13249	GULF SEAL	IPOD	IPOD-6	1229-1356	258-512	DEMUX
13250	GULF SEAL	IPOD	IPOD-7	1356-1482	512-764	DEMUX
13251	GULF SEAL	IPOD	IPOD-8	1482-1575	764-950	DEMUX
13252	GULF SEAL	IPOD	IPOD-9	1539A-1668	1-260	DEMUX
13253	GULF SEAL	IPOD	IPOD-10	1668-1795	260-513	DEMUX
13254	GULF SEAL	IPOD	IPOD-11	1795-1921	513-766	DEMUX
13255	GULF SEAL	IPOD	IPOD-12	1921-2051	766-26	DEMUX
13256	GULF SEAL	IPOD	IPOD-13	2051-2067	26-58	DEMUX
13257	GULF SEAL	IPOD	IPOD-14	2068-2194	59-312	DEMUX
13258	GULF SEAL	IPOD	IPOD-15	2194-2321	312-566	DEMUX
13259	GULF SEAL	IPOD	IPOD-16	2321-2348A	566-98	DEMUX
13260	GULF SEAL	IPOD	IPOD-17	2348A-2478	98-357	DEMUX
13261	GULF SEAL	IPOD	IPOD-18	2478-2585	357-572	DEMUX
13262	GULF SEAL	IPOD	IPOD-19	2586-2740	573-882	DEMUX
13263	GULF SEAL	IPOD	IPOD-20	2740-2881	882-164	DEMUX
13264	GULF SEAL	IPOD	IPOD-21	2882-3057	165-516	DEMUX
13265	GULF SEAL	IPOD	IPOD-22	3057-3102	516-606	DEMUX
13267	GULF SEAL	IPOD	IPOD-24	3274-3407	950-336	DEMUX
13268	GULF SEAL	IPOD	IPOD-25	3407-3579	336-680	DEMUX
13269	GULF SEAL	IPOD	IPOD-26	3579-3753	680-28	DEMUX
13270	GULF SEAL	IPOD	IPOD-27	3753-3925	28-372	DEMUX
13271	GULF SEAL	IPOD	IPOD-28	3925-3940	372-402	DEMUX
13272	GULF SEAL	IPOD	IPOD-29	3940-4111	403-743	DEMUX
13273	GULF SEAL	IPOD	IPOD-30	4111-4281	743-83	DEMUX
13274	GULF SEAL	IPOD	IPOD-31	4281-4414A	83-10	DEMUX
13275	GULF SEAL	IPOD	IPOD-32	4414A-4583	10-348	DEMUX
13276	GULF SEAL	IPOD	IPOD-33	4583-4779	349-739	DEMUX
13277	GULF SEAL	IPOD	IPOD-34	4779-4972	739-125	DEMUX
13278	GULF SEAL	IPOD	IPOD-35	4972-5058	125-298	DEMUX
13279	GULF SEAL	IPOD	IPOD-36	5059-5256	299-694	DEMUX
13280	GULF SEAL	IPOD	IPOD-37	5256-5454	694-90	DEMUX
13281	GULF SEAL	IPOD	IPOD-38	5454-5652	90-485	DEMUX
13282	GULF SEAL	IPOD	IPOD-39	5652-5850	485-881	DEMUX
13283	GULF SEAL	IPOD	IPOD-40	5850-6047	881-275	DEMUX
13284	GULF SEAL	IPOD	IPOD-41	6047-6246	275-673	DEMUX
13285	GULF SEAL	IPOD	IPOD-42	6246-6422	673-26	DEMUX

[PB]

SLOT	PROJECT	LINE	REEL	SPTS	FILES	TYPE
13286	GULF SEAL	IPOD	IPOD-43	6422-6621	27-424	DEMUX

13287	GULF SEAL	IPOD	IPOD-44	6621-6748	424-677	DEMUX
13288	GULF SEAL	IPOD	IPOD-45	6748-6918	678-18	DEMUX
13289	GULF SEAL	IPOD	IPOD-46	6918-7100	18-401	DEMUX
13290	GULF SEAL	IPOD	IPOD-47	7100-7294	401-790	DEMUX
13291	GULF SEAL	IPOD	IPOD-48	7294-7483	790-168	DEMUX
13292	GULF SEAL	IPOD	IPOD-49	7483-7677	168-555	DEMUX
13293	GULF SEAL	IPOD	IPOD-50	7677-7681	555-564	DEMUX
16597	GULF SEAL	IPOD	IPOD-51	7682-7935	565-71	DEMUX
16598	GULF SEAL	IPOD	IPOD-52	7935-8188	71-577	DEMUX
16599	GULF SEAL	IPOD	IPOD-53	8188-8441	577-83	DEMUX
16600	GULF SEAL	IPOD	IPOD-54	8441-8695	83-592	DEMUX
16601	GULF SEAL	IPOD	IPOD-55	8695-8948	592-98	DEMUX
16602	GULF SEAL	IPOD	IPOD-56	8948-8967	98-135	DEMUX
16603	GULF SEAL	IPOD	IPOD-57	8967-9220	135-641	DEMUX
16604	GULF SEAL	IPOD	IPOD-58	9220-9295	641-812	DEMUX
16605	GULF SEAL	IPOD	IPOD-59	9296-9556	813-334	DEMUX
16606	GULF SEAL	IPOD	IPOD-60	9556-9810	334-841	DEMUX
16607	GULF SEAL	IPOD	IPOD-61	9810-10063	841-347	DEMUX
16608	GULF SEAL	IPOD	IPOD-62	10063-10316	347-853	DEMUX
16609	GULF SEAL	IPOD	IPOD-63	10316-10569	853-360	DEMUX
16610	GULF SEAL	IPOD	IPOD-64	10569-10823	360-867	DEMUX
16611	GULF SEAL	IPOD	IPOD-65	10823-10861	867-943	DEMUX
16612	GULF SEAL	IPOD	IPOD-66	10861-11108	943-438	DEMUX
16613	GULF SEAL	IPOD	IPOD-67	11108-11117	438-456	DEMUX
16614	GULF SEAL	IPOD	IPOD-68	11118-11328	457-417	DEMUX
16615	GULF SEAL	IPOD	IPOD-69	11328-11581	417-923	DEMUX
16616	GULF SEAL	IPOD	IPOD-70	11581-11827	923-416	DEMUX
16617	GULF SEAL	IPOD	IPOD-71	11827-12074	416-910	DEMUX
16618	GULF SEAL	IPOD	IPOD-72	12074-12320	910-402	DEMUX
16619	GULF SEAL	IPOD	IPOD-73	12320-12567	402-895	DEMUX
16620	GULF SEAL	IPOD	IPOD-74	12567-12820	895-402	DEMUX
16621	GULF SEAL	IPOD	IPOD-75	12820-12834	402-430	DEMUX
16622	GULF SEAL	IPOD	IPOD-76	12835-13057	431-876	DEMUX
16623	GULF SEAL	IPOD	IPOD-77	13057-13279	876-319	DEMUX
16624	GULF SEAL	IPOD	IPOD-78	13279-13501	319-764	DEMUX
16625	GULF SEAL	IPOD	IPOD-79	13501-13722	764-206	DEMUX
16626	GULF SEAL	IPOD	IPOD-80	13722-13944	206-650	DEMUX
16627	GULF SEAL	IPOD	IPOD-81	13944-14111	650-984	DEMUX
16628	GULF SEAL	IPOD	IPOD-82	14112-14363	985-487	DEMUX
16629	GULF SEAL	IPOD	IPOD-82B	14242-14258	246-277	DEMUX
16630	GULF SEAL	IPOD	IPOD-83	14363-14616	487-993	DEMUX
16631	GULF SEAL	IPOD	IPOD-84	14616-14867	993-496	DEMUX
16632	GULF SEAL	IPOD	IPOD-85	14867-15120	496-1	DEMUX

16633	GULF SEAL	IPOD	IPOD-86	15120-15371	1-504	DEMUX
16634	GULF SEAL	IPOD	IPOD-87	15371-15624	504-10	DEMUX
16635	GULF SEAL	IPOD	IPOD-88	15624-15875	10-512	DEMUX
16636	GULF SEAL	IPOD	IPOD-89	15875-16128	512-17	DEMUX
16637	GULF SEAL	IPOD	IPOD-90	16128-16249	17-259	DEMUX
16638	GULF SEAL	IPOD	IPOD-91	16250-16454	260-229	DEMUX
16639	GULF SEAL	IPOD	IPOD-92	16454-16706	229-733	DEMUX
16640	GULF SEAL	IPOD	IPOD-93	16706-16959	733-240	DEMUX
16641	GULF SEAL	IPOD	IPOD-94	16959-17212	240-746	DEMUX
16642	GULF SEAL	IPOD	IPOD-95	17212-17465	746-252	DEMUX
16643	GULF SEAL	IPOD	IPOD-96	17465-17717	252-755	DEMUX
16644	GULF SEAL	IPOD	IPOD-97	17717-17970	755-261	DEMUX
16645	GULF SEAL	IPOD	IPOD-98	17970-18222	261-765	DEMUX
16646	GULF SEAL	IPOD	IPOD-99	18222-18475	765-271	DEMUX
16647	GULF SEAL	IPOD	IPOD-100	18475-18726	271-773	DEMUX

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SLOT	PROJECT	LINE	REEL	SPTS	FILES	TYPE
16648	GULF SEAL	IPOD	IPOD-101	18726-18979	773-279	DEMUX
16649	GULF SEAL	IPOD	IPOD-102	18979-19197	279-716	DEMUX
16650	GULF SEAL	IPOD	IPOD-103	19198-19420	717-161	DEMUX
16651	GULF SEAL	IPOD	IPOD-104	19420-19643	161-607	DEMUX
16652	GULF SEAL	IPOD	IPOD-105	19643-19865	607-51	DEMUX
16653	GULF SEAL	IPOD	IPOD-106	19865-20087	51-496	DEMUX
16654	GULF SEAL	IPOD	IPOD-107	20087-20309	496-939	DEMUX
16655	GULF SEAL	IPOD	IPOD-108	20309-20531	939-383	DEMUX
16656	GULF SEAL	IPOD	IPOD-109	20531-20753	383-827	DEMUX
16657	GULF SEAL	IPOD	IPOD-110	20753-20970	827-262	DEMUX
16658	GULF SEAL	IPOD	IPOD-111	20970-21180	262-682	DEMUX
16659	GULF SEAL	IPOD	IPOD-112	21181-21403	683-128	DEMUX
16660	GULF SEAL	IPOD	IPOD-113	21403-21626	128-573	DEMUX
16661	GULF SEAL	IPOD	IPOD-114	21626-21847	573-16	DEMUX
16662	GULF SEAL	IPOD	IPOD-115	21848-22053	17-427	DEMUX
16663	GULF SEAL	IPOD	IPOD-116	22053-22276	427-874	DEMUX
16664	GULF SEAL	IPOD	IPOD-117	22276-22498	874-317	DEMUX
16665	GULF SEAL	IPOD	IPOD-118	22498-22719	317-759	DEMUX
16666	GULF SEAL	IPOD	IPOD-119	22719-22941	759-204	DEMUX
16667	GULF SEAL	IPOD	IPOD-120	22941-23128	204-257	DEMUX
16668	GULF SEAL	IPOD	IPOD-121	23128-23346	257-694	DEMUX
16669	GULF SEAL	IPOD	IPOD-122	23346-23567	694-135	DEMUX

16670	GULF SEAL	IPOD	IPOD-123	23567-23730	135-462	DEMUX
16671	GULF SEAL	IPOD	IPOD-124	23732-23954	465-910	DEMUX
16672	GULF SEAL	IPOD	IPOD-125	23954-24173	911-347	DEMUX
16673	GULF SEAL	IPOD	IPOD-126	24173-24391	348-784	DEMUX
16674	GULF SEAL	IPOD	IPOD-127	24392-24614	785-229	DEMUX
16675	GULF SEAL	IPOD	IPOD-128	24614-24836	229-673	DEMUX
16676	GULF SEAL	IPOD	IPOD-129	24836-25057	673-115	DEMUX
16677	GULF SEAL	IPOD	IPOD-130	25057-25101	115-204	DEMUX
16678	GULF SEAL	IPOD	IPOD-131	25102-25325	205-651	DEMUX
16679	GULF SEAL	IPOD	IPOD-132	25325-25544	651-90	DEMUX
16680	GULF SEAL	IPOD	IPOD-133	25544-25767	90-535	DEMUX
16885	GULF SEAL	IPOD	IPOD-134	25767-25989	535-979	DEMUX
16886	GULF SEAL	IPOD	IPOD-135	25989-26210	979-422	DEMUX
16887	GULF SEAL	IPOD	IPOD-136	26210-26432	422-866	DEMUX
16888	GULF SEAL	IPOD	IPOD-137	26432-26647	866-296	DEMUX
16889	GULF SEAL	IPOD	IPOD-138	26647-26870	296-741	DEMUX
16890	GULF SEAL	IPOD	IPOD-139	26870-27091	741-184	DEMUX
16891	GULF SEAL	IPOD	IPOD-140	27091-27314	184-630	DEMUX
16892	GULF SEAL	IPOD	IPOD-141	27314-27536	630-74	DEMUX
16893	GULF SEAL	IPOD	IPOD-142	27536-27759	74-520	DEMUX
16894	GULF SEAL	IPOD	IPOD-143	27759-27766	520-533	DEMUX
16895	GULF SEAL	IPOD	IPOD-144	27766-27988	533-977	DEMUX
16896	GULF SEAL	IPOD	IPOD-145	27988-28211	977-423	DEMUX
16897	GULF SEAL	IPOD	IPOD-146	28211-28433	423-867	DEMUX
16898	GULF SEAL	IPOD	IPOD-147	28433-28655	867-311	DEMUX
16899	GULF SEAL	IPOD	IPOD-148	28655-28878	311-757	DEMUX
16900	GULF SEAL	IPOD	IPOD-149	28878-29100	757-201	DEMUX
16901	GULF SEAL	IPOD	IPOD-150	29100-29322	201-646	DEMUX
16902	GULF SEAL	IPOD	IPOD-151	29322-29544	646-90	DEMUX
16903	GULF SEAL	IPOD	IPOD-152	29544-29768	90-537	DEMUX
16904	GULF SEAL	IPOD	IPOD-153	29768-29886	537-774	DEMUX
16905	GULF SEAL	IPOD	IPOD-154	29886-29911	774-824	DEMUX
16906	GULF SEAL	IPOD	IPOD-155	29912-30133	825-269	DEMUX
16907	GULF SEAL	IPOD	IPOD-156	30134-30356	269-713	DEMUX
16908	GULF SEAL	IPOD	IPOD-157	30356-30580	713-162	DEMUX
16909	GULF SEAL	IPOD	IPOD-158	30580-30803	162-608	DEMUX
16910	GULF SEAL	IPOD	IPOD-159	30803-31026	608-53	DEMUX

[PB]

SLOT	PROJECT	LINE	REEL	SPTS	FILES	TYPE

16911	GULF SEAL	IPOD	IPOD-160	31026-31244	53-490	DEMUX
16912	GULF SEAL	IPOD	IPOD-161	31244-31467	490-936	DEMUX
16913	GULF SEAL	IPOD	IPOD-162	31467-31688	936-378	DEMUX
16914	GULF SEAL	IPOD	IPOD-163	31688-31912	378-825	DEMUX
16915	GULF SEAL	IPOD	IPOD-164	31912-32133	825-268	DEMUX
16916	GULF SEAL	IPOD	IPOD-165	32133-32355	268-711	DEMUX
16917	GULF SEAL	IPOD	IPOD-166	32355-32576	711-153	DEMUX
16918	GULF SEAL	IPOD	IPOD-167	32576-32798	153-598	DEMUX
16919	GULF SEAL	IPOD	IPOD-168	32798-33019	598-40	DEMUX
16920	GULF SEAL	IPOD	IPOD-169	33019-33241	40-484	DEMUX
16921	GULF SEAL	IPOD	IPOD-170	33241-33463	484-927	DEMUX
16922	GULF SEAL	IPOD	IPOD-171	33463-33686	927-374	DEMUX
16923	GULF SEAL	IPOD	IPOD-172	33686-33909	374-819	DEMUX
16924	GULF SEAL	IPOD	IPOD-173	33909-34110	819-222	DEMUX

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SHOTPOINT LOCATION DATA

Shotpoint location data are given in the ASCII text file IPOD.NAV in the NAV subdirectory.

LOCATION DATA RECORD FORMAT

<latitude> <longitude> <shotpoint>

where

<latitude> is the latitude in decimal degrees to 6 places precision.
<longitude> is the longitude in decimal degrees to 6 places precision.
<shotpoint> is the point to be located.

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OBPLOT

INTRODUCTION

OBPLOT is an interactive DOS utility which will translate a PCX-format graphic image file of observer logs stored on the CD-ROM into a temporary binary file, and display that binary file to the user's personal computer (PC) display.

OVERVIEW

OBPLOT will query the user for the CD-ROM drive letter, the PCX file to view, and the drive letter for the drive on which to create the temporary binary file. After the user has answered those queries, OBPLOT will open the indicated PCX file and translate its contents into a temporary binary file stored on the indicated drive. After converting the PCX file into the temporary file, OBPLOT will query the user for the display resolution: VGA or Super VGA. With the selection of the viewing resolution, OBPLOT will display the whole graphic image to the user's PC display. The image displayed will have a "selection box" over a portion of the display. The user may use the keyboard arrow keys to move the selection box around the displayed image to select a portion to be displayed at a greater resolution. OBPLOT will display that portion of the image at the "zoomed" resolution. After the zoomed panel has been displayed, the user may scroll horizontally and vertically, zoom in or out of the selected portion, select another portion to display,

or quit the current display. If quitting the current display, the user will be queried about whether to display another PCX image or exit the program.

PROGRAM STARTUP AND FILE SELECTION

OBPLOT may be started from the DOS prompt by typing OBPLOT and pressing ENTER. OBPLOT will display a menu of CD-ROM drive letters and prompt the user to use the arrow keys to select the letter representing the CD-ROM drive and press ENTER. OBPLOT will go to the OBLOGS subdirectory on

the CD-ROM, display a menu of PCX format files available, and prompt the user to highlight the desired file using the arrow keys and then to select the file by pressing ENTER. With the selection of the PCX file to translate, OBPLOT will prompt the user to select the letter of the drive that will receive the temporary file containing the translated image. The drive letter is selected in the same manner as described above for the CD-ROM drive letter. After the user has entered this information, OBPLOT will open the indicated PCX file and translate it into a file named "OBTEMP" on the drive indicated to receive this file.

VIEWING THE IMAGE

After the translation of the PCX file into the temporary file, the user is presented with a viewing resolution menu and prompted to select the desired viewing resolution: VGA or Super VGA. With the selection of the display resolution, the whole PCX image will be drawn on the PC's display and the selection box placed in the upper left-hand portion of the image. The selection box may be moved about the image using the arrow keys. Once the selection box is placed in the desired location and ENTER is pressed, OBPLOT will display that portion of the image at a higher, or zoomed, resolution. The user may scroll this image horizontally and vertically using the arrow keys, zoom into the display using the F5 key, zoom out of the display using

the F6 key, or select another portion for viewing by pressing the F4 key.

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EXITING THE PROGRAM

The user may exit viewing the image by pressing the ESC key. A menu will then appear that will allow the user to select another PCX image to display or to exit the program. Selecting to view another PCX file will display the file selection menu. Selecting to exit will return the user to the DOS prompt.

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PLOTSEGY V1.0: A DOS Graphics Program to Display SEG-Y Disk-Image Seismic Data

by F.N. Zihlman1

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1992

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ILLUSTRATIONS

PLOTSEGY V1.0

ABSTRACT

PLOTSEGY is an interactive program written in C and designed to display digital seismic data, stored in industry-standard SEG-Y format, using an 80286 or greater personal computer and the MS-DOS or PC-DOS operating system. PLOTSEGY will prompt the user for the file path and file name of the SEG-Y data file to display, the type of trace display to use, the time window and timing lines annotation frequency, the gain to apply to the data, the trace clipping allowed, the first trace in the file to plot, the number of traces per panel to display, and the trace annotation frequency to use in the display. PLOTSEGY will automatically recognize and use EGA, VGA, and Hercules video devices. A screen dump of the seismic data displayed may be sent to an attached printer by issuing the DOS GRAPHICS command before running PLOTSEGY. Screen images are sent to the printer by pressing simultaneously the SHIFT and PRINT SCRN keys

INTRODUCTION

The combination of low cost, powerful personal computers

(PC's) possessing hard disk drives with hundreds of megabytes of storage allows a "mainframe" level of computing on a user's desk. Desktop PC's have increased in processing power to the point that an Intel 80486 processor-based DOS PC running at 25 Mhz was able to execute a computationally intensive seismic data processing algorithm 50% faster than the same source code running on a VAX 11/780 with an attached array processor (Miller, 1992, personal communication). This increase in desktop computing power and disk storage has made the real-time display of seismic data a practical reality. The data are stored in a disk file in industry-standard SEG-Y format. A typical amount of seismic data occupies many megabytes of storage space and thus, for practical purposes, a hard disk or CD-ROM is necessary.

PLOTSEGY was written to operate on DOS-based PC's to read any standard SEG-Y format disk or CD-ROM files and display that data in real-time to the user's monitor without the need for any preprocessing of the data.

It should be noted that PLOTSEGY normalizes the amplitudes of each sample within each trace against a reference value for that trace. This reference value is determined by calculating the average value of all non-zero samples within a trace. This reference value is set equal to 1/4 of the distance between traces on the screen. Thus the relative amplitudes between traces are not preserved by PLOTSEGY, although relative amplitudes within the same trace are unmodified. The advantage of this normalization technique is that it permits the viewing of data sets having a widely varying average amplitudes between traces (such as raw shot records) on the same screen using the

same gain factor. A future verson of PLOTSEGY is to include an option to preserve relative amplitudes between traces.

This open-file report (OF92-349A) describes the PLOTSEGY program and is available in paper copy. The executable image, source code files and a sample SEG-Y data set are available as a

separate open-file report, OF92-349B, composed of four high density 5.25 inch diskettes.

SYSTEM REQUIREMENTS

PLOTSEGY was developed in C using Borland C/C++ 3.0 on an ALR BusinessVEISA with a 33 Mhz Intel 80386 processor, an 80387 math coproccessor, and MS-DOS 4.01.

PLOTSEGY requires the following hardware and software requirements:

* Intel 80286 or higher processor. An 80386 or greater is strongly recommended.
* Video card capable of EGA, VGA, or Hercules displays.
* DOS 3.0 or later.
* A hard disk drive or CD-ROM containing the input file(s).
* A math coprocessor is NOT required, but will be used if available and is strongly recommended.

A color monitor is strongly recommended. Monochrome displays may possibly be improved by starting PLOTSEGY using the black and white option:

```
C:\> PLOTSEGY  -bw
```

This will also convert a color display to black and white.

PLOTSEGY OVERVIEW

PLOTSEGY consists of three program sections: entry of SEG-Y data file path and name, entry of seismic trace display information, and the SEG-Y data display itself. PLOTSEGY is started at the DOS command line prompt by typing

```
C:\> PLOTSEGY
```

and prompts the user for input file directory path and name. The user is prompted continuously until the file path and SEG-Y file name have been successfully entered and the corresponding SEG-Y

data file opened, or the user enters "exit" or "EXIT". Entering "exit" or "EXIT" to either prompt will halt program execution and return the user to the DOS command level.

After the file directory path and the SEG-Y file name have been entered, PLOTSEGY will display some information about the data file opened (see File Information, below) and then pause until the user presses a key. After a key has been pressed, PLOTSEGY clears the monitor screen and prompts the user for the trace display information: trace type, the seismic trace time window, and the trace display parameters to use for the display (see Trace Display Information, below). Entering "quit" or "QUIT" to any prompt will return the user to the file path/name prompts. Entering "exit" or "EXIT" will halt program execution and return the user to the DOS command level.

After the user has successfully entered the File Information and Trace Display Information, PLOTSEGY will access the first trace requested. After the first trace, all traces after that are accessed sequentially. The sample rate and number of samples per trace are determined from each trace header. All samples for each trace are read, regardless of the time window entered, to allow for future processing needs (such as AGC or filtering). Currently a maximum of 6000 samples are allowed per trace. Data sets having more than 6000 samples per trace will cause PLOTSEGY to fail and should be resampled to have 6000 samples per trace or less.

PLOTSEGY will produce the seismic data display a "panel", or screen, at a time. The number of traces displayed per panel is set by the user by means of the trace display parameter prompts. At the end of each panel the user may return to the file path/name data entry screen or display the next panel of data, if it exists. If all the data has been displayed the user is returned to the file path/name entry screen. Pressing the escape key (ESC) at any time during the display of data will stop the

data display and return the user to the file path/name entry screen.

All information entered by the user in response to a program prompt will be kept as the default value for that prompt. Default values are displayed with each prompt enclosed in square brackets. A Default value is selected by pressing the enter key (ENTER) in response to a particular prompt.

PLOTSEGY does no extensive error checking on the values entered by the user. Indiscriminate replies to the program's prompts may cause PLOTSEGY to fail.

Hardcopy of the screen display, in the form of a "screen dump" is available through the DOS GRAPHICS command and the SHIFT-PRINT SCREEN DOS function. The user must issue the GRAPHICS command at the DOS prompt before running PLOTSEGY. Any seismic display produced may be sent to the attached printer by simultaneously pressing the SHIFT and PRINT SCREEN keys. See the appropriate MS-DOS manual for an explanation of the SHIFT-PRINT SCREEN function.

FILE INFORMATION

Figure 1a is an example of the File Information Entry Screen. PLOTSEGY prompts the user for the DOS file path to the directory containing the SEG-Y data file and for a SEG-Y data file name, as described below:

> DOS File Path - The DOS directory path to the location of the SEG-Y data files. The current working directory (the directory from which the program is invoked) is the first default value with all other user-entered paths as subsequent default values. The user may enter a "-" at the prompt to indicate PLOTSEGY is to use the path of the current working directory as the DOS file

path.

SEG-Y File Name - The file containing the SEG-Y data to be displayed. These are binary files representing a disk image of a SEG-Y data set obtained in a bit-for-bit copy from tape. The author recommends a .SGY file extension to identify these files as binary SEG-Y disk images.

PLOTSEGY will combine the file path and SEG-Y file name entered into a single file specification. PLOTSEGY will continuously prompt for the two items until it successfully opens the specified file or the user enters "exit", which will return the user to the DOS command level. Both the file path and file name entered will be saved as default values for future use during the program session.

After successfully opening the specified file, PLOTSEGY will determine and return the following file information:

* File name.
* Sample interval, in milliseconds.
* Number of samples per seismic trace.
* Maximum time value per seismic trace, in milliseconds.
* Bytes per seismic trace.
* Bytes in the file.
* Number of seismic traces in the file.

This information remains on the screen until the user presses any key. Figure 1b is an example of the File Information Display following successful entry of the file path and name as shown in Figure 1a.

TRACE DISPLAY INFORMATION

The Trace Display Information screen is shown in Figure 2. This screen appears after successfully selecting and opening a seismic data file. The prompts are described below:

Trace Display Type - wiggle trace, variable area trace, or both. Variable area is recommended for very crowded displays, generally 250 or more traces per "panel" (see Trace Parameters, below).

Trace Time Window - determines what portion of the trace will be displayed and how often the time axis will be annotated:

Trace Minimum Time - Starting display time, in milliseconds.

Trace Maximum Time - Ending display time, in milliseconds.

Timing Lines - How often, in milliseconds, to annotate the time axis.

Trace Display Parameters - The following parameters describe how the seismic data traces will be displayed per screen "panel":

Trace Gain - A floating point scalar value applied to each sample value. This parameter is used to scale up or down trace amplitudes, after trace normalization, as desired. A negative value will reverse the polarity of the traces plotted.

Trace Clipping - The number of trace widths beyond which the trace amplitude swing will be truncated, or "clipped". This is used to limit the horizontal excursion of the traces in the resulting display.

1st Trace Number - The number of the first trace to plot, counted sequentially from the first trace in the file. This allows PLOTSEGY to randomly access any starting point within the data file.

Traces per Panel - The number of traces to display on the user's monitor. Although each PC will have a physical maximum number of traces which may be displayed at any one time based on the resolution of it's monitor, PLOTSEGY allows the user to specify a number greater than that maximum. PLOTSEGY will then decimate the data in order to plot "all" the traces within that range. For example, if a given monitor allows a maximum of 500 traces per panel and the user specifies 1000 traces per panel, PLOTSEGY will display every other trace (a "trace increment" of 2), allowing the whole range of data to be displayed. Trace spacing

is kept constant for all traces displayed, so different Traces per Panel values will result in display panels of differing widths. The user is encouraged to experiment with different values for Traces per Panel. Generally some integer factor or multiple of the maximum horizontal resolution will work the best.

Trace Annotation Frequency - The frequency with which to annotate the displayed traces. All trace locations will have a "tick" mark on the horizontal axis at the top of the seismic display (Figure 3) until a Traces per Panel value greater than 250. For panels with more than 250 traces, only the annotated traces will be "ticked".

Entering "quit" or "QUIT" to any Trace Display Information prompt will return the user to the File Information entry screen. Entering "exit" or "EXIT" to any prompt will return the user to the DOS command level. As with the File Information prompts, all Trace Display Information entered by the user in response to the program prompts are saved as default values for future use during the program session.

SEISMIC DATA DISPLAY

Figure 3 is an example of the Seismic Data Display. After the successful entry of the File and Trace Display Information, the monitor screen will clear and the seismic data display "panel" will be drawn. The upper left corner will display the Trace Gain and Trace Clipping values entered and the trace increment used in displaying the data. The file name is displayed in the upper right corner. The data traces are displayed in a large rectangle with the trace locations along the horizontal axis and time values, in milliseconds, along the y axis. Traces are plotted left-to-right and time values are displayed from low-to-high with the low values starting at the top of the display. Trace spacing is kept constant which will result in displays of varying widths depending on the number of Traces per Panel specified. The seismic data is displayed a screen panel at a time. The trace CDP number, read from the trace header, and the sequential trace number, are displayed along the x axis according to the user-entered Trace Annotation Frequency. PLOTSEGY will beep at the end of each screen panel, alerting the user that particular panel is full, and prompt the user to press any key to continue or press "q" or "Q" to quit. If the user presses "q" or "Q", PLOTSEGY returns to the File Information entry screen. Pressing any other key will cause the screen to clear and the next panel of seismic data to be displayed. PLOTSEGY will beep twice at the end of the input file and prompt the user to press any key to continue. After pressing a key the user is returned to the File Information Entry Screen. The user may interrupt the display of traces at any time by

pressing the "escape" (ESC) key. After pressing the ESC key the user will be returned to the File Information Entry Screen.

DATA SAMPLE CONVERSION

Each SEG-Y sample is stored as four consecutive bytes in

IBM-compatible format as defined in IBM Form GA 22-6821 (Barry, et al, 1975). These four bytes form a 32 bit word as defined by the SEG Committee on Technical Standards for the SEG-Y format (Barry, et al, 1975). Since DOS-based PC's internally represent numbers using the IEEE format, reading the IBM-format sample will result in the byte order being changed. For example, a 32 bit sample value may have the hexidecimal value 459AEAEB in IBM-format representation. Reading this value and assigning it to a long integer variable will convert it into the IEEE-format resulting in a hexidecimal value of EBEA9A45. In order to maintain the proper byte order, each byte of the four byte (32 bit) word must be read as an unsigned character and the sample built by "left-shifting" each byte into it's proper position.

Each 32 bit sample is then decomposed into a sign bit (Qs), a 7 bit characteristic (Qc) and a 24 bit fraction (Qf). The corresponding sample value may be calculated by the following:

sample value = Qs * 16^(Qc-64) * Qf

where 16^(Qc-64) is 16 raised to the (Qc-64) power.

TRACE AMPLITUDE NORMALIZATION

As mentioned in the Introduction, the amplitude of each trace is normalized such that it's reference value (the average of all non-zero values for that trace) is set to 1/4 of the trace width, in pixels. The trace width, in pixels, is determined by the number of pixels in a panel divided by the number of traces in that panel. Any user-supplied gain is applied after the reference value is determined. All sample value pixel locations are calculated relative to the trace mid-point representing a zero sample value and the pixel location used for the average sample value by

Xpixel = Xaverage * (Sample * Gain)/Sampleaverage + Xmid-point

where

Xpixel = the pixel location of a sample.

Xaverage = number of pixels away from the trace mid-

point representing the average non-zero sample value. This value is calculated to be 1/4 of the trace width, in pixels, or 1, whichever is larger (a trace width can not be less than 1 pixel).

Sampleaverage = the average non-zero sample value for a trace.

Xmid-point = the pixel location of the trace mid-point, representing a zero sample value of zero.

Sample value pixel locations may range some number of trace widths from the mid-point with the trace excursion determined by the Trace Clipping value entered by the user.

SAMPLE DATA FILE

Included with this software publication is the final stacked section for the seismic line 624-79 from the Point Barrow region in the National Petroleum Reserve in Alaska. Line 624-79 has 493 traces of 12 fold data "sliced" onto 3 high density 5.25 inch floppy disks. The data, which requires approximately 3 megabytes of disk space, may be reconstituted by placing sample data disk #1 in a 5.25 inch floppy drive and typing:

```
C:\> SPLICE  <source>  <destination>
```

For example, if the <source> is the 5.25 inch floppy drive A and the destination is the directory C:\DATA, then the command to reconstitute the seismic data would be:

```
C:\> SPLICE  A:  C:\DATA
```

The program will prompt the user when to place the two remaining floppies in the drive when needed. The reconstituted

seismic line will reside in a file named 624-79.SGY. This may be used as an input file name for PLOTSEGY.

DISCLAIMER

REFERENCE

Barry, K.M., Cavers, D.A., and Kneale, C.W., 1975, Recommended standards for digital tape formats, in Digital Tape Standards; Society of Exploration Geophysicists ["Recommended standards for digital tape formats" reprinted from Geophysics, v. 32, p. 1073 - 1084; v. 37, p. 36-44; v. 40, p. 344 - 352.] p. 22 - 30.

```
     SEGY INPUT FILE PARAMETERS
---------------------------------------


CURRENT WORKING DIRECTORY: D:\NPRA\CPGMS\SEGY\P4

CURRENT FILE PATH: D:\NPRA\CPGMS\SEGY\P4\
enter new path, "exit", "-" to use the current working directory
or press ENTER to use current file path: ..\DATA

CURRENT FILE NAME:
enter new name, "exit" or press ENTER to use current: 624-79.SGY
```

Figure 1a: An example of the File Information entry screen. The user has entered a DOS path of ..\DATA which is different from the current working directory. The resulting path will be D:\NPRA\CPGMS\SEGY\DATA. A data file name of 624-79.SGY is entered.

```
---------------------------------------
      INPUT FILE CHARACTERISTICS
---------------------------------------

           FILE: 624-79.SGY
     sample rate:    4.000 msec
number of samples:     1500
    maximum time:     6000 msec
  bytes per trace:     6240
    bytes in file:  3079920
   traces in file:      493

Press any key to continue...
```

Figure 1b: An example of the file information returned upon the

successful opening of SEG-Y input file 624-79.SGY.


```
---------------------------------------
        TRACE PLOTTING TYPES
---------------------------------------
TRACE TYPES: (1) wiggle  (2) variable area  (3) both
trace type [3]:

---------------------------------------
         PLOT DISPLAY TIMES
---------------------------------------
minimum time [0]:
maximum time [6000]: 1000
timing lines [1000]: 100

---------------------------------------
        TRACE PARAMETERS
---------------------------------------
trace gain [1.000]: 1.5
trace clipping [3]: 1
1st trace number [1]:
Maximum horizontal resolution is 550 traces per panel.  Best
displays
result by using either an integer factor or multiple of this
value.
traces per panel [125]:
trace annotation frequency [10]:
```

Figure 2: An example of the Trace Information entry screen.

[NOTE: NOT INCLUDED IN THIS COPY]

Figure 3: An example of a "panel" of seismic data displayed to a user's monitor.

==========
========== PLOTSEGY V2.0 ==========
==========

PLOTSEGY V2.0
Changes to the Program Version 1.0

PLOTSEGY V2.0 incorporates 4 major changes in function:

1) The ability to change the sample rate used or replace it if not found in the SEG-Y binary header.

2) The ability to scale the display of the data as either "trace normalized" or against a "relative amplitude" either calculated or entered by the user.

3) A trace increment parameter.

4) The ability to annotate traces using one of 3 different trace header values.

Changes 3 and 4 allow PLOTSEGY to display unstacked SEG-Y data and label it appropriately. Shown in figures 1 - 7 are the user-interface changes seen in PLOTSEGY V2.0.

(1) SAMPLE RATE

After PLOTSEGY has opened the indicated input file and read the binary trace header information, the sample rate found in the binary header is displayed and the user has an opportunity to change it if desired. The default value found in the binary header is displayed in square brackets (["sample rate", milliseconds]) and may be accepted by pressing <ENTER>. The user may enter a new value at the prompt, or "quit" or "exit". The sample rate accepted will be used in all subsequent calculations.

(2A) SCALING - TRACE NORMALIZED

Trace Normalized scaling will compute the average non-zero absolute sample value per trace and use that value to represent 1/2 a trace width when plotting that trace's samples. Each sample will be displayed relative to that average value for that trace.

(2B) SCALING - RELATIVE AMPLITUDE

Relative Amplitude scaling will take either a value entered by the user or a value calculated from a user-defined set of

traces from within the input file and use this value to represent 1/2 a trace width when plotting all samples within the data set.

(3) TRACE INCREMENT

The TRACE INCREMENT parameter allows the user to increment the trace counter through the data. For unstacked data, this allows the user to display individual traces from each ensemble.

For example, Baikal line 6 SEG-Y demultiplexed data has ensembles composed of 101 traces: 5 auxiliary channels (traces 1 - 5) and 96 data channels (traces 6 - 101). Ensemble trace 6 is the 1st data trace per ensemble and represents the far data trace. Ensemble trace 101 is the 96th data trace per ensemble and represents the near data trace. PLOTSEGY counts the physical traces in the file, where the first trace in the file is physical trace number 1. PLOTSEGY V2.0 will display ALL traces per ensemble, including the auxiliary traces, so they must be included in calculating a starting trace value. The PLOTSEGY V2.0 parameter 1st_trace_number is the number of the 1st physical trace in the file to display. If the data set is composed of 10 shot ensembles, the near trace for those 10 shots may be displayed by setting the PLOTSEGY V2.0 parameter 1st_trace_number to file trace 101 and the parameter

trace_increment to 101. This will produce a display using physical traces 101, 202, 303, 404, 505, 606, 707, 808, 909 and 1010, which represent ensemble trace 101 for shots 1 through 10. A far trace display is possible by setting PLOTSEGY V2.0 parameter 1st_trace_number to physical trace 6 and the parameter trace_increment to 101. This will produce a display using physical traces 6, 107, 208, 309, 410, 511, 612, 713, 814, and 915, which represent ensemble trace 6 for shots 1 through 10.

For stacked data, this allows the user to simulate the display more data per screen ("panel") then is physically possible. If the display monitor has VGA resolution, it is capable of displaying 550 traces per panel. If the SEG-Y data being displayed has 1100 traces in the data set, the "entire" line may be displayed by setting the PLOTSEGY V2.0 parameter traces_per_panel to 550 and the PLOTSEGY V2.0 parameter trace_increment to 2. This will decimate the data, displaying every other trace and simulates displaying 1100 traces per panel.

*** NOTE ***
A negative trace increment value will plot the traces in the reverse order to which they are stored in the file. A trace increment of "-1" and a starting trace number equal to the

number of traces in the file will plot the entire data file in reverse order.

(4) TRACE HEADER DISPLAYS

PLOTSEGY V2.0 annotates traces with the physical trace number within the file, labelled "File Trace", and one of 3 trace header values. The user may select header value CDP, ensemble trace number, or the original field record number (FFID) of that trace.

FIGURES

SEGY INPUT FILE PARAMETERS

CURRENT WORKING DIRECTORY: D:\CPGMS\SEGY\P5

CURRENT FILE PATH: D:\CPGMS\SEGY\P5
enter new path, "exit", "-" to use the current working
directory or press ENTER to use current file path: ..\DATA

CURRENT FILE NAME:
enter new name, "exit" or press ENTER to use current: 624-
79.SGY

624-79.SGY currently has a sample rate of [4.000] msec.
Enter a new sample rate if desired. Press <CR> to accept
current value.
sample rate [4.000]:

FIGURE 1: PLOTSEGY V2.0 SEG-Y Input File Parameters Screen.

DISPLAY TRACE SCALING METHODS

NORMALIZED: PLOTSEGY will average the amplitudes
within
the current trace being plotted and uses
that

amplitude to represent 1/2 the trace
width
for the display of that trace.

RELATIVE AMPLITUDE: The user selects a starting trace and
the
number of traces to use. PLOTSEGY will
average the amplitudes found for all
samples
within that range of traces and uses
that
amplitude to represent 1/2 a trace width
for
the display of all traces in the data
set.

Trace scaling: (1) normalized (2) relative amplitude
scaling [1]: 2

FIGURE 2: PLOTSEGY V2.0 Scaling Methods Screen.

Press any key to accept the current relative amplitude to
use for
plotting. Enter a new relative amplitude value or press "C"
to
compute a new one.

Current relative amplitude value [1.000]: C

FIGURE 3: User has selected to scale the data using a
relative amplitude to be computed ("C").

Traces in file 624-79.sgy: [493]
The relative amplitude is computed by averaging the sample
values

over a range of traces given by a starting trace number and the
number of traces to use.

starting trace number: 200
number of traces to use: 10

FIGURE 4: User has requested the relative amplitude be computed from the average of the sample values found in traces 200 - 209.

---

trace [200] average amplitude [134455664.000]
trace [201] average amplitude [134324672.000]
trace [202] average amplitude [134405600.000]
trace [203] average amplitude [133956936.000]
trace [204] average amplitude [133936984.000]
trace [205] average amplitude [134326336.000]
trace [206] average amplitude [134122296.000]
trace [207] average amplitude [134137880.000]
trace [208] average amplitude [134346800.000]
trace [209] average amplitude [134024192.000]

FIGURE 5: PLOTSEGY V2.0 display of calculating the average relative amplitude to be used.

```
---------------------------------------
INPUT FILE CHARACTERISTICS
---------------------------------------

FILE:              624-79.sgy
sample rate:         4.000 msec
number of samples:    1500
maximum time:        6000 msec
bytes per trace:     6240
bytes in file:       3079920
traces in file:      493
scaling:             RELATIVE AMPLITUDE
scaling factor:      134203736.000

Press any key to continue...
```

FIGURE 6: Input file characteristics displayed by PLOTSEGY V2.0 after computing a new relative amplitude.

```
---------------------------------------
TRACE PLOTTING TYPES
---------------------------------------
TRACE TYPES: (1) wiggle  (2) variable area  (3) both
trace type [3]:

---------------------------------------
     PLOT DISPLAY TIMES
---------------------------------------
minimum time [0]:
```

maximum time [6000]: 1000

timing lines [1000]: 100

<NEW PAGE>

TRACE PARAMETERS
---
trace gain [1.000]: 1.5

trace clipping [3]: 1

1st trace number [1]:

Maximum horizontal resolution is 550 traces per panel.
traces per panel [125]:

trace annotation frequency [10]:

trace increment [1]:

Header value to display:
(1) CDP Number (2) Ensemble Trace Number (3) Field File Number
header value [1]:

Figure 7: PLOTSEGY V2.0 Trace Information entry screen.

==========
========== PLOTSEGY V2.1 ==========
==========

PLOTSEGY V2.1
Changes to the Program Version 2.0

(1) PROGRAM STARTUP

PLOTSEGY is started at the DOS prompt, and has 3 optional parameters:

PLOTSEGY {-p DOS path} {-t DOS file descriptor} {-bw}

When started, PLOTSEGY will display a banner page on the user's terminal, which will remain displayed until the user presses any key. Once the user presses any key, PLOTSEGY will display a File Selection Menu (see FILE SELECTION MENU, below).

Starting PLOTSEGY with no parameters will display to the user a File Selection Menu displaying all the files in the current directory.

Two optional parameters "filter" the files which appear in the File Selection Menu:

OPTION	DESCRIPTION
-p DOS path	Allows the user to instruct PLOTSEGY to look in the following directory path for any files.
-t file descriptor	Allows the user to instruct PLOTSEGY to look for only those files matching the following file descriptor.

Starting PLOTSEGY with the "-bw" parameter will display the data in black and white.

EXAMPLES:

PLOTSEGY This example starts up PLOTSEGY, which will look in the current directory location for files.

PLOTSEGY -p c:\project1\segy This example starts up PLOTSEGY, instructing it to use only those files found in the "C:\PROJECT\SEGY" subdirectory.

PLOTSEGY -t p*.sgy This example starts up
PLOTSEGY, instructing it
to use only those files
in the current directory
location starting with a
"P" and having a ".SGY"
file extension.

PLOTSEGY -t *.sgy -p c:\archive This example starts up
PLOTSEGY, instructing it
to use all files having a
".SGY" file extension in
the "C:\ARCHIVE"
directory.

(2) FILE SELECTION MENU

The File Selection Menu is a list of files available to PLOTSEGY as instructed by the user (see PROGRAM STARTUP, above). The user may navigate through the File Selection Menu as described below:

UP ARROW: move up 1 line.
DN ARROW: move down 1 line.
PAGE UP: move up 1 menu page.
PAGE DOWN: move down 1 menu page.
HOME: move to 1st menu page.
END: move to last menu page.
ENTER: select highlighted file.
ESC: exit file selection.

==========
========== PLOTSEGY V2.2 ==========
==========

PLOTSEGY V2.2
Changes to the Program Version 2.1

PLOTSEGY V2.2 will determine which type of SEG-Y data is

present using the SEG-Y defined "data sample format code"
read from bytes 3225-3226 of the binary coded file header.
The SEG-Y defined data sample format codes are shown below:

FORMAT CODE	DATA SAMPLE FORMAT
1	32 bit IBM floating point
2	32 bit fixed point
3	16 bit fixed point
4	16 bit fixed point with gain code

==========
========== PLOTSEIS V1.0 ==========
==========

PLOTSEIS V1.0
Changes to the PLOTSEGY Version 2.2

Name changed from PLOTSEGY to PLOTSEIS with the additional
ability of processing MINI-SOUSIE seismic data files.

(1) PLOTSEIS will interpret any file names ending in .MIN as
MINI-SOUSIE seismic data files and process them accordingly.

(2) PROGRAM STARTUP: new command line argument. PLOTSEIS
will display the data with the amplitudes color-coded if
started with the command line parameter "-c", as shown
below:

PLOTSEIS {-p DOS path} {-t DOS file descriptor} {-c}

The amplitudes are colored according to the following
method:

color value = absolute value of the sample amplitude divided
by the reference amplitude times 100, i.e.,

colorValue = abs(sampleAmplitude/referenceAmplitude*100)

where the reference amplitude depends on the type of trace scaling specified by the user:

TRACE NORMALIZED: the reference amplitude is the average positive sample amplitude found for each individual trace. The colorValue for each sample in an individual trace is determined relative to that value.

RELATIVE AMPLITUDE: the reference amplitude is either entered by the user or the average positive sample amplitude found from a user-specified range of traces. The colorValue for each sample in an individual trace is determined relative to that value.

Colors are assigned according to the following ranges:

colorValue	Color
0 - 80	blue
80 - 160	light blue
160 - 240	green
240 - 320	light green
320 - 400	red
> 400	light red

Changing the RELATIVE AMPLITUDE will change how the trace sample amplitudes are colored. Increasing the RELATIVE AMPLITUDE will shift the colorValue to the lower end of the ranges shown above. Decreasing the RELATIVE AMPLITUDE will shift the colorValue to the higher end of the ranges.

The TRACE GAIN may be decreased / increased with a corresponding increase / decrease in the RELATIVE AMPLITUDE to maintain the sample horizontal trace excursion.

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U.S. GEOLOGICAL SURVEY DIGITAL DATA SERIES DDS-13

International Phase of Ocean Drilling
Seismic Line 1 Demultiplexed Data
Cape Hatteras to Mid-Atlantic Ridge

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International Phase of Ocean Drilling
Seismic Line 1 Demultiplexed Data
Cape Hatteras to Mid-Atlantic Ridge

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