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WELLOG: COMPUTER SOFTWARE SYSTEM FOR
ANALYZING AND PLOTTING WELL LOG DATA
(A USER'S GUIDE TO WELLOG. REV2)

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ABSTRACT

WELLOG is a software system that has been developed at the Earth Science Laboratory to plot digitized well log data in a manner suitable for analysis. Multiple logs can be plotted side by side for correlation analysis, and up to three logs can be plotted on a cross plot. Data entry, editing, and modification functions are also provided by the program.

The WELLOG system is currently operating on the University of Utah Research Institute's, PRIME 400 computer. Digitizing is accomplished by a TEKTRONIX 4954 (on-line) digitizing tablet, and plotting is done on a TEKTRONIX 4014 graphics terminal, a STATOS 42 electrostatic plotter, or a CALCOMP pen plotter using a device independent plotting system. This program (WELLOG.REV2) is not as system-dependent as the former version (WELLOG.REV1). The user must supply a program to digitize the data and supply subroutines to interface the program with file manipulation and plotting routines of their system.

WELLOG.REV2 is greatly improved over WELLOG.REV1. One major improvement is the use of an on line digitizing system whereby the program accesses disk files rather than reading the data from tape. In REV2 the merge file has been automated such that the file is initialized automatically upon creation and also delete protected. The randomly spaced data capabilities have been greatly improved allowing the averaging and cross plotting of the data. Routines have been added which allow all of the cross plots excepting the Z-plot to be printed on a line printer. Dresser Atlas' "A-K" plot has also been added. Perhaps most important is the increased portability of WELLOG.REV2. The program is almost completely self contained needing only a few interfacing and system subroutines.

The WELLOG program may still be of use to those that have no digitizing or plotting capabilities because the program does allow input of data from a user terminal, and can produce line printer plots of most of the cross plots.

INTRODUCTION AND PURPOSE OF THE WELLOG SYSTEM

A great number of geothermal well logs have been and will continue to be submitted as part of the data packages purchased by DOE/DGE (Department of Energy / Division of Geothermal Energy) through the Industry Coupled Case Study Program. Most of the well logs are digitized, plotted, and studied at the Earth Science Laboratory (ESL), University of Utah Research Institute (UURI), Salt Lake City, Utah. In order to perform the log analyses, several computer programs were written to digitize and plot the well log data. These programs were incorporated into one large software system to allow easier manipulation and use of the data.

Many of the features incorporated into the computer program are traditional log analysis techniques such as density and neutron cross plots, Schlumberger's (1974) MN plot, and Dresser Atlas' (1979) AK plot. Also available are grid overlays for neutron-density-sonic cross plots, and a line fitting routine for fitting a line to plotted points on a cross plot. The program contains several useful features which allow the user to recognize and correct digitizing errors and to modify and convert data for special plots and analyses. The program described here is the second revision, Rev 2, of ESL's well log digitizing, plotting, and analysis system. The earlier version, Rev 1, was described in an earlier publication (Atwood et al., 1980). Rev 1 was implemented on a UNIVAC 1108 computer and used an old model CALMA digitizer to produce data tapes which were then processed by the WELLOG program. Rev 2 is the product of the conversion to UURI/ESL's PRIME computer and includes many modifications and additions. Significant changes include the implementation of the TEKTRONIX digitizing system, and increased plotting and data manipulation capabilities. The TEKTRONIX digitizing system is a separate program from WELLOG.

SYSTEM DESCRIPTION

Program

The well log digitizing, plotting, and analysis system is comprised of one main program which links together several subprograms and numerous subroutines. The system has been written in modular form to facilitate program modifications and additions. If desired, or if the user's system is too small for the entire program, the program can be divided with relative ease into as many as six smaller programs corresponding to the six major subprograms.

WELLOG is the main program and also the first subprogram.

This program processes the digitized data and, as used on the UURI/ESL system, also passes control to the other subprograms.

DATCAL is a subprogram for special data manipulations and conversions.

FMAIN is a subprogram for correcting digitizing errors and for general maintenance of the merge file (the mass storage data file).

CRSPLT is a subprogram to generate a variety of log data plots. Conventional well log interpretation cross plots found in well log literature can be generated with this program including Z-plots, MN plots (Schlumberger, 1974), and AK plots (Dresser-Atlas, 1979). Linear, semi-log, log-log, and linear-square-root scales are available plot options. An overprint grid is available except on the MN and AK plots. A line fitting option is available on most plots. Also available is a data-versus-depth plot, and line printer plots of all except the Z-plot, grid overlay, and fitted line plots. The CRSPLT subprogram also includes options to average and modify the data before plotting. The line printer plots are useful for quick evaluations and where no other graphics plotting is available.

PDATE and PDAT are complementary subprograms which create a plot parameter file and use it to produce side-by-side depth-versus-data plots. The plots are drawn on one of the plotting devices; in this case a TEKTRONIX 4014 graphics terminal, a STATOS 4222 electrostatic plotter, or a CALCOMP pen plotter. Plotting on the UURI/ESL system creates a plot vector file if the plot is to be done on either the STATOS or CALCOMP plotters. The plot file is then used by a system program to generate the plot. An optional column is generated on the right-hand side to accommodate a litholog. The user has options to control log data and depth scales, to overlay logs, and to use solid or dashed traces. There is an option to allow three line thicknesses on the STATOS and TEKTRONIX plot devices, or three pen colors (or pen sizes) on the CALCOMP plotter.

Detailed descriptions of the various subprograms and their options are given in later sections of this guide.

Data Files

Four data files are used by the WELLOG program:

The header work file is an unformatted direct-access file of five records with 100 words per record. It is a small work file for holding well log header information. A detailed description of the header work file is given in Table C1, Appendix C.

The merge file is an unformatted direct-access file with an

unspecified number of records, with 100 words per record. The first record in the file contains information about the merge file itself. The remaining records consist of five records of header information and up to 200 records of data for each subfile. A subfile may consist of a complete log or any portion of a log. The program has the ability to merge separate subfiles into one. A detailed description of the merge file is given in Table C2, Appendix C.

The plot parameter file is an unformatted direct-access file consisting of an unspecified number of records with 7 words per record. It contains the information necessary to produce a depth-versus-data plot, and is created by PDATF. PDAT then uses the file to produce a depth-data plot. A detailed description of the plot parameter file is given in Table C3, Appendix C.

There is also a formatted sequential access file that is created by a digitizing program containing the digitized data. A detailed description of the digitized data file is given in Table C4, Appendix C.

Program Control and Data Flow

A short description of program control and data flow in the WELLOG system would begin with the digitizing of the desired well logs. At ESL the data are written to a file by using a TEKTRONIX 4954 digitizing tablet and a digitizing program, but any system which can be made to produce the necessary file format can be used. A user's guide and description of the digitizing program is given in Appendix A and Table C4, Appendix C. The WELLOG system is then activated by the user and the digitized file is processed by entering log header information into the work file and then processing a digitized file. The process is continued by entering or modifying the header for each digitized file, and then processing the file. Each processed file is then stored in the merge file prior to processing another file. Digitizing errors can be corrected in most cases by using the file maintenance routine (FMAIN), and data modifications can be made by using the data calculation routine (DATCAL).

After the data have been processed and placed in the merge file, they can be plotted in cross plots using the CRSPLT routine or plotted in correlation plots using the PDATF and PDAT routines respectively. PDATF solicits user input to define the correlation plot, and PDAT uses the created file to plot the correlation plot as specified. Additional data can be digitized and processed without affecting the previously stored subfiles.

WELLOG OPTION SYSTEM

Introduction

The WELLOG program permits the user to perform certain desired operations through the use of an option system. Related options have been placed in groups which are connected together in a structured hierarchy. By selecting a specific option, the user may perform certain functions or move up or down in the hierarchy.

When an option selection is to be made, the program will print out:

XXXXXXXXXOPTION # (I):

(XXXXXXXXXX represents an eight-character option name). If the user does not know the desired option number, the user may print the list of options by inputting a 0 (zero) or any other number that is known to be out of the option number range. A 1 (one) in most cases will take the user out of that list of options and into the next higher level in the option hierarchy. Any number which is greater than one and less than or equal to the highest option number available will result in either the execution of an option or a step down to a lower group of options.

WELLOG Options

The highest level of options is in the WELLOG master program. There are twelve of these options:

WELLOG Options Listing---

WELLOG--OPTION # (I): 0

- 1 TERMINATE WELLOG PROGRAM
- 2 SELECT AND OPEN MERGE-FILE
- 3 INPUT OR EDIT SUB-FILE HEADER (See HEADER--OPTION)
- 4 INPUT DATA FROM DIGITIZED FILE
- 5 INPUT DATA FROM USER TERMINAL (See INPUT---OPTION)
- 6 WRITE SUB-FILE TO MERGE-FILE
- 7 READ SUB-FILE FROM MERGE-FILE (See READ----OPTION)
- 8 XGT DATA CALCULATION ROUTINES (See DATCAL--OPTION)
- 9 XGT FILE MAINTANANCE ROUTINES (See FMAIN---OPTION)
- 10 XGT CROSS-PLOT ROUTINES (See CRSPLT--OPTION)
- 11 CREATE DEPTH-DATA PLOT-FILE
- 12 PLOT DEPTH-DATA PLOT-FILE

Except for options 1, 2, 4, 6, 11, and 12, the options in WELLOG direct the program to a subprogram containing a lower level option list. These option lists are noted in the parentheses above and are discussed later in this report. A description of the WELLOG options follows:

WELLOG Options Description----

1. TERMINATE WELLOG PROGRAM: Terminates the WELLOG program and closes the program files.
2. SELECT AND OPEN MERGE-FILE: Opens the data merge file.
3. INPUT OR EDIT SUB-FILE HEADER: Creates or edits a header containing all pertinent description information for the drill hole and log data.
4. INPUT DATA FROM DIGITIZED FILE: Reads data from digitized data file and converts it to equally spaced, absolute data values, using the parameters from the input header file.
5. INPUT DATA FROM USER TERMINAL: Allows the user to input discrete data values from the terminal.
6. WRITE SUB-FILE TO MERGE-FILE: Writes the newly created header and processed data to the merge file.
7. READ SUB-FILE FROM MERGE-FILE: Reads a specified subfile from the merge file.
8. XQT DATA CALCULATION ROUTINES: Passes control to the data calculation and modification routines.
9. XQT FILE MAINTANANCE ROUTINES: Passes control to the merge file maintenance routines.
10. XQT CROSS-PLOT ROUTINES: Passes control to the data cross plotting routines.
11. CREATE DEPTH-DATA PLOT-FILE: Sets up a plot file to be used by PDAT for correlation plots.
12. PLOT DEPTH-DATA PLOT-FILE: Plots a depth-versus-data correlation plot using the specified parameters contained in the file created by PDATF.

Listings and brief descriptions of each of the lower level option lists are presented below.

WELLOG Second Level Option Lists

HEADER Options - WELLOG Option 3

Listing---

```
HEADER--OPTION # (I):  0
    1  TERMINATE HEADER EDIT
    2  INPUT NEW HEADER
    3  EDIT PREV HEAD BY LINE # (See Header Edit Options)
    4  EDIT ALL HEAD BELOW LINE (See Header Edit Options)
    5  PRINT HEADER
```

Description---

1. TERMINATE HEADER EDIT: Returns control to the calling program or subroutine.
2. INPUT NEW HEADER: Allows the input of a completely new header. The user is queried for the information by the program. This information is the same as that described in the Header Edit Options section.
3. EDIT PREV HEAD BY LINE #: Allows the user to edit the last header which was used by the program. This saves time when a series of headers is needed where only a few lines are different.
4. EDIT ALL HEAD BELOW LINE: Allows the user to input all new information below the specified line of the previously used header.
5. PRINT HEADER: Prints the header on the terminal for inspection by the user.

HEADER Third Level Option List

Header Edit Options - HEADER Options 3 & 4

Listing---

WHAT DO YOU WANT TO CHANGE (0 = INDEX) (1): 0

- 1= EXIT FROM EDIT MODE
- 2= DRILLING COMPANY NAME
- 3= DRILL HOLE NAME
- 4= AREA
- 5= PROJECT NAME
- 6= LOCATION
- 7= LOGGING COMPANY NAME
- 8= LOG NAME
- 9= LOG DATE
- 10= DATA TYPE
- 11= DATA UNITS
- 12= Y ORIGIN
- 13= UNITS PER INCH
- 14= STARTING DEPTH AND DEPTH UNITS
- 15= ENDING DEPTH
- 16= DRILLING MEASURED FROM
- 17= ELEVATION ABOVE PERMANENT DATUM
- 18= LOG MEASURED FROM
- 19= ELEVATION ABOVE PERMANENT DATUM
- 20= PERMANENT DATUM
- 21= ELEVATION
- 22= CASING DEPTH
- 23= BIT SIZE
- 24= FLUID TYPE
- 25= TIME SINCE CIRCULATION
- 26= MAXIMUM RECORDED TEMPERATURE
- 27= COMMENTS
- 28= SCALE CHANGES

Description---

The description of each option is self-evident and will not be discussed in detail. Each number refers to the item in the header to be edited. The numbers within the parentheses on the header sheets (see Figure 1, Appendix A) correspond to the editing option numbers.

INPUT Options - WELLOG Option 5

Listing---

INPUT---OPTION # (1): 0

- 1 TERMINATE DATA INPUT
- 2 EQUALLY SPACED DATA
- 3 RANDOMLY SPACED DATA (See DELINS--OPTION)

Description---

1. TERMINATE DATA INPUT: Returns control to the WELLOG program.
2. EQUALLY SPACED DATA: Allows the input of equally spaced data from the user terminal.
3. RANDOMLY SPACED DATA: Allows the input of randomly spaced data from the user terminal.

INPUT Third Level Option List

DELINS Options - INPUT Option 3

Listing---

DELINS--OPTION # (I): 0
1 RETURN
2 INSERT
3 DELETE

Description---

1. RETURN: Returns control to the data editing routine.
2. INSERT: Allows the insertion of a depth and a data point into the data file.
3. DELETE: Allows the deletion of a depth and a data point from the data file.

READ Options - WELLOG Option 7

Listing---

```
READ----OPTION # (I):  0
      1  TERMINATE FILE READ
      2  READ HEADER
      3  READ HEADER AND DATA
```

Description---

1. TERMINATE FILE READ: Returns control to the WELLOG program.
2. READ HEADER: Reads the header of the specified subfile.
3. READ HEADER AND DATA: Reads the entire specified subfile from the merge file.

DATCAL OPTION SYSTEM

Introduction

The DATCAL subprogram allows the user to modify and convert data into special forms for analysis. The option system operates in the same manner as the WELLOG option system and in turn passes control to lower level option systems. DATCAL is a second level option system in the WELLOG program.

DATCAL Options - WELLOG Option 8

Listing---

```
DATCAL--OPTION # (I):  0
      1  TERMINATE DATCAL
      2  READ SUB-FILE FROM MERG-FILE
      3  WRITE SUB-FILE TO MERG-FILE
      4  CALCULATE AVERAGE
      5  CALCULATE  $(X - A) / B$ 
      6  CALCULATE  $A / (X - B)$ 
      7  CALCULATE  $A + B * X$ 
      8  CALCULATE  $A + B / X$ 
```

9	CALCULATE LOG X	
10	CALCULATE 10**X	
11	CALCULATE A * X**B	
12	CALCULATE A * X**(1 / B)	
13	PRINT DATA	(See PRINT---OPTION)
14	EDIT DATA	(See DELINS---OPTION)
15	PRINT HEADER	
16	EDIT HEADER	(See HEADER---OPTION)
17	CALCULATE GRADIENT	
18	A + B * X + C * X2 + D * X3	
19	CONVERT DEPTH (F-M OR M-F)	
20	CONV DEPTH INCR (E-U OR U-E)	

Description---

1. TERMINATE DATCAL: Terminates the DATCAL subprogram and returns control to the WELLOG main program.
2. READ SUB-FILE FROM MERG-FILE: Reads the selected subfile from the merge file to allow modification.
3. WRITE SUB-FILE TO MERG-FILE: Writes the modified (or unmodified) subfile to a new subfile in the merge file.
4. CALCULATE AVERAGE: Averages the data using the specified parameters.
5. CALCULATE $(X - A) / B$: Calculates new data using the formula: $(x - a) / b$, where "a" and "b" are specified by the user.
6. CALCULATE $A / (X - B)$: Calculates new data using the formula: $a / (x - b)$.
7. CALCULATE $A + B * X$: Calculates new data using the formula: $a + (b * x)$.
8. CALCULATE $A + B / X$: Calculates new data using the formula: $a + (b / x)$.
9. CALCULATE LOG X: Calculates the log (base 10) of the data.
10. CALCULATE 10**X: Calculates the antilog (base 10) of the data.
11. CALCULATE $A * X**B$: Calculates new data using the formula: $a * (x \text{ raised to the } b\text{th power})$.
12. CALCULATE $A * X**(1 / B)$: Calculates new data using the formula: $a * (\text{the } b\text{th root of } x)$.

13. PRINT DATA: Prints the modified (or unmodified) data for inspection.
14. EDIT DATA: Allows the user to edit the data.
15. PRINT HEADER: Prints the present header for inspection.
16. EDIT HEADER: Allows the user to edit the header.
17. CALCULATE GRADIENT: Calculates the gradient of the data using the specified parameters.
18. $A + B * X + C * X^2 + D * X^3$: Calculates new data using the formula: $a + (b * x) + (c * x \text{ squared}) + (d * x \text{ cubed})$.
19. CONVERT DEPTH (F-M OR M-F): Converts depth units from feet to meters or vice versa.
20. CONV DEPTH, INCR (E-U OR U-E): Converts equally spaced data to randomly spaced data or vice versa.

DATCAL Third Level Options

PRINT Options - DATCAL Option 13

Listing---

```

PRINT---OPTION # (I):  0
    1  RETURN TO DATCAL
    2  PRINT ENTIRE FILE
    3  PRINT ONLY PART OF FILE
  
```

Description---

1. RETURN TO DATCAL: Returns control to the DATCAL subprogram.
2. PRINT ENTIRE FILE : Prints the entire data listing.
3. PRINT ONLY PART OF FILE : Prints only the part of the file specified by the user.

DELINS Options - DATCAL Option 14 (Random Data Only)

The listing and description of DELINS--OPTION are the same as that described in the WELLOG-INPUT-DELINS section.

HEADER Options - DATCAL Option 16

The listing and description of HEADER--OPTION are the same as those described in the WELLOG-HEADER section.

HEADER Fourth Level Option List

Header Edit Options - HEADER Options 3 & 4

The listing and description of the Header Edit Options are the same as those described in the WELLOG-HEADER-Header Edit section.

FMAIN OPTION SYSTEM

Introduction

The FMAIN subprogram is used as a file maintenance routine allowing the user to edit and delete individual data subfiles. Options in FMAIN permit the user to locate and correct subfiles which contain digitizing errors. An option system which operates in the same manner as the one in the main WELLOG program allows the user to select reading and editing functions. In the present program FMAIN is a second-level option system.

FMAIN Options - WELLOG Option 9

Listing---

FMAIN---OPTION # (I): 0

- 1 TERMINATE FMAIN
- 2 DIRECTORY (SHORT)
- 3 DIRECTORY (LONG)
- 4 CHECK PLOT
- 5 DELETE & PACK
- 6 OPEN DIFFERENT MERGE-FILE

(See CHKPLT--OPTION)

7	READ SUB-FILE DATA	
8	EDIT SUB-FILE HEADER	(See HEADER--OPTION)
9	EDIT SUB-FILE DATA	(See DELINS--OPTION)
10	FIX SUB-FILE DATA	(See FIXDAT--OPTION)
11	PRINT SUB-FILE DATA	
12	MOVE FILE TO DIFF MERGE-FILE	
13	CONCATINATE SUB-FILES	
14	PRINT SELECTED SUB-FILES	(See PRTMFL--OPTION)
15	APPEND ANOTHER MERGE-FILE	(See MGTWFL--OPTION)
16	EMPTY HEADER AND DATA ARRAYS	

Description---

1. TERMINATE FMAIN: Returns control to the WELLOG main program.
2. DIRECTORY (SHORT): Writes a short directory consisting of specific data parameters of each subfile to the terminal or line printer.
3. DIRECTORY (LONG): Writes a long directory consisting of the entire header of each subfile to the terminal or line printer.
4. CHECK PLOT: Creates small test plots of the specified subfiles.
5. DELETE & PACK: Allows the deletion of obsolete subfiles from the merge file.
6. OPEN DIFFERENT MERGE-FILE: Closes previously opened merge file and opens a different one.
7. READ SUB-FILE DATA: Allows the user to look at specified intervals of a data file.
8. EDIT SUB-FILE HEADER: Allows editing of a subfile header.
9. EDIT SUB-FILE DATA: Allows editing of subfile data.
10. FIX SUB-FILE DATA: Allows modification of large intervals of data within a subfile.
11. PRINT SUB-FILE DATA: Prints the entire data file.
12. MOVE FILE TO DIFF MERGE-FILE: Places a subfile in a different merge file.
13. CONCATINATE SUB-FILES: Merges together two subfiles into one larger subfile.

14. PRINT SELECTED SUB-FILES: Prints the entire subfile including header and data of the specified subfiles.
15. APPEND ANOTHER MERGE-FILE: Merges a separate merge file onto the end of the present merge file.
16. EMPTY HEADER AND DATA ARRAYS: Empties the program arrays containing the header and data information to allow the reading of a new subfile.

FMAIN Third Level Option Lists

CHKPLT Options - FMAIN Option 4

Listing---

```
CHKPLT--OPTION # (I):  0
      1  TERMINATE CHKPLT
      2  PLOT LAST SUB-FILE
      3  PLOT ALL SUB-FILES
      4  PLOT SELECTED SUB-FILES
```

Description---

1. TERMINATE CHKPLT: Returns control to the FMAIN subprogram.
2. PLOT LAST SUB-FILE: Plots the last subfile contained in the merge file.
3. PLOT ALL SUB-FILES: Plots all of the subfiles contained in the merge file.
4. PLOT SELECTED SUB-FILES: Plots only the user-selected subfiles.

CHKPLT Fourth Level Option List

Plotter Options - CHKPLT Options 2, 3, & 4

Listing---

INPUT : 0 = USER TERMINAL
 1 = TEKTRONIX
 2 = STATOS
 3 = CALCOMP
 4 = LINE PRINTER (I):

Description---

0. 0 = USER TERMINAL: Open a terminal plot. (Not used for plots created by CHKPLT or PDAT.)
1. 1 = TEKTRONIX: Open a TEKTRONIX plot.
2. 2 = STATOS: Open a STATOS plot.
3. 3 = CALCOMP: Open a CALCOMP plot.
4. 4 = LINE PRINTER: Open a file for a line printer plot. (Not used for plots created by CHKPLT or PDAT.)

HEADER Options - FMAIN Option 8

The listing and description of HEADER--OPTION are the same as those described in the WELLOG-HEADER section.

HEADER Fourth Level Option List

Header Edit Options - HEADER Options 3 & 4

The listing and description of the Header Edit Options are the same as those described in the WELLOG-HEADER-Header Edit section.

DELINS Options - FMAIN Option 9 (Random Data Only)

The listing and description of DELINS--OPTION are the same as those described in the WELLOG-INPUT-DELINS section.

FIXDAT Options - FMAIN Option 10

For randomly spaced data see RNFIXD Options.

Listing---

```
FIXDAT--OPTION # (I):  0
    1  TERMINATE FIXDAT
    2  SELECT DEPTH INTERVAL
    3  ADD TO DATA
    4  SUBTRACT FROM DATA
    5  MULTIPLY DATA
    6  DIVIDE DATA
    7  FIX AS FUNCTION OF DEPTH  (See FUNCTN--OPTION)
    8  SHIFT STARTING DEPTH
    9  CORRECT DATA SPACING
```

Description---

1. TERMINATE FIXDAT: Returns control to the FMAIN subprogram.
2. SELECT DEPTH INTERVAL: Allows the user to select the start and end depths of the interval to be modified. (Default is the entire subfile.)
3. ADD TO DATA: Add a specified amount to each data point.
4. SUBTRACT FROM DATA: Subtract a specified amount from each data point.
5. MULTIPLY DATA: Multiply each data point by a specified amount.
6. DIVIDE DATA: Divide each data point by a specified amount.
7. FIX AS FUNCTION OF DEPTH: Perform modification of data as a function with depth.
8. SHIFT STARTING DEPTH: Shifts the start and end depths of the data file.

9. **CORRECT DATA SPACING:** Allows repair of files where the wrong start or end depths were used when processing the digitized file.

FIXDAT Fourth Level Option List

FUNCTN Options - FIXDAT Option 7

Listing---

```
FUNCTN--OPTION # (I):  0
                        1  RETURN TO FIXDAT
                        2  ADD TO DATA
                        3  SUBTRACT FROM DATA
                        4  MULTIPLY DATA
                        5  DIVIDE DATA
```

Description---

1. **RETURN TO FIXDAT:** Returns control to FIXDAT.
2. **ADD TO DATA:** Adds a specified amount per depth unit to the data.
3. **SUBTRACT FROM DATA:** Subtracts a specified amount per depth unit from the data.
4. **MULTIPLY DATA:** Multiplies the data by a specified amount per depth unit.
5. **DIVIDE DATA:** Divides the data by a specified amount per depth unit.

RNFI XD Options - FMAIN Option 10 (Random Data FIXDAT)

Listing---

```
RNFI XD--OPTION # (I):  0
                        1  TERMINATE RNFI XD
                        2  SELECT DEPTH INTERVAL
```

- 3 ADD TO DATA
- 4 SUBTRACT FROM DATA
- 5 MULTIPLY DATA
- 6 DIVIDE DATA
- 7 FIX AS FUNCTION OF DEPTH (See FUNCTN--OPTION)
- 8 SHIFT STARTING DEPTH

Description---

The option descriptions are the same as those for FIXDAT.

RNFIXD Fourth Level Option List

FUNCTN Options - RNFIXD Option 7

Listing---

FUNCTN--OPTION # (I): 0
 1 RETURN TO RNFIXD
 2 ADD TO DATA
 3 SUBTRACT FROM DATA
 4 MULTIPLY DATA
 5 DIVIDE DATA

Description---

The option descriptions are the same as those under FMAIN-FIXDAT-FUNCTN section, except that option 1 returns control to RNFIXD.

PRTMFL Options - FMAIN Option 14

Listing---

PRTMFL--OPTION # (I): 0
 1 RETURN TO FMAIN
 2 PRINT LAST SUB-FILE
 3 PRINT ALL SUB-FILES
 4 PRINT SELECTED SUB-FILES

Description---

1. RETURN TO FMAIN: Returns control to the FMAIN subprogram.
2. PRINT LAST SUB-FILE: Prints the last subfile in the merge file, including the header and all of the data, on the line printer.
3. PRINT ALL SUB-FILES: Prints all of the subfiles contained in the merge file.
4. PRINT SELECTED SUB-FILES: Prints only selected subfiles from the merge file.

MGTWFL Options - FMAIN Option 15

Listing---

```

MGTWFL--OPTION # (1):  0
      1  TERMINATE MGTWFL
      2  APPEND ALL SUB-FILES
      3  APPEND SELECTED SUB-FILES

```

Description---

1. TERMINATE MGTWFL: Returns control to the FMAIN subprogram.
2. APPEND ALL SUB-FILES: Merges the entire contents of the second merge file to the first merge file.
3. APPEND SELECTED SUB-FILES: Merges only selected subfiles from the second merge file to the first merge file.

CRSPLT OPTION SYSTEM

Introduction

The CRSPLT subprogram allows the user to cross plot the different data files which have been stored in the merge file. The CRSPLT option system operates in the same manner as the previously described option systems.

CRSPLT Options - WELLOG Option 10

Listing---

```
CRSPLT--OPTION # (I):  0
  1  TERMINATE CROSS-PLOT ROUTINE
  2  SELECT SUBFILE NUMBERS
  3  SELECT PLOT DEPTHS
  4  SELECT PLOTTER (See Plotter Options)
  5  SELECT PLOT SIZE PARAMETERS
  6  LINEAR-LINEAR PLOT (See SELPLT--OPTION)
  7  LINEAR-LOG PLOT (See SELPLT--OPTION)
  8  LOG-LOG PLOT (See SELPLT--OPTION)
  9  LINEAR-SQUARE ROOT PLOT (See SELPLT--OPTION)
 10  Z LINEAR PLOT (See SELPLT--OPTION)
 11  FREQUENCY HISTOGRAM
 12  DATA VS DEPTH PLOT
 13  MODIFY PLOT DATA (See DTMDFY--OPTION)
 14  SPECIAL PLOTS (See SPCLPT--OPTION)
 15  XGT RANDOM CRSPLT (See RNCSP--OPTION)
```

Description---

1. TERMINATE CROSS-PLOT ROUTINE: Returns control to the WELLOG main program.
2. SELECT SUBFILE NUMBERS: Allows the user to select from one to three subfiles to be cross plotted.
3. SELECT PLOT DEPTHS: Selects the depth interval to be plotted.
4. SELECT PLOTTER: Selects the plot device.
5. SELECT PLOT SIZE PARAMETERS: Allows the user to specify the plot axes lengths and values.
6. LINEAR-LINEAR PLOT: Creates a linear-versus-linear cross plot.
7. LINEAR-LOG PLOT: Creates a linear-versus-log cross

plot.

8. LOG-LOG PLOT: Creates a log-versus-log cross plot.
9. LINEAR-SQUARE ROOT PLOT: Creates a linear-versus-square root cross plot.
10. Z LINEAR PLOT: Creates a linear-versus-linear plot with symbols representing a third plot dimension.
11. FREQUENCY HISTOGRAM: Creates a frequency histogram plot.
12. DATA VS DEPTH PLOT: Creates a data-versus-depth cross plot.
13. MODIFY PLOT DATA: Allows the user to modify or fix the data before plotting the cross plots.
14. SPECIAL PLOTS: Allows the user to create special cross plots including MN, AK, and grid overlay cross plots.
15. XQT RANDOM CRSPLT: Passes control to the random data cross plot routines.

RNCSPT Options - Random Data CRSPLT - CRSPLT Option 15

Listing---

```
RNCSPT--OPTION # (I):  0
  1  TERMINATE RANDM XPLT ROUTINE
  2  SELECT SUBFILE NUMBERS
  3  SELECT PLOT DEPTHS
  4  SELECT PLOTTER                      (See Plotter Options)
  5  SELECT PLOT SIZE PARAMETERS
  6  LINEAR-LINEAR PLOT                  (See SELPLT--OPTION)
  7  LINEAR-LOG PLOT                    (See SELPLT--OPTION)
  8  LOG-LOG PLOT                      (See SELPLT--OPTION)
  9  LINEAR-SQUARE ROOT PLOT            (See SELPLT--OPTION)
 10  Z LINEAR PLOT                      (See SELPLT--OPTION)
 11  FREQUENCY HISTOGRAM
 12  DATA VS DEPTH PLOT
 13  MODIFY PLOT DATA                  (See DTMDFY--OPTION)
 14  SPECIAL PLOTS                     (See SPCLPT--OPTION)
```

Description---

The option descriptions are the same as those described in the CRSPLT section, except that option 1 returns control to CRSPLT.

CRSPLT Third Level Option Lists (RNCST 4th Level)

Plotter Options - CRSPLT (& RNCST) Option 4

The listing and description of Plotter Options are the same as those described in the FMAIN-CHKPLT-Plotter Options section.

SELPLT Options - CRSPLT (&RNCST) Options 6, 7, 8, 9, and 10

Listing---

```
SELPLT--OPTION # (I):  0
      1  NORMAL PLOT (Y VS X)
      2  PLOT X VS Y
      3  PLOT Z VS X
      4  PLOT X VS Z
      5  PLOT Y VS Z
      6  PLOT Z VS Y
```

Description---

1. NORMAL PLOT (Y VS X): Plot the data with the second file on the Y axis and the first file on the X axis.
2. PLOT X VS Y: Plot the data with the first file on the Y axis and the second file on the X axis.
3. PLOT Z VS X: Plot the data with the third file on the Y axis.
4. PLOT X VS Z: Plot the data with the third file on the X axis.
5. PLOT Y VS Z: Plot the data with the third file on the X axis.
6. PLOT Z VS Y: Plot the data with the third file on the Y axis.

DTMDFY Options - CRSPLT (& RNCST) Option 13

Listing---

```
DTMDFY--OPTION # (I):  0
  1  TERMINATE DTMDFY
  2  (X - A) / B
  3  A / (X - B)
  4  A + B * X
  5  A + B / X
  6  LOG X
  7  10**X
  8  A * X**B
  9  A * X**(1 / B)
 10  Y / Z
 11  Y * Z
 12  Y + Z
 13  Y - Z
 14  AVERAGE DATA
 15  CALCULATE GRADIENT
```

Description---

1. TERMINATE DTMDFY: Returns control to the CRSPLT subprogram.
2. (X - A) / B: Calculates new data using the formula $(x - a) / b$.
3. A / (X - B): Calculates new data using the formula $a / (x - b)$.
4. A + B * X: Calculates new data using the formula $a + (b * x)$.
5. A + B / X: Calculates new data using the formula $a + (b / x)$.
6. LOG X: Calculates new data by taking the log (base 10) of the specified file.
7. 10**X: Calculates new data by taking the antilog (base 10) of the specified file.
8. A * X**B: Calculates new data using the formula $a * (x \text{ raised to the } b \text{th power})$.
9. A * X**(1 / B): Calculates new data using the formula $a * (\text{the } b \text{th root of } x)$.

10. Y / Z: Calculates new data by dividing one specified file by another.
11. Y * Z: Calculates new data by multiplying one specified file by another.
12. Y + Z: Calculates new data by adding one specified file to another.
13. Y - Z: Calculates new data by subtracting one specified file from another.
14. AVERAGE DATA: Averages the data in all of the cross plot files.
15. CALCULATE GRADIENT: Calculates the gradient of the specified file and averages the others.

SPCLPT Options - CRSPLT (& RNCSP) Option 14

Listing---

```

SPCLPT--OPTION # (I):  0
    1  TERMINATE SPECIAL PLOTS
    2  SELECT PLOTTER                                     (See Plotter Options)
    3  SELECT PLOT SIZE PARAMETERS
    4  SET UP OVER-PRINT GRID                             (See SETORD--OPTION)
    5  SELECT LINE FITTING OPTION
    6  SET STANDARDS (M&N AND A&K)
    7  LINEAR-LINEAR PLOT                                  (See SELPLT--OPTION)
    8  LINEAR-LOG PLOT                                    (See SELPLT--OPTION)
    9  LOG-LOG PLOT                                       (See SELPLT--OPTION)
   10  LINEAR-SQUARE ROOT PLOT                            (See SELPLT--OPTION)
   11  M & N PLOT
   12  A & K PLOT

```

Description---

1. TERMINATE SPECIAL PLOTS: Returns control to the CRSPLT subprogram.
2. SELECT PLOTTER: Allows the user to select the plotting device.
3. SELECT PLOT SIZE PARAMETERS: Allows the user to specify the plot axes lengths and values.

4. SET UP OVER-PRINT GRID: Allows the user to set up an overprint grid. (Glenn and Hulen, 1979)
5. SELECT LINE FITTING OPTION: Allows the user to specify the type of line to be fitted. (Up to a ninth order polynomial fit)
6. SET STANDARDS (M&N AND A&K): Allows the user to set up standards to be plotted on an MN or AK cross plot.
7. LINEAR-LINEAR PLOT: Creates a linear-versus-linear cross plot with an optional overprint grid and fitted line.
8. LINEAR-LOG PLOT: Creates a linear-versus-log cross plot with an optional overprint grid and fitted line.
9. LOG-LOG PLOT: Creates a log-versus-log cross plot with an optional overprint grid and fitted line.
10. LINEAR-SQUARE ROOT PLOT: Creates a linear-versus-square root cross plot with an optional overprint grid and fitted line.
11. M & N PLOT: Creates a MN (Schlumberger, 1974) cross plot with optional standards and fitted line.
12. A & K PLOT: Creates an AK (Dresser Atlas, 1979) cross plot with optional standards and fitted line.

SPCLPT Fourth Level Option Lists

Plotter Options - SPCLPT Option 2

The listing and description of Plotter Options are the same as those described in the FMAIN-CHKPLT-Plotter Options section.

SETGRD Options - SPCLPT Option 4

Listing---

```
SETGRD--OPTION # (I):  0
    1  RETURN TO SPECIAL PLOT ROUTINE
    2  POROS & % HYD MINER (N POR & BK DEN)
    3  POROS & % HYD MINER (N POR & TV TIM)
```

- 4 POROS & % HYD MINER (B DEN & TV TIM)
- 5 SET CORNERS MANUALLY (ALL OTHERS)

Description---

1. RETURN TO SPECIAL PLOT ROUTINE: Returns control to the SPCLPT subprogram.
2. POROS & % HYD MINER (N POR & BK DEN): Sets up a grid for a bulk density-versus-neutron porosity cross plot.
3. POROS & % HYD MINER (N POR & TV TIM): Sets up a grid for a interval transit time-versus-neutron porosity cross plot.
4. POROS & % HYD MINER (B DEN & TV TIM): Sets up a grid for a bulk density-versus-interval transit time cross plot.
5. SET CORNERS MANUALLY (ALL OTHERS): Allows the user to set up a grid on any other type cross plot by manually specifying the four corners.

SELPLT Options - SPCLPT Options 7, 8, 9, and 10

The listing and description of SELPLT--OPTION are the same as those described in the CRSPLT-SELPLT section.

DATA VERSUS DEPTH PLOT SYSTEM

Introduction

The data-versus-depth plotting system consists of two subprograms. PDATF creates the plot parameter file and PDAT uses the plot parameter file to create the data-versus-depth plot. PDATF must be used prior to using PDAT.

PDATF Options - WELLOG Option 11

There is no formal set of PDATF options. The user is given the choice upon entering PDATF whether to create a new subfile or to edit an old one. If no previous subfile exists then PDATF automatically enters the mode to create a new subfile. If a new plot subfile is to be created, the user is queried for the plot parameters. The information asked for is the same as that described under the CHANGE--OPTION section. The user is also asked for the number of plot fields, the number of plots on each field (the number of Y axes), and the number of data subfiles to be plotted on each plot. These last three values cannot be changed once entered.

PDATF Third Level Option List

EDIT Options - PDATF Edit Option

Listing---

```
EDIT----OPTION # (I):  0
    1  RETURN TO PDATF
    2  READ PLOT SUB-FILE
    3  PRINT OUT PLOT SUB-FILE
    4  EDIT PLOT SUB-FILE
    5  WRITE PLOT SUB-FILE
```

(See CHANGE--OPTION)

Description---

1. RETURN TO PDATF: Returns control to the PDATF subprogram.
2. READ PLOT SUB-FILE: Reads a plot subfile from the plot merge file.
3. PRINT OUT PLOT SUB-FILE: Prints out the contents of the plot subfile.
4. EDIT PLOT SUB-FILE: Allows the user to edit the plot subfile.
5. WRITE PLOT SUB-FILE: Writes the edited subfile to the plot merge file.

EDIT Fourth Level Option List

CHANGE Options - EDIT Option 4

Listing---

CHANGE--OPTION # (1): 0

1	DRILL HOLE NAME
2	X AXIS START DEPTH
3	X AXIS END DEPTH
4	DEPTH UNITS/INCH SCALE
5	Y AXIS LENGTH
6	Y AXIS MINIMUM VALUE
7	Y AXIS MAXIMUM VALUE
8	Y AXIS UNITS
9	Y AXIS TITLE
10	RELATIVE OR ABSOLUTE ?
11	SUB-FILE INDEX NUMBER
12	PEN SELECT NUMBER
13	LINE CODE & INCREMENT
14	START & END DEPTH

Description---

1. DRILL HOLE NAME: Change plot drill hole name.
2. X AXIS START DEPTH: Change plot depth axis starting value.
3. X AXIS END DEPTH: Change plot depth axis end value.
4. DEPTH UNITS/INCH SCALE: Change plot depth axis units per inch.
5. Y AXIS LENGTH: Change data axis length (inches).
6. Y AXIS MINIMUM VALUE: Change data axis minimum value.
7. Y AXIS MAXIMUM VALUE: Change data axis maximum value.
8. Y AXIS UNITS: Change data axis units name.
9. Y AXIS TITLE: Change data axis title.
10. RELATIVE OR ABSOLUTE ? : Change the data axis type. Relative means that the axis has no absolute values but only a units-per-inch value. For example, 1 inch equals a change of plus or minus X data units.

11. SUB-FILE INDEX NUMBER: Change the data subfile number.
12. PEN SELECT NUMBER: Change the plotter pen number.
13. LINE CODE & INCREMENT: Change the dashed line code (1 - 10 where 1 = solid line), and dash basic increment (0.03 is a recommended value).
14. START & END DEPTH: Change the portion of the subfile to be plotted.

PDAT Options - WELLOG Option 12

PDAT has no formal option list but allows the user to specify which plot subfile is to be plotted. If only one subfile has been created PDAT automatically plots it. Choice is also given as to whether or not a space for a lithologic column is to be generated.

PDAT Third Level Option List

Plotter Options - PDAT Plotter Option

The listing and description of Plotter Options are the same as those described in the FMAIN-CHKPLT-Plotter Options section.

PROGRAM CONVERSION TO OTHER HARDWARE SYSTEMS

Introduction

Conversion of the WELLOG.REV2 program to other hardware systems should not be difficult. Most of the work in converting the program involves writing interfacing subroutines with the new system's plotting and file manipulation routines. As mentioned previously, the user must also provide the digitizing program. It does not matter how the actual digitizing process is done provided the digitizing program produces a sequential access file of the exact same format as that described in Table C4 of APPENDIX C. The program uses the routines ENCODE, DECODE, and \$INSERT which are a part of PRIME's extended FORTRAN. ENCODE and DECODE are routines which convert the elements of an I/O list into ASCII data and vice versa. \$INSERT allows the insertion of source code from an external file at compilation time. For those

systems which have no code insertion capabilities, each occurrence of the \$INSERT statement should be replaced with the appropriate \$INSERT file designated by the \$_ prefix. As for the interfacing subroutines, a description of the needed subroutines is given below.

Subroutines to be Supplied by the User

ESL and PRIME System Routines

The following ESL and PRIME system routines are entirely system dependent and therefore must be programmed for each individual system. The ESL routines (CLOSEF, DEFILE, DELE, OPNRED, OPNWRT, PROF and SPOUT) are included in the released source, but will have to be rewritten on any system other than a PRIME.

Subroutine CLOSEF

Purpose:

CLOSEF closes a FORTRAN read and/or write unit number.

Usage:

CALL CLOSEF(IU)

Description of Parameters:

IU = (Int.) FORTRAN logical unit number (Input).

Subroutine DEFILE

Purpose:

DEFILE creates and/or opens a direct-access file.

Usage:

CALL DEFILE(IUNIT, FNAME, NC, LR4, ISTAT)

Description of Parameters:

IUNIT = (Int.) FORTRAN logical unit number (Input).

FNAME = (Alpha.) Direct-access file name (Input).
NC = (Int.) Number of characters in FNAME (Input).
LR4 = (Int.) Fixed record length (4-byte words) (Input).
ISTAT = (Int.) File status (Output).
 0 = Existing file opened for read/write.
 1 = New file opened for read/write.
 2 = Unit already open.
 3 = Unsuccessful open.
 4 = File in use.

Subroutine DELE

Purpose:

DELE deletes a file, given the name and the number of characters in the name (Input).

Usage:

CALL DELE(NAME, LN)

Description of Parameters: (All Input)

NAME = (Alpha.) Name of the file to be deleted.

LN = (Int.) Number of characters in NAME.

Subroutine EXIT

Purpose:

EXIT is the subroutine which terminates execution of a program on the PRIME computer. It contains a simple stop command.

Usage:

CALL EXIT

Description of Parameters:

EXIT has no passed parameters.

Subroutine OPNRED

Purpose:

OPNRED opens a sequential read-only file.

Usage:

CALL OPNRED(IU, NAME, LN)

Description of Parameters: (All Input)

IU = (Int.) FORTRAN logical unit number.

NAME = (Alpha.) Name of sequential file.

LN = (Int.) Number of characters in NAME.

Subroutine OPNWRT

Purpose:

OPNWRT opens a sequential write file. This subroutine actually opens the file for reading or writing.

Usage:

CALL OPNWRT(IU, NAME, LN)

Description of Parameters: (All Input)

IU = (Int.) FORTRAN logical unit number.

NAME = (Alpha.) Name of sequential file.

LN = (Int.) Number of characters in NAME.

Subroutine PROF

Purpose:

PROF sets the file access rights on the specified file.

Usage:

CALL PROF(NAME, LNAME, IOWN, NOWN)

Description of Parameters: (All Input)

NAME = (Alpha.) Name of sequential file.

LNAME = (Int.) Number of characters in NAME.

IOWN = (Int.) Owner rights code.

0 = No access rights.

1 = Read only.

2 = Write only.

3 = Read and write.

4 = Delete and truncate only.

5 = Delete, truncate, and read.

6 = Delete, truncate, and write.

7 = All access rights.

NOWN = (Int.) Non-owner rights code.
Same as owner rights.

Subroutine SPOUT

Purpose:

SPOUT spools a file on the line printer from a FORTRAN program.

Usage:

CALL SPOUT(NAME, LNAME, FTN)

Description of Parameters: (All Input)

NAME = (Alpha.) Name of file to be spooled.

LNAME = (Int.) Number of characters in NAME.

FTN = (Logical) .TRUE. if FORTRAN forms control is to be used, and .FALSE. if not.

Subroutine TNOU

Purpose:

TNOU is used to print a message on the user terminal. This routine is essentially a FORTRAN write.

Usage:

CALL TNOU(MESG,NCAR)

Description of Parameters: (All Input)

MESG = (Alpha.) Message to be printed.

NCAR = (Int.) Number of characters in MESG.

Subroutine TNOUA

Purpose:

TNOUA is used to print a message on the user terminal without a carriage return at the end. This allows the data to be typed in at the end of the prompt line. If no such option is available on the user system, a routine containing a FORTRAN write statement will work.

Usage:

CALL TNOUA(MESG,NCAR)

Description of Parameters: (All Input)

MESG = (Alpha.) Message to be printed.

NCAR = (Int.) Number of characters in MESG.

UUPLT Library Routines

The following UUPLT library routines are necessary to do any plotting (except line printer plots) with the WELLOG program. The UUPLT library routines described in this section can be replaced with "Industry Standard" plotting subroutines that are found on most general-purpose computing systems.

Subroutine CALOPR

Purpose:

CALOPR is used to set pen assignments and to give other instructions to the plotter operator. On the ESL system this routine is only used for CALCOMP plotting. The information which is written to file by this routine is ignored by the other plot devices.

Usage:

CALL CALOPR(NOTE, ITZIZE, WAIT)

Description of Parameters: (All Input)

NOTE = (Alpha.) Array containing the message to be sent to the operator. The message must be less than 79 characters.

ITZIZE = (Int.) Number of characters in NOTE.

WAIT = (Logical) Variable in that .TRUE. will cause the plotter to pause for operator response before proceeding to plot.

Subroutine CLOSEP

Purpose:

CLOSEP closes the plot file.

Usage:

CALL CLOSEP

Description of Parameters:

No parameters are passed through the call to CLOSEP, however MODE is passed as a variable in a common block.

MODE = (Int.) Plot device code (Set by calling OPNPLT).
1 = TEKTRONIX 4014
2 = STATOS
3 = CALCOMP

Subroutine OPNPLT

Purpose:

OPNPLT is used to open the specified plot device.

Usage:

CALL OPNPLT(IDEV, XM, YM)

Description of Parameters: (All Input)

IDEV = (Int.) Plotter number.

1 = TEKTRONIX plot.

2 = STATOS plot.

3 = CALCOMP plot.

XM = (Real) Plot X dimension in inches.

YM = (Real) Plot Y dimension in inches.

MODE is a variable in a common block which is set by OPNPLT.

MODE = (Int.) Plot device code.

1 = TEKTRONIX 4014

2 = STATOS

3 = CALCOMP

Subroutine PENSEL

Purpose:

PENSEL is used to select the pen turret for a CALCOMP plot.
It sets line thickness on the TEKTRONIX and STATOS devices.

Usage:

CALL PENSEL(IPN)

Description of Parameters:

IPN = (Int.) Pen selection code (Input).

If MODE = 1 (TEKTRONIX) then

IPN = 1 = normal Z axis.

IPN = 2 = defocused Z axis.

IPN = 3 = defocused Z axis.

If MODE = 2 (STATOS) then

IPN = 1 = thin line (1x).

IPN = 2 = medium line (3x).
IPN = 3 = thick line (5x).
If MODE = 3 (CALCOMP) then
IPN = 1 = turret number 1.
IPN = 2 = turret number 2.
IPN = 3 = turret number 3.
If PENSEL is never called IPN defaults to 1.

MODE is passed as a variable in a common block which is set by calling OPNPLT.

MODE = (Int.) Plot device code.
1 = TEKTRONIX 4014
2 = STATOS
3 = CALCOMP

Subroutine PLOT

Purpose:

PLOT moves the plot pen to new coordinates and creates vectors or lines depending on the plot device.

Usage:

CALL PLOT(X,Y,IP)

Description of Parameters: (All Input)

X = (Real) X coordinate in inches relative to the last origin that has been set.

Y = (Real) Y coordinate in inches relative to the last origin that has been set.

IP = (Int.) Pen status code and origin setting parameter.
1 = Use previous status.
2 = Pen down status.
3 = Pen up status.
If IP is negative, origin is reset to the new coordinate.

Subroutine SYMBOL

Purpose:

SYMBOL plots alphanumeric data or special symbols in the specified character size and plot angle.

Usage:

There are two ways to call SYMBOL:

(*1*) The string to be plotted is passed.

(*2*) A special character number is passed.

CALL SYMBOL(X, Y, H, IBFF, ANG, NC)

Description of Parameters: (All Input)

X = (Real) X coordinate for the lower left hand corner of the string.

Y = (Real) Y coordinate for the lower left hand corner of the string.

H = (Real) Character height in inches.

IBFF = (Alpha.) Buffer containing the alphanumeric characters to be plotted. (*1*)

or

IBFF = (Int.) Special character identification code. Valid codes are 0 to 128. (*2*)

ANG = (Real) Angle at which the string is to be plotted relative to a positive X axis.

NC = (Int.) Number of characters in IBFF. (*1*) If NC = 0 IBFF is a single short integer with a right-justified (ASCII) character.

or

NC = (Int.) Determines if the pen is up or down. (*2*) A negative number specifies that this is a special symbol call.

-1 = Pen is up while moving to plot location.

< -1 = Pen is down while moving to plot location.

WELLOG Program Size and Specifications

The WELLOG program requires 1.5 megabytes of storage to execute on the PRIME 400 computer.

REFERENCES

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Schlumberger, Ltd., 1974, Log Interpretation, Vol. II - Applications: New York.

APPENDIX A

THE ESL DIGITIZING SYSTEM

Introduction

Digitizing is done on the PRIME 400 using a Tektronix 4014 terminal and a Tektronix 4954 Graphics Tablet.

The tablet is used to convert data from a continuous well log into a set of points stored in a disc file which can be read from various user programs, WELLOG in particular. The digitizer records the absolute x,y position of the cursor on the tablet surface and stores these points in inches on a disc file. Each log (or portion of a log) is stored in a different disc file.

Preparation

Before actually digitizing, there are several things to be done. The digitizer stores in a file only that part of the log that fits on the tablet surface, so the log must be divided into sections that will fit within the 35 inch tablet width by marking a likely stopping point with pencil. The starting point of the log should also be marked with pencil. Both the starting and stopping point should be circled along the intended base line. These points should correspond to depth lines on the log for ease of reading. The value of the Y axis at this base line should be noted as input for the "Y origin."

Some additional pencil marks need to be made on the well log before beginning to digitize. These include the following:

1. IRGs (inter-record gaps) - A pencil mark every few inches, at convenient locations, needs to be made to mark a place where the person digitizing can stop to rest or change hand positions without introducing noise into the data. These marks are also used for a returning reference point when errors are made. It is convenient if the IRGs correspond to depth lines. The IRGs need not be evenly spaced along the log.

2. Scale changes and origin shifts - The location of all scale changes and origin shifts should also be marked in pencil.

Heading information sheets (see Figure 1) should be filled out with the necessary information for each group of digitized files. The name of the disc file (12 characters long) should be marked on the sheet next to the data information. The starting depth and ending depth should be filled in during the digitizing process to avoid error. The Y origin and Y units per inch should also be noted. The number of scale changes and the scale change ratios should be noted on a scale change sheet (see Figure 2).

Starting the Digitizing Process

Turn on the power to both the 4014 and the Tablet Power Module. An "ACCESS VIOLATION" will result if trying to digitize with the power module off.

Securely fasten the log to the tablet surface with masking tape, in a reasonably horizontal position. The logs should be digitized with the beginning of the log on the left side. The starting and ending points of the digitized portion of the log should be at least 1.5 inches from each side of the tablet frame. Because many of the logs are warped, the baseline of the log should be aligned with a good straight edge.

Login to the appropriate account UFD (Sign in on the PRIME).

Mark the start of the log by recording the depth at the starting baseline point and the Y axis value at the baseline (Y origin).

Type DIG to start the digitizing program. The program will request the following information which was discussed in the previous section:

1. The name of the disc file where the digitized points will be stored (12 characters).
2. A one-line (80 character) header identifying the disc file. This header could contain such information as well name, location, and date of the digitizing, etc.
3. The starting depth, ending depth, Y origin, and Y units per inch. The ending depth is the value where digitizing ended.
4. The number of scale changes.
5. The value of the scale change ratios if the number of scale changes is greater than zero.

When this input is finished, the screen will erase and the "Ready" light on the power module will be illuminated. If the light is not on, press <CR> (carriage return) on the keyboard. If the light still does not come on, refer to the "Abort Job" section of this document for further instructions.

To input the baseline, place the crosshairs of the cursor (or the tip of the pen) on the starting point of the baseline which was previously marked in pencil. Press the button (or depress the pen) and lift the cursor. The "Ready" light should go out and the bell should sound. If not, press <CR> and try again.

After the starting point has been input and the bell has sounded, press <CR>. The "Ready" light should come on. Place the cursor over the ending point of the baseline which was marked in pencil and press the button. The "Ready" light should go out and the bell should sound. Lift the cursor from the tablet. If the bell did not sound, press <CR> and try again. Then press <CR>.

Digitizing the Log

The "Ready" light should come on. Press D from the keyboard and then <CR>. The "Ready" light will blink.

Place the cursor at the beginning of the log, depress the button and start tracing the log up to the first IRG while holding the button down during the trace. If the trace begins more than 0.05 inches from the beginning of the baseline in the X direction, a bell will sound. Ignore this if the trace actually starts that far from the baseline beginning. If the bell continues to ring, either you are moving too fast or you forgot to input D from the keyboard. If you forgot to input D, lift the cursor, press <CR> if the "Ready" light is not on. Place the cursor at the beginning of the trace and continue. If you are moving too fast, lift the cursor and input B from the keyboard and begin tracing from the beginning of the log again, moving more slowly this time.

When you come to the first IRG, lift the cursor to mark the location on the disc file. A bell should sound and the "Ready" light should come on. When you are ready to continue tracing, place the cursor back on the log at the point where it was lifted (or slightly behind it). Begin tracing to the next IRG.

If you must stop digitizing between IRG marks, lift the pen from the tablet and mark the exact location where you stopped.

"R" and "L" Modes

When a vertical trace ends in an origin shift, or a scale change with an origin shift, it was found that erroneous data was produced. For this reason two modes were added to DIG to correct the problem. These modes are "R" (regular) mode and "L" (line) mode.

"R" mode is the default mode and does not need to be explicitly entered unless returning from "L" mode during the same log. "R" mode is used when there are no vertical lines in the log terminating in an origin shift. "R" mode is entered by typing R, followed by <CR> from the keyboard.

Other Problems

If part of the log is missing or if there is a discrepancy between two runs of the log, treat the end of the data as an end of log and start the next section of data as a new log.

Finishing the Log

At the end of the log, lift the cursor from the tablet and enter S, then <CR> from the keyboard. The terminal will respond by printing the number of scale changes entered, and the number of digitized points written to file. If the number of points is very small, the digitizing was not done correctly and should be done again.

If another log is to be done, wait for the terminal to respond with "OK," then start over from the beginning, using a new disc file name, and the appropriate header sheets.

Verifying the Log

After the terminal responds with "OK," a data verification program may be run to see the results of the digitizing session. A Tektronix or Statos plot of the digitized points can be generated with the program DIGP to verify the accuracy of the digitizing. Gaps in the data will appear as straight lines on the line plot. Two types of plots can be generated, a line plot or a point plot. The Statos plots can be placed over the log for comparison (using a light table).

To use this program, type DIGP and input the appropriate information as queried on the terminal. The plotting device is input as 1 for a Tektronix plot, and a 2 for a Statos plot. The grid spacing should correspond to the grid spacing in inches of the depth lines on the well log.

Completing the Digitizing Process

Turn off the Power Module and logout.

Complete the heading sheets for the files digitized and check the information for accuracy and completeness. Always make sure that the Y origin, Y units per inch, starting depth, and ending depth are filled in properly. These values are essential to run the WELLOG program. Also make sure the correct disc file name is listed with the appropriate data.

"L" mode should be entered whenever a log contains a vertical trace terminating in an origin shift. "L" mode is entered by typing L, followed by <CR> from the keyboard. The L is entered after the D when starting the trace, and before actually tracing the log.

If the log is a combination of "R" and "L" mode segments, these segments should be separated with IRQs and the mode (R or L) should be entered after the appropriate IRQs for the following records. Other instructions remain the same for both modes.

Mistakes and Speed Errors

Speed errors are identified by the bell sounding while you are digitizing. If a speed error occurs or if you wander off the log, lift the cursor from the tablet. Input B, then <CR> from the keyboard. Place the cursor at the last IRQ (or slightly behind it) and continue digitizing from that point.

Origin Shifts and Scale Changes

Often the data on the log will exceed the range of the log. When this occurs two things may be done. One is to shift the origin, the other is to change the scale. In an origin shift the baseline is given a new value, usually at or near the value at which it went off scale. The number of Y units per inch, however, remains the same. In a scale change the origin usually retains value (it may not) but the number of Y units per inch changes. The scale change ratio as input at the beginning of the digitizing process is the value which the original Y units per inch must be multiplied by to get the new Y units per inch.

To digitize origin shifts, simply digitize up to the point of change, lift the cursor from the tablet, type C, then <CR> from the keyboard. Place the cursor on the trace at the new origin and continue digitizing.

To digitize scale changes (without origin shift), trace to the last point as before and then lift the cursor from the tablet, press A, then <CR> from the keyboard. Place the cursor on the newly scaled data and continue digitizing.

To digitize scale changes which are accompanied by an origin shift, trace to the last point as described above and lift the cursor from the tablet. Press C, then <CR>, then A, and another <CR> from the keyboard. Place the cursor on the newly scaled data and continue digitizing.

Abort Job

If it becomes necessary to abort the digitizing program, press the ESC and/or the BREAK keys, then type in CLOSE ALL. Control is now back to the PRIMOS operating system. To start the program again, begin with paragraph 5 of "Starting the Digitizing Process".

Summary of Steps

1. Mark the baseline start and end points, IRGs, scale changes, and other problems in pencil on the log.
2. Tape the log to the tablet.
3. Mark the heading sheet.
4. Login to the appropriate account UFD.
5. Turn on the Power Module.
6. Type DIG.
7. Input the requested information.
8. Input the baseline start and end points.
9. Input "D".
10. Move the cursor to the start of the data.
11. Trace to each IRG.
12. Lift the cursor to mark the IRG.
13. At the end of the log, type "S", then <CR>.
14. Turn off the Power Module.
15. Run DIGP if desired.
16. Logout.
17. Complete the heading sheets.

Header Sheets (Figures 1 & 2)

DATE DIGITIZED				BY WHOM			
DATE PLOTTED				DID DATA PLOT CORRECTLY ?			
CAN FILE BE OVERWRITTEN ?				DATE OVERWRITTEN			
=====							
DRILLING COMPANY (2)							
DRILL HOLE NAME (3)							
AREA (4): FIELD				COUNTY		STATE	
PROJECT NAME (5)							
LOCATION (6): SECTION LATITUDE				TOWNSHIP LONGITUDE		RANGE	
LOGGING COMPANY (7)							
LOG NAME (8)				LOG DATE (9)			
DATA TYPE (10)				DATA UNITS (11)			
STARTING DEPTH (14)	ENDING DEPTH (15)	Y-ORIGIN (12)	Y-UNITS PER IN. (13)	DIG. FILE LETTER	MERGE-FILE NUMBER	*	
DRILLING MEASURED FROM (16)				ELEVATION (ABOVE P. D.) (17)			
LOGGING MEASURED FROM (18)				ELEVATION (ABOVE P. D.) (19)			
PERMANENT DATUM (20)				ELEVATION			
CASING DEPTH (22)				BIT SIZE (23)			
FLUID TYPE (24)				TIME SINCE CIRCULATION (25)			
MAXIMUM RECORDED TEMPERATURE (26)							
COMMENTS (27)							
NUMBER OF SCALE CHANGES (28):							

50

SCALE CHANGE SHEET

INSC					
1.	2.	3.	4.	5.	6.
7.	8.	9.	10.	11.	12.
13.	14.	15.	16.	17.	18.
19.	20.	21.	22.	23.	24.
25.	26.	27.	28.	29.	30.
31.	32.	33.	34.	35.	36.
37.	38.	39.	40.	41.	42.
43.	44.	45.	46.	47.	48.
49.	50.	51.	52.	53.	54.
55.	56.	57.	58.	59.	60.
61.	62.	63.	64.	65.	66.
67.	68.	69.	70.	71.	72.
73.	74.	75.	76.	77.	78.
79.	80.	81.	82.	83.	84.
85.	86.	87.	88.	89.	90.
91.	92.	93.	94.	95.	96.
97.	98.	99.	100.	101.	102.
103.	104.	105.	106.	107.	108.
109.	110.	111.	112.	113.	114.
115.	116.	117.	118.	119.	120.
121.	122.	123.	124.	125.	126.
127.	128.	129.	130.	131.	132.
133.	134.	135.	136.	137.	138.
139.	140.	141.	142.	143.	144.
145.	146.	147.	148.	149.	150.

Figure 2

APPENDIX B

SAMPLE COMPUTER SESSIONS

The following pages contain sample computer sessions which illustrate the use of the WELLOG program. An attempt has been made to display the use of each option system, but to illustrate each option would be both costly and relatively senseless. In the following listings comments are placed to help the user understand the process. These comments are enclosed in the brackets [] and should not be taken as part of the actual print-out. Some of the illustrations, particularly the log and square root cross plots, have been presented here merely to show the program capabilities and should not necessarily be construed as having any interpretive value. Many of the plots have been reduced so that they will fit entirely on one page. The program was not designed to produce interactive response for the purpose of publication, hence the output runs off the physical boundary of a page in a number of places. In all cases an attempt has been made to preserve as much of the output as possible.

Data Input Session

OK, WELLOG
GO

[ESL system command to invoke
the WELLOG program]

*****WELL LOG DATA MANIPULATION AND PLOTTING PROGRAM*****

REQUESTED RESPONSE FORMATS: (A) = ALPHANUMERIC
(F) = FLOATING POINT
(I) = INTEGER

WELLOG--OPTION # (I): 0 [0 (zero) will in all
cases give a listing]

- 1 TERMINATE WELLOG PROGRAM
- 2 SELECT AND OPEN MERGE-FILE
- 3 INPUT OR EDIT SUB-FILE HEADER
- 4 INPUT DATA FROM DIGITIZED FILE
- 5 INPUT DATA FROM USER TERMINAL
- 6 WRITE SUB-FILE TO MERGE-FILE
- 7 READ SUB-FILE FROM MERGE-FILE
- 8 XQT DATA CALCULATION ROUTINES
- 9 XQT FILE MAINTANANCE ROUTINES
- 10 XQT CROSS-PLOT ROUTINES
- 11 CREATE DEPTH-DATA PLOT-FILE
- 12 PLOT DEPTH-DATA PLOT-FILE

WELLOG--OPTION # (I): 2

*****OPEN MERGE-FILE*****

WHAT IS THE NAME OF THE MERGE-FILE ?
INPUT UP TO 12 CHARACTERS (A): TEST-FILE

*****NEW FILE INITIALIZATION***** [When a new file is
named, the program automatically
allows it to be initialized]

PASSWORD ? PLEASE

INPUT UP TO 60 CHARACTERS OF HEADING (A)
: WELLOG PROGRAM DOCUMENTATION AND TEST FILE

*****MERGE-FILE INITIALIZED*****

WELLOG--OPTION # (I): 3

*****HEADING INPUT***** [If no previous header is in
existence the program will
start with the header
input model]

DRILLING COMPANY NAME (A): UURI
DRILL HOLE NAME (A): TEST
AREA IS: FIELD (A): TEST
COUNTY (A): SALT LAKE

STATE (A): UTAH
PROJECT NAME (A): WELLOG

LOCATION IS GIVEN BY:

SECTION, TOWNSHIP, RANGE
LATITUDE, LONGITUDE

INPUT "LALO" OR "STRA" (A): STRA

SECTION (A):

TOWNSHIP (A):

RANGE (A):

LOGGING COMPANY (A): UURI

LOG NAME (A): TEST

LOG DATE (A): 5/14/80

DATA TYPE (A): TEST

UNITS (A): TEST

Y ORIGIN IS AT VALUE (F): 0

UNITS PER INCH (F): 20

DATA STARTING DEPTH (F): 1800

DEPTH UNITS ARE (1 = FEET, 2 = METERS) (I): 1

DATA ENDING DEPTH (F): 3600

DRILLING WAS MEASURED FROM (A):

ELEVATION ABOVE PERMANENT DATUM (F): 0

LOGGING WAS MEASURED FROM (A):

ELEVATION ABOVE PERMANENT DATUM (F): 0

PERMANENT DATUM (A): GL

ELEVATION (F): 5200

CASING DEPTH (F): 0

CASING TYPE (A):

BIT SIZE (F): 0

FLUID TYPE IN HOLE (A): WATER

TIME SINCE CIRCULATION (A):

MAXIMUM RECORDED TEMPERATURE (F): 60

MAXIMUM TEMPERATURE UNITS (A): DEG F

INPUT 10 LINES OF COMMENTS, 60 CHARACTERS PER LINE INCLUDING SPACES.

(WRITE "*EXIT*" TO SKIP REMAINING LINES)

: THIS IS A TEST OF THE WELLOG PROGRAM

: *EXIT*

INPUT THE NUMBER OF SCALE CHANGES (I): 0

HEADER--OPTION # (I): 0

- 1 TERMINATE HEADER EDIT
- 2 INPUT NEW HEADER
- 3 EDIT PREV HEAD BY LINE #
- 4 EDIT ALL HEAD BELOW LINE
- 5 PRINT HEADER

HEADER--OPTION # (I): 3

WHAT DO YOU WANT TO CHANGE (0 = INDEX) (I): 0

1= EXIT FROM EDIT MODE

2= DRILLING COMPANY NAME

3= DRILL HOLE NAME
 4= AREA
 5= PROJECT NAME
 6= LOCATION
 7= LOGGING COMPANY NAME
 8= LOG NAME
 9= LOG DATE
 10= DATA TYPE
 11= DATA UNITS
 12= Y ORIGIN
 13= UNITS PER INCH
 14= STARTING DEPTH AND DEPTH UNITS
 15= ENDING DEPTH
 16= DRILLING MEASURED FROM
 17= ELEVATION ABOVE PERMANENT DATUM
 18= LOG MEASURED FROM
 19= ELEVATION ABOVE PERMANENT DATUM
 20= PERMANENT DATUM
 21= ELEVATION
 22= CASING DEPTH
 23= BIT SIZE
 24= FLUID TYPE
 25= TIME SINCE CIRCULATION
 26= MAXIMUM RECORDED TEMPERATURE
 27= COMMENTS
 28= SCALE CHANGES

WHAT DO YOU WANT TO CHANGE (0 = INDEX) (I): 7
 LOGGING COMPANY (A): ESL

WHAT DO YOU WANT TO CHANGE (0 = INDEX) (I): 1

HEADER--OPTION # (I): 5

1

*****FILE # 0*****

PROJECT NAME: WELLOG
 DRILLING COMPANY NAME: UURI
 DRILL HOLE NAME: TEST
 FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

 LOCATION: SEC TWP RGE
 LOGGING COMPANY: ESL
 LOG NAME: TEST
 LOG DATE: 5/14/80

DATA TYPE: TEST

UNITS: TEST

Y ORIGIN: 0.00000E-01 UNITS/INCH: 2.00000E 01 DFG: 0.00000E-01

DATA STARTING DEPTH: 1800.00 FEET

DATA ENDING DEPTH: 3600.00 FEET

PERMANENT DATUM: GL

ELEVATION: 5200.00 FEET ABOVE SEA LEVEL

DRILLING MEASURED FROM:

ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

LOG MEASURED FROM:

ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

CASING TYPE:

CASING DEPTH: 0.00 FEET

BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER

TIME SINCE CIRCULATION:

MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

HEADER--OPTION # (1): 1

WELLOG--OPTION # (1): 4

INPUT EQUALLY SPACED DATA INCREMENT (0=ABORT) (F): .5

INPUT 12 CHARACTER FILENAME OF DIGITIZED DATA (A): DF-TEST-FILE

*****CHECK HEADER VALUES IN DIGITIZED FILE WITH THOSE IN WELLOG HEADER***

STARTING DEPTHS DONT AGREE 1800.000 1850.000

INPUT PROPER VALUE (F): 1850

ENDING DEPTHS DONT AGREE 3600.000 3550.000

INPUT PROPER VALUE (F): 3550

Y UNITS PER INCH DONT AGREE 20.000 -36.000

INPUT PROPER VALUE (F): -36

WELLOG--OPTION # (1): 6

NUMBER OF RECORDS WRITTEN = 40

DATA WRITTEN ON MASTER FILE # 1

WELLOG--OPTION # (I): 3

*****HEADING EDIT*****

SUB-FILE # 0

HEADER--OPTION # (I): 1

WELLOG--OPTION # (I): 5

INPUT---OPTION # (I): 0

- 1 TERMINATE DATA INPUT
- 2 EQUALLY SPACED DATA
- 3 RANDOMLY SPACED DATA

INPUT---OPTION # (I): 2

DEPTH INCREMENT IS (F): 100
VALUE AT DEPTH 1850.00 IS (F): 1
VALUE AT DEPTH 1950.00 IS (F): 2
VALUE AT DEPTH 2050.00 IS (F): 3
VALUE AT DEPTH 2150.00 IS (F): 4
VALUE AT DEPTH 2250.00 IS (F): 5
VALUE AT DEPTH 2350.00 IS (F): 6
VALUE AT DEPTH 2450.00 IS (F): 7
VALUE AT DEPTH 2550.00 IS (F): 8
VALUE AT DEPTH 2650.00 IS (F): 9
VALUE AT DEPTH 2750.00 IS (F): 0
VALUE AT DEPTH 2850.00 IS (F): 1
VALUE AT DEPTH 2950.00 IS (F): 2
VALUE AT DEPTH 3050.00 IS (F): 3
VALUE AT DEPTH 3150.00 IS (F): 4
VALUE AT DEPTH 3250.00 IS (F): 5
VALUE AT DEPTH 3350.00 IS (F): 6
VALUE AT DEPTH 3450.00 IS (F): 7
VALUE AT DEPTH 3550.00 IS (F): 8

DO YOU WANT DATA PRINTED ? Y

THERE ARE 18 VALUES !
DO YOU WANT TO PRINT ? Y

SUB-FILE # 0

TEST

TEST

DEPTH

VALUE

DEPTH

VALUE

DEPTH

VALUE

1850.00 = 1.00000E 00	2450.00 = 7.00000E 00	3050.00 = 3.00000E 00
1950.00 = 2.00000E 00	2550.00 = 8.00000E 00	3150.00 = 4.00000E 00
2050.00 = 3.00000E 00	2650.00 = 9.00000E 00	3250.00 = 5.00000E 00
2150.00 = 4.00000E 00	2750.00 = 0.00000E-01	3350.00 = 6.00000E 00
2250.00 = 5.00000E 00	2850.00 = 1.00000E 00	3450.00 = 7.00000E 00
2350.00 = 6.00000E 00	2950.00 = 2.00000E 00	3550.00 = 8.00000E 00

DO YOU WANT TO EDIT ? N

WELLOG--OPTION # (I): 6

NUMBER OF RECORDS WRITTEN = 6
DATA WRITTEN ON MASTER FILE # 2

WELLOG--OPTION # (I): 3

*****HEADING EDIT*****

SUB-FILE # 0

HEADER--OPTION # (I): 5

1

*****FILE # 0*****

PROJECT NAME: WELLOG
DRILLING COMPANY NAME: UURI
DRILL HOLE NAME: TEST
FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

LOCATION: SEC TWP RGE
LOGGING COMPANY: ESL
LOG NAME: TEST
LOG DATE: 5/14/80

DATA TYPE: TEST

UNITS: TEST

Y ORIGIN: 0.00000E-01 UNITS/INCH: -3.60000E 01 DFG: 1.00000E 02

DATA STARTING DEPTH: 1850.00 FEET
DATA ENDING DEPTH: 3550.00 FEET

PERMANENT DATUM: GL
ELEVATION: 5200.00 FEET ABOVE SEA LEVEL
DRILLING MEASURED FROM:
ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM
LOG MEASURED FROM:
ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

CASING TYPE: CASING DEPTH: 0.00 FEET
BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER
TIME SINCE CIRCULATION:
MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

HEADER--OPTION # (I): 1

WELLOG--OPTION # (I): 5

INPUT---OPTION # (I): 3

INPUT DEPTHS AND VALUES (DEPTH = -1.0 TO EXIT) :

POINT # 1 DEPTH VALUE IS (F): 1850
VALUE AT DEPTH 1850.00 IS (F): 1
POINT # 2 DEPTH VALUE IS (F): 1950
VALUE AT DEPTH 1950.00 IS (F): 2
POINT # 3 DEPTH VALUE IS (F): 2050
VALUE AT DEPTH 2050.00 IS (F): 3
POINT # 4 DEPTH VALUE IS (F): 2150
VALUE AT DEPTH 2150.00 IS (F): 3
POINT # 5 DEPTH VALUE IS (F): 2250
VALUE AT DEPTH 2250.00 IS (F): 5
POINT # 6 DEPTH VALUE IS (F): 2350
VALUE AT DEPTH 2350.00 IS (F): 6
POINT # 7 DEPTH VALUE IS (F): 2370
VALUE AT DEPTH 2370.00 IS (F): 7
POINT # 8 DEPTH VALUE IS (F): 2550
VALUE AT DEPTH 2550.00 IS (F): 8
POINT # 9 DEPTH VALUE IS (F): 2650
VALUE AT DEPTH 2650.00 IS (F): 9
POINT # 10 DEPTH VALUE IS (F): 2850
VALUE AT DEPTH 2850.00 IS (F): 1
POINT # 11 DEPTH VALUE IS (F): -1

DO YOU WANT DATA PRINTED ? Y

THERE ARE 10 VALUES !
DO YOU WANT TO PRINT ? Y

SUB-FILE # 0

TEST

DEPTH	VALUE
1850.00 =	1.00000E 00
1950.00 =	2.00000E 00
2050.00 =	3.00000E 00
2150.00 =	3.00000E 00

TEST

DEPTH	VALUE
2250.00 =	5.00000E 00
2350.00 =	6.00000E 00
2370.00 =	7.00000E 00

DEPTH	VALUE
2550.00 =	8.00000E 00
2650.00 =	9.00000E 00
2850.00 =	1.00000E 00

DO YOU WANT TO EDIT ? Y

EDIT DATA OR DEPTH ? (EX TO EXIT) (A): DATA
EDIT DATA AT DEPTH (F): 2150
DATA AT DEPTH 2150.00 = 3.00000E 00
NEW DATA VALUE = (F): 4

EDIT DATA OR DEPTH ? (EX TO EXIT) (A): DEPTH
EDIT DEPTH (F): 2370
DATA AT DEPTH 2370.00 = 7.00000E 00
NEW DEPTH VALUE = (F): 2450

EDIT DATA OR DEPTH ? (EX TO EXIT) (A): EX

DO YOU WANT TO DELETE OR INSERT VALUES ? Y

DELINS--OPTION # (I): 0
1 RETURN
2 INSERT
3 DELETE

DELINS--OPTION # (I): 2

INSERT VALUE AT DEPTH (F): 2750
DATA VALUE IS (F): 0

DELINS--OPTION # (I): 2

INSERT VALUE AT DEPTH (F): 2950
DATA VALUE IS (F): 2

DELINS--OPTION # (I): 1

DO YOU WANT DATA PRINTED ? Y

THERE ARE 12 VALUES !
DO YOU WANT TO PRINT ? Y

SUB-FILE # 0

TEST

DEPTH	VALUE
1850.00	= 1.00000E 00
1950.00	= 2.00000E 00
2050.00	= 3.00000E 00
2150.00	= 4.00000E 00

TEST

DEPTH	VALUE
2250.00	= 5.00000E 00
2350.00	= 6.00000E 00
2450.00	= 7.00000E 00
2550.00	= 8.00000E 00

DEPTH	VALUE
2650.00	= 9.00000E 00
2750.00	= 0.00000E-01
2850.00	= 1.00000E 00
2950.00	= 2.00000E 00

DO YOU WANT TO EDIT ? N

WELLOG--OPTION # (I): 6

NUMBER OF RECORDS WRITTEN = 6
DATA WRITTEN ON MASTER FILE # 3

WELLOG--OPTION # (I): 7

SUB-FILE # (I): 1

READ----OPTION # (I): 0
1 TERMINATE FILE READ
2 READ HEADER
3 READ HEADER AND DATA

READ----OPTION # (I): 3

NUMBER OF RECORDS READ = 40

READ----OPTION # (I): 1

WELLOG--OPTION # (I): 6

NUMBER OF RECORDS WRITTEN = 40
DATA WRITTEN ON MASTER FILE # 4

WELLOG--OPTION # (I): 1

OK,

Data Modification and Editing Session

OK, WELLOG
GO

*****WELL LOG DATA MANIPULATION AND PLOTTING PROGRAM*****

REQUESTED RESPONSE FORMATS: (A) = ALPHANUMERIC
(F) = FLOATING POINT
(I) = INTEGER

WELLOG--OPTION # (I): 0

- 1 TERMINATE WELLOG PROGRAM
- 2 SELECT AND OPEN MERGE-FILE
- 3 INPUT OR EDIT SUB-FILE HEADER
- 4 INPUT DATA FROM DIGITIZED FILE
- 5 INPUT DATA FROM USER TERMINAL
- 6 WRITE SUB-FILE TO MERGE-FILE
- 7 READ SUB-FILE FROM MERGE-FILE
- 8 XGT DATA CALCULATION ROUTINES
- 9 XGT FILE MAINTANANCE ROUTINES
- 10 XGT CROSS-PLOT ROUTINES
- 11 CREATE DEPTH-DATA PLOT-FILE
- 12 PLOT DEPTH-DATA PLOT-FILE

WELLOG--OPTION # (I): 8

*****OPEN MERGE-FILE*****

WHAT IS THE NAME OF THE MERGE-FILE ?
INPUT UP TO 12 CHARACTERS (A): TEST-FILE

*****DATCAL ROUTINE*****

DATCAL--OPTION # (I): 0

- 1 TERMINATE DATCAL
- 2 READ SUB-FILE FROM MERG-FILE
- 3 WRITE SUB-FILE TO MERG-FILE
- 4 CALCULATE AVERAGE
- 5 CALCULATE $(X - A) / B$
- 6 CALCULATE $A / (X - B)$
- 7 CALCULATE $A + B * X$
- 8 CALCULATE $A + B / X$
- 9 CALCULATE $\log X$
- 10 CALCULATE $10^{**}X$
- 11 CALCULATE $A * X^{**}B$
- 12 CALCULATE $A * X^{**}(1 / B)$
- 13 PRINT DATA
- 14 EDIT DATA
- 15 PRINT HEADER

16 EDIT HEADER
17 CALCULATE GRADIENT
18 $A + B * X + C * X^2 + D * X^3$
19 CONVERT DEPTH (F-M OR M-F)
20 CONV DEPTH INCR (E-U OR U-E)

DATCAL--OPTION # (I): 2

SUB-FILE # (I): 1

DATCAL--OPTION # (I): 4

*****DATA AVERAGING ROUTINE*****

SUB-FILE # 1
STARTING DEPTH = 1850.00
ENDING DEPTH = 3550.00
EQUALLY SPACED INTERVAL = 0.50

INPUT VALUES AS DEPTH
INPUT START AND END VALUES (F,F): 1850,3550
INPUT AVERAGING INTERVAL (F): 10

HOW MANY VALUES DO YOU WANT OVERLAPPED ? (I): 10

AVERAGING PARAMETERS ARE :

SUB-FILE # 1
STARTING DEPTH = 1850.00
ENDING DEPTH = 3550.00
EQUALLY SPACED INTERVAL = 10.00
DO YOU WANT TO CHANGE THEM ? N

*****CALCULATION COMPLETED*****

DATCAL--OPTION # (I): 16

*****HEADING EDIT*****

SUB-FILE # 0

HEADER--OPTION # (I): 0
1 TERMINATE HEADER EDIT
2 INPUT NEW HEADER
3 EDIT PREV HEAD BY LINE #
4 EDIT ALL HEAD BELOW LINE
5 PRINT HEADER

HEADER--OPTION # (I): 3

WHAT DO YOU WANT TO CHANGE (0 = INDEX) (I): 0

1= EXIT FROM EDIT MODE
2= DRILLING COMPANY NAME
3= DRILL HOLE NAME
4= AREA
5= PROJECT NAME
6= LOCATION
7= LOGGING COMPANY NAME
8= LOG NAME
9= LOG DATE
10= DATA TYPE
11= DATA UNITS
12= Y ORIGIN
13= UNITS PER INCH
14= STARTING DEPTH AND DEPTH UNITS
15= ENDING DEPTH
16= DRILLING MEASURED FROM
17= ELEVATION ABOVE PERMANENT DATUM
18= LOG MEASURED FROM
19= ELEVATION ABOVE PERMANENT DATUM
20= PERMANENT DATUM
21= ELEVATION
22= CASING DEPTH
23= BIT SIZE
24= FLUID TYPE
25= TIME SINCE CIRCULATION
26= MAXIMUM RECORDED TEMPERATURE
27= COMMENTS
28= SCALE CHANGES

WHAT DO YOU WANT TO CHANGE (0 = INDEX) (I): 10
DATA TYPE (A): AVERAGE TEST

WHAT DO YOU WANT TO CHANGE (0 = INDEX) (I): 1

HEADER--OPTION # (I): 1

DATCAL--OPTION # (I): 3

NUMBER OF RECORDS WRITTEN = 7
DATA WRITTEN ON MASTER FILE # 5

DATCAL--OPTION # (I): 2

SUB-FILE # (I): 1

DATCAL--OPTION # (I): 13

PRINT---OPTION # (I): 0

- 1 RETURN TO DATCAL
- 2 PRINT ENTIRE FILE
- 3 PRINT ONLY PART OF FILE

PRINT---OPTION # (I): 3

SUB-FILE # 1

TEST TEST
NUM REC = 40 NUM PTS IN LAST REC = 1
NUM TOT PTS = 3401
START DEPTH = 1850.00 END DEPTH = 3550.00
EQUAL SPACED INTERVAL = 0.50
Y ORIGIN VAL = 0.00000E-01 Y UNITS / INCH = -3.60000E 01
MIN = 2.88000E 00 MAX = 6.15600E 01

BEGIN WITH DEPTH (F): 1850
NUMBER OF VALUES TO PRINT (I): 10
1850.00 FEET = 1.11852E 01
1850.50 FEET = 1.54952E 01
1851.00 FEET = 1.87200E 01
1851.50 FEET = 1.87200E 01
1852.00 FEET = 1.87200E 01
1852.50 FEET = 1.87200E 01
1853.00 FEET = 1.87495E 01
1853.50 FEET = 1.98561E 01
1854.00 FEET = 3.72722E 01
1854.50 FEET = 5.17868E 01
DO YOU WANT TO CONTINUE ? N

DATCAL---OPTION # (I): 17

*****DATA GRADIENT ROUTINE*****

SUB-FILE # 1
STARTING DEPTH = 1850.00
ENDING DEPTH = 3550.00
EQUALLY SPACED INTERVAL = 0.50

INPUT VALUES AS DEPTH
INPUT START AND END VALUES (F,F): 1850,3550
INPUT AVERAGING INTERVAL (F): 10

HOW MANY VALUES DO YOU WANT OVERLAPPED ? (I): 20

GRADIENT PARAMETERS ARE :

SUB-FILE # 1
STARTING DEPTH = 1850.00
ENDING DEPTH = 3550.00
EQUALLY SPACED INTERVAL = 10.00

DO YOU WANT TO CHANGE THEM ? N

*****CALCULATION COMPLETED*****

DATCAL--OPTION # (I): 13

PRINT---OPTION # (I): 0

- 1 RETURN TO DATCAL
- 2 PRINT ENTIRE FILE
- 3 PRINT ONLY PART OF FILE

PRINT---OPTION # (I): 2

THERE ARE 170 VALUES !
DO YOU WANT TO PRINT ? Y

SUB-FILE # 0

TEST

DEPTH	VALUE
1855.00	= 2.74534E 00
1865.00	= -1.05750E-01
1875.00	= -2.61593E-02
1885.00	= -8.54180E-01
1895.00	= 7.25156E-01
1905.00	= 1.14240E 00
1915.00	= -6.16050E-01
1925.00	= -1.45305E 00
1935.00	= -1.56914E-01
1945.00	= -8.00758E-02
1955.00	= 1.01745E 00
1965.00	= 9.23534E-02
1975.00	= -1.10266E 00
1985.00	= -2.49847E-01
1995.00	= 3.85118E-01
2005.00	= 1.64360E-01
2015.00	= -2.95970E-01
2025.00	= -1.57011E-01
2035.00	= -5.44884E-02
2045.00	= 1.22337E-02
2055.00	= 5.99885E-01
2065.00	= 6.84761E-01
2075.00	= 3.19441E-01
2085.00	= -2.81672E-01
2095.00	= -5.55792E-01
2105.00	= 4.85736E-01
2115.00	= 3.13885E-01
2125.00	= -7.42541E-01

TEST

DEPTH	VALUE
2425.00	= 1.97546E-01
2435.00	= -1.35514E-01
2445.00	= 3.70901E-01
2455.00	= 1.46445E-01
2465.00	= -3.21047E-01
2475.00	= -2.10567E-01
2485.00	= -1.00190E-01
2495.00	= -3.22952E-02
2505.00	= 3.02130E-01
2515.00	= 8.85790E-03
2525.00	= -5.21134E-01
2535.00	= -2.39525E-01
2545.00	= -1.84396E-01
2555.00	= -1.14920E-01
2565.00	= 2.41633E-01
2575.00	= 4.86755E-01
2585.00	= -1.22298E-01
2595.00	= -4.68480E-01
2605.00	= -5.57103E-02
2615.00	= -1.23960E-01
2625.00	= -1.05714E-01
2635.00	= -8.35514E-02
2645.00	= -1.15695E-01
2655.00	= -2.79767E-02
2665.00	= 2.30692E-02
2675.00	= 8.05610E-01
2685.00	= 7.43685E-01
2695.00	= -2.51894E-01

DEPTH	VALUE
2995.00	= 1.55846E 00
3005.00	= 1.62042E-01
3015.00	= -1.53583E 00
3025.00	= -7.51083E-01
3035.00	= -1.44603E-01
3045.00	= 1.20787E-02
3055.00	= 1.05711E-01
3065.00	= 1.98420E-01
3075.00	= 2.19837E-01
3085.00	= 3.28741E-02
3095.00	= -4.93678E-03
3105.00	= 1.41867E-01
3115.00	= -8.04644E-03
3125.00	= -1.39541E-01
3135.00	= -1.72051E-01
3145.00	= -3.25919E-01
3155.00	= -1.76385E-01
3165.00	= 1.10269E-01
3175.00	= 8.81891E-02
3185.00	= -3.00905E-03
3195.00	= -9.38897E-03
3205.00	= 1.53529E-01
3215.00	= 1.51398E-01
3225.00	= 4.62031E-01
3235.00	= 6.86714E-01
3245.00	= 4.14334E-01
3255.00	= -1.32109E-01
3265.00	= -5.74620E-01

2135.00 = -7.07761E-01	2705.00 = 3.13693E-01	3275.00 = -2.92436E-01
2145.00 = 2.20716E-03	2715.00 = 3.38701E-01	3285.00 = 2.96949E-01
2155.00 = -1.11934E-01	2725.00 = -6.46469E-01	3295.00 = -2.12527E-01
2165.00 = -1.79124E-01	2735.00 = -9.32911E-02	3305.00 = -2.77807E-01
2175.00 = -9.23807E-02	2745.00 = 7.24464E-01	3315.00 = -8.62232E-02
2185.00 = -2.65003E-02	2755.00 = -5.43853E-01	3325.00 = -1.08942E-01
2195.00 = -2.65164E-03	2765.00 = -1.22669E 00	3335.00 = 1.24161E-01
2205.00 = 7.04072E-02	2775.00 = -7.12359E-02	3345.00 = -8.09004E-02
2215.00 = 6.90691E-02	2785.00 = 1.88148E-01	3355.00 = -8.11881E-02
2225.00 = 1.79064E-02	2795.00 = 1.01963E-02	3365.00 = 4.41030E-02
2235.00 = 1.40321E-01	2805.00 = -2.83122E-01	3375.00 = -2.76169E-02
2245.00 = 1.15221E 00	2815.00 = 2.38038E-02	3385.00 = 9.22963E-02
2255.00 = 7.95828E-01	2825.00 = 3.36838E-01	3395.00 = 1.26030E-01
2265.00 = 7.21138E-01	2835.00 = 8.66594E-02	3405.00 = 1.04325E 00
2275.00 = 7.17197E-01	2845.00 = -1.24284E-01	3415.00 = 5.90874E-01
2285.00 = -7.84061E-01	2855.00 = 3.18220E-01	3425.00 = -7.73527E-01
2295.00 = -1.09183E 00	2865.00 = 8.48697E-02	3435.00 = -4.33741E-01
2305.00 = -2.76677E-01	2875.00 = -2.42198E-01	3445.00 = -8.17759E-02
2315.00 = 6.47756E-01	2885.00 = -1.76347E-01	3455.00 = -2.13002E-02
2325.00 = 1.37750E 00	2895.00 = 2.42865E-02	3465.00 = 1.10352E-01
2335.00 = 8.70922E-01	2905.00 = 3.28561E-01	3475.00 = -2.77186E-01
2345.00 = -1.86923E-01	2915.00 = 1.37994E-01	3485.00 = -3.92640E-01
2355.00 = -2.62080E-01	2925.00 = -2.61058E-01	3495.00 = -2.82977E-01
2365.00 = 2.44686E-01	2935.00 = -9.15795E-02	3505.00 = 2.34838E-02
2375.00 = -8.78042E-01	2945.00 = 1.09939E-01	3515.00 = 7.91844E-02
2385.00 = -1.25010E 00	2955.00 = 6.67725E-01	3525.00 = 3.16870E-01
2395.00 = -1.80821E-01	2965.00 = 1.16956E-03	3535.00 = 3.77448E-01
2405.00 = 1.34835E-01	2975.00 = -7.84481E-01	3545.00 = 8.02964E-01
2415.00 = 2.61643E-01	2985.00 = 4.94058E-01	

DATCAL--OPTION # (I): 3

*****HEADING EDIT*****

SUB-FILE # 0

HEADER--OPTION # (I): 1

DATCAL--OPTION # (I): 3

NUMBER OF RECORDS WRITTEN = 7
DATA WRITTEN ON MASTER FILE # 6

DATCAL--OPTION # (I): 2

SUB-FILE # (I): 1

DATCAL--OPTION # (I): 18

*****DATA COMPUTING ROUTINE*****

FILE # 1
STARTING DEPTH = 1850.00
ENDING DEPTH = 3550.00
EQUALLY SPACED INTERVAL = 0.50

INPUT VALUES AS DEPTH
INPUT START AND END VALUES (F,F): 1850,3550

FORMULA IS $A + B * X + C * X^{**2} + D * X^{**3}$
INPUT A, B, C, AND D (F,F,F,F): 1.,.25,.05,0

COMPUTING PARAMETERS ARE :

FILE # 1
STARTING DEPTH = 1850.00
ENDING DEPTH = 3550.00
EQUALLY SPACED INTERVAL = 0.50
A = 1.00000E 00 B = 2.50000E-01 C = 5.00000E-02 D = 0.00000E-01
DO YOU WANT TO CHANGE THEM ? N

*****CALCULATION COMPLETED*****

DATCAL--OPTION # (I): 3

*****HEADING EDIT*****

SUB-FILE # 0

HEADER--OPTION # (I): 1

DATCAL--OPTION # (I): 3

NUMBER OF RECORDS WRITTEN = 40
DATA WRITTEN ON MASTER FILE # 7

DATCAL--OPTION # (I): 2

SUB-FILE # (I): 1

DATCAL--OPTION # (I): 19

*****CALCULATION COMPLETED*****

DATCAL--OPTION # (I): 3

NUMBER OF RECORDS WRITTEN = 40
DATA WRITTEN ON MASTER FILE # 8

DATCAL--OPTION # (I): 2

SUB-FILE # (I): 1

DATCAL--OPTION # (I): 20

*****CALCULATION COMPLETED*****

DATCAL--OPTION # (I): 3

NUMBER OF RECORDS WRITTEN = 74
DATA WRITTEN ON MASTER FILE # 9

DATCAL--OPTION # (I): 1

WELLOG--OPTION # (I): 9

*****FMAIN PROGRAM*****

FMAIN---OPTION # (I): 0
1 TERMINATE FMAIN
2 DIRECTORY (SHORT)
3 DIRECTORY (LONG)
4 CHECK PLOT
5 DELETE & PACK
6 OPEN DIFFERENT MERGE-FILE
7 READ SUB-FILE DATA
8 EDIT SUB-FILE HEADER
9 EDIT SUB-FILE DATA
10 FIX SUB-FILE DATA
11 PRINT SUB-FILE DATA
12 MOVE FILE TO DIFF MERGE-FILE
13 CONCATINATE SUB-FILES
14 PRINT SELECTED SUB-FILES
15 APPEND ANOTHER MERGE-FILE
16 EMPTY HEADER AND DATA ARRAYS

FMAIN---OPTION # (I): 5

PASSWORD ? PLEASE
SELECT SUBFILES TO BE DELETED WITH A <Y>
OF SELECTIONS= 9
123456789
YYY

FMAIN---OPTION # (I): 2

INPUT 1 FOR TERMINAL OR 14 FOR LINE PRINTER (I): 1
1

*****DIRECTORY*****

WELLOG PROGRAM DOCUMENTATION AND TEST FILE
LR = 100 NSF = 6

*** FILE # 1 ***

TEST ESL 5/14/80
N REC = 40 PT LST REC = 1 N PTS = 3401 ST DP = 1850.00 EN DP = 3550.
DATA INT = 0.50 MIN = 2.88000E 00 MAX = 6.15600E 01 DP = FEET

*** FILE # 2 ***

AVERAGE TEST ESL 5/14/80
N REC = 7 PT LST REC = 70 N PTS = 170 ST DP = 1855.00 EN DP = 3545.
DATA INT = 10.00 MIN = 5.02945E 00 MAX = 4.23303E 01 DP = FEET

*** FILE # 3 ***

TEST ESL 5/14/80
N REC = 7 PT LST REC = 70 N PTS = 170 ST DP = 1855.00 EN DP = 3545.
DATA INT = 10.00 MIN = -1.53583E 00 MAX = 2.74534E 00 DP = FEET

*** FILE # 4 ***

TEST ESL 5/14/80
N REC = 40 PT LST REC = 1 N PTS = 3401 ST DP = 1850.00 EN DP = 3550.
DATA INT = 0.50 MIN = 2.13472E 00 MAX = 2.05872E 02 DP = FEET

*** FILE # 5 ***

TEST ESL 5/14/80
N REC = 40 PT LST REC = 1 N PTS = 3401 ST DP = 563.88 EN DP = 1082.
DATA INT = 0.15 MIN = 2.88000E 00 MAX = 6.15600E 01 DP = METERS

*** FILE # 6 ***

TEST

ESL

5/14/80

N REC = 74 PT LST REC = 2 N PTS = 6802 ST DP = 1850.00 EN DP = 3550.
DATA INT = 0.00 MIN = 2.88000E 00 MAX = 6.15600E 01 DP = FEET

FMAIN---OPTION # (I): 4

*****CHECK PLOT SUBROUTINE*****

CHKPLT---OPTION # (I): 0

- 1 TERMINATE CHKPLT
- 2 PLOT LAST SUB-FILE
- 3 PLOT ALL SUB-FILES
- 4 PLOT SELECTED SUB-FILES

CHKPLT---OPTION # (I): 4

OF SELECTIONS= 6

123456

Y Y

INPUT : 0 = USER TERMINAL
1 = TEKTRONIX
2 = STATOS
3 = CALCOMP
4 = LINE PRINTER (I): 2

OF VECTORS= 4499

[See Plot 1]

INPUT : 0 = USER TERMINAL
1 = TEKTRONIX
2 = STATOS
3 = CALCOMP
4 = LINE PRINTER (I): 2

OF VECTORS= 4506

[See Plot 2]

FMAIN---OPTION # (I): 7

SUB-FILE # (I): 1

SUB-FILE # 1

TEST

TEST

NUM REC = 40 NUM PTS IN LAST REC = 1

NUM TOT PTS = 3401

START DEPTH = 1850.00 END DEPTH = 3550.00

EQUAL SPACED INTERVAL = 0.50

Y ORIGIN VAL = 0.00000E-01 Y UNITS / INCH = -3.60000E 01

MIN = 2.88000E 00 MAX = 6.15600E 01

BEGIN WITH DEPTH (F): 1850

NUMBER OF VALUES TO PRINT (I): 10

1850.00 FEET = 1.11852E 01

1850.50 FEET = 1.54952E 01

1851.00 FEET = 1.87200E 01

1851.50 FEET = 1.87200E 01
 1852.00 FEET = 1.87200E 01
 1852.50 FEET = 1.87200E 01
 1853.00 FEET = 1.87495E 01
 1853.50 FEET = 1.98561E 01
 1854.00 FEET = 3.72722E 01
 1854.50 FEET = 5.17868E 01
 DO YOU WANT TO CONTINUE ? N

FMAIN---OPTION # (I): 16

*****ARRAYS CLEARED*****

FMAIN---OPTION # (I): 7

SUB-FILE # (I): 6

SUB-FILE # 6

TEST

TEST

NUM REC = 74 NUM PTS IN LAST REC = 2

TOT NUM PTS = 6802

START DEPTH = 1850.00 END DEPTH = 3550.00

EQUAL SPACED INTERVAL = 0.00

Y ORIGIN VAL = 0.00000E-01 Y UNITS / INCH = -3.60000E 01

MIN = 2.88000E 00 MAX = 6.15600E 01

BEGIN WITH DEPTH (F): 1850

NUMBER OF VALUES TO PRINT (I): 10

1850.00 FEET = 1.11852E 01
 1850.50 FEET = 1.54952E 01
 1851.00 FEET = 1.87200E 01
 1851.50 FEET = 1.87200E 01
 1852.00 FEET = 1.87200E 01
 1852.50 FEET = 1.87200E 01
 1853.00 FEET = 1.87495E 01
 1853.50 FEET = 1.98561E 01
 1854.00 FEET = 3.72722E 01
 1854.50 FEET = 5.17868E 01

DO YOU WANT TO CONTINUE ? N

FMAIN---OPTION # (I): 9

SUBFILE # 6

DO YOU WANT DATA LISTED ? N

DO YOU WANT TO EDIT ? Y

EDIT DATA OR DEPTH ? (EX TO EXIT) (A): EX

DO YOU WANT TO DELETE OR INSERT VALUES ? Y

DELINS--OPTION # (I): 0
1 RETURN
2 INSERT
3 DELETE

DELINS--OPTION # (I): 1

DO YOU WANT DATA LISTED ? N

DO YOU WANT TO EDIT ? N
IS IT OK TO REPLACE SUBFILE ? N

FMAIN---OPTION # (I): 10

*****DATA FIXING ROUTINE*****

SUB-FILE # 6
IS IT OK TO CHANGE SUBFILE ? Y

RNFI XD--OPTION # (I): 0
1 TERMINATE RNFI XD
2 SELECT DEPTH INTERVAL
3 ADD TO DATA
4 SUBTRACT FROM DATA
5 MULTIPLY DATA
6 DIVIDE DATA
7 FIX AS FUNCTION OF DEPTH
8 SHIFT STARTING DEPTH

RNFI XD--OPTION # (I): 7

FUNCTN--OPTION # (I): 0
1 RETURN TO RNFI XD
2 ADD TO DATA
3 SUBTRACT FROM DATA
4 MULTIPLY DATA
5 DIVIDE DATA

FUNCTN--OPTION # (I): 1

RNFI XD--OPTION # (I): 1

IS IT OK TO REPLACE SUBFILE ? N

FMAIN---OPTION # (I): 12

*****OPEN MERGE-FILE*****

WHAT IS THE NAME OF THE MERGE-FILE ?
INPUT UP TO 12 CHARACTERS (A): TEST-FILE-B

*****NEW FILE INITIALIZATION*****

PASSWORD ? PLEASE

INPUT UP TO 60 CHARACTERS OF HEADING (A)
: TEMPORARY TEST FILE

*****MERGE-FILE INITIALIZED*****
IS IT OK TO WRITE SUBFILE ? Y

FILE WRITTEN ON SUB-FILE # 1

FMAIN---OPTION # (I): 15

INPUT NAME OF MERGE-FILE TO BE APPENDED
INPUT UP TO 12 CHARACTERS (A): TEST-FILE-C

MGTWFL--OPTION # (I): 0

- 1 TERMINATE MGTWFL
- 2 APPEND ALL SUB-FILES
- 3 APPEND SELECTED SUB-FILES

MGTWFL--OPTION # (I): 3

OF SELECTIONS= 4

1234

YY

TOTAL NUMBER OF SUB-FILES = 8

FMAIN---OPTION # (I): 13

*****SUB-FILE CONCATINATION ROUTINE*****

INPUT FIRST SUB-FILE NUMBER (PERMANENT FILE)
SUB-FILE # (I): 7

INPUT SECOND SUB-FILE NUMBER (FILE WILL BE DELETED)
SUB-FILE # (I): 8

SUB-FILE 1 IS # 7 SUB-FILE 2 IS # 8
OK TO CONTINUE ? Y
DO YOU WANT TO CONCATINATE ANOTHER FILE ? N

FMAIN---OPTION # (I): 3

INPUT 1 FOR TERMINAL OR 14 FOR LINE PRINTER (I): 14
DO YOU WANT SCALE CHANGES PRINTED ? N
PRINT FILE PRT001 [See Sample Long Directory]

FMAIN---OPTION # (I): 10

SUB-FILE # (I): 7

*****DATA FIXING ROUTINE*****

SUBFILE #: 7

IS IT OK TO CHANGE SUBFILE ? Y

FIXDAT---OPTION # (I): 0

- 1 TERMINATE FIXDAT
- 2 SELECT DEPTH INTERVAL
- 3 ADD TO DATA
- 4 SUBTRACT FROM DATA
- 5 MULTIPLY DATA
- 6 DIVIDE DATA
- 7 FIX AS FUNCTION OF DEPTH
- 8 SHIFT STARTING DEPTH
- 9 CORRECT DATA SPACING

FIXDAT---OPTION # (I): 7

FUNCTN---OPTION # (I): 0

- 1 RETURN TO FIXDAT
- 2 ADD TO DATA
- 3 SUBTRACT FROM DATA
- 4 MULTIPLY DATA
- 5 DIVIDE DATA

FUNCTN---OPTION # (I): 2

ADD (PER DEPTH UNIT) (F): 0

*****MODIFICATION COMPLETED*****

FIXDAT---OPTION # (I): 1

IS IT OK TO REPLACE SUBFILE ? Y

FMAIN---OPTION # (I): 10

SUB-FILE # (I): 4

*****DATA FIXING ROUTINE*****

SUBFILE #: 4

IS IT OK TO CHANGE SUBFILE ? Y

FIXDAT---OPTION # (I): 9

PASSWORD ? JOHNWATWOOD

PRESENT STARTING DEPTH = 1850.00 PRESENT ENDING DEPTH = 3550.00

STARTING DEPTH (F): 1800
ENDING DEPTH (F): 3600

NEW STARTING DEPTH = 1800.00 NEW ENDING DEPTH = 3600.00
OK TO MAKE CHANGE ? Y

*****MODIFICATION COMPLETED*****

FIXDAT--OPTION # (I): 1

IS IT OK TO REPLACE SUBFILE ? N

FMAIN---OPTION # (I): 14

*****MERGE-FILE PRINTING SUBROUTINE*****

!!!!!!WARNING--THIS ROUTINE PRINTS OUT ALL DATA CONTAINED IN A SUBFILE.
IT SHOULD NOT USUALLY BE USED TO PRINT OUT SUB-FILES CREATED BY USING
THE DIGITIZER AS IT CAN CREATE THOUSANDS OF PAGES OF PRINT!!!!!!
OK TO CONTINUE ? Y

PRTMFL--OPTION # (I): 0

- 1 RETURN TO FMAIN
- 2 PRINT LAST SUB FILE
- 3 PRINT ALL SUB FILES
- 4 PRINT SELECTED SUB FILES

PRTMFL--OPTION # (I): 1

FMAIN---OPTION # (I): 1

WELLOG--OPTION # (I): 1

OK,

Sample Check Plots (Plots 1 & 2)

FILE * 1

TEST

TEST

Plot 1

78

FILE # 6

TEST

TEST

67.

Sample Long Directory

*****DIRECTORY*****

WELLOG PROGRAM DOCUMENTATION AND TEST FILE
LR = 100 NSF = 7

*****FILE # 1*****

PROJECT NAME: WELLOG
DRILLING COMPANY NAME: UURI
DRILL HOLE NAME: TEST
FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

LOCATION: SEC TWP RGE
LOGGING COMPANY: ESL
LOG NAME: TEST
LOG DATE: 5/14/80

DATA TYPE: TEST UNITS: TEST

Y ORIGIN: 0.00000E-01 UNITS/INCH: -3.60000E 01 DFG: 5.00000E-01

DATA STARTING DEPTH: 1850.00 FEET
DATA ENDING DEPTH: 3550.00 FEET

PERMANENT DATUM: GL
ELEVATION: 5200.00 FEET ABOVE SEA LEVEL
DRILLING MEASURED FROM:
ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM
LOG MEASURED FROM:
ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

CASING TYPE: CASING DEPTH: 0.00 FEET
BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER
TIME SINCE CIRCULATION:
MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

TOTAL NUMBER OF DATA POINTS = 3401

*****FILE # 2*****

PROJECT NAME: WELLOG
DRILLING COMPANY NAME: UURI
DRILL HOLE NAME: TEST
FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

LOCATION: SEC TWP RGE
LOGGING COMPANY: ESL
LOG NAME: TEST
LOG DATE: 5/14/80

DATA TYPE: AVERAGE TEST UNITS: TEST

Y ORIGIN: 0.00000E-01 UNITS/INCH: -3.60000E 01 DFG: 1.00000E 01

DATA STARTING DEPTH: 1855.00 FEET
DATA ENDING DEPTH: 3545.00 FEET

PERMANENT DATUM: GL

ELEVATION: 5200.00 FEET ABOVE SEA LEVEL

DRILLING MEASURED FROM:

ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

LOG MEASURED FROM:

ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

CASING TYPE: CASING DEPTH: 0.00 FEET

BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER

TIME SINCE CIRCULATION:

MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

TOTAL NUMBER OF DATA POINTS = 170

*****FILE # 3*****

PROJECT NAME: WELLOG
DRILLING COMPANY NAME: UURI
DRILL HOLE NAME: TEST
FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

LOCATION: SEC TWP RGE
LOGGING COMPANY: ESL
LOG NAME: TEST
LOG DATE: 5/14/80

DATA TYPE: TEST

UNITS: TEST

Y ORIGIN: 0.00000E-01 UNITS/INCH: -3.60000E 01 DFG: 1.00000E 01

DATA STARTING DEPTH: 1855.00 FEET
DATA ENDING DEPTH: 3545.00 FEET

PERMANENT DATUM: GL

ELEVATION: 5200.00 FEET ABOVE SEA LEVEL

DRILLING MEASURED FROM:

ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

LOG MEASURED FROM:

ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

CASING TYPE: CASING DEPTH: 0.00 FEET

BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER

TIME SINCE CIRCULATION:

MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

TOTAL NUMBER OF DATA POINTS = 170

*****FILE # 4*****

PROJECT NAME: WELLOG
DRILLING COMPANY NAME: UURI
DRILL HOLE NAME: TEST
FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

LOCATION: SEC TWP RGE
LOGGING COMPANY: ESL
LOG NAME: TEST
LOG DATE: 5/14/80

DATA TYPE: TEST

UNITS: TEST

Y ORIGIN: 0.00000E-01 UNITS/INCH: -3.60000E 01 DFG: 5.00000E-01

DATA STARTING DEPTH: 1850.00 FEET
DATA ENDING DEPTH: 3550.00 FEET

PERMANENT DATUM: GL

ELEVATION: 5200.00 FEET ABOVE SEA LEVEL

DRILLING MEASURED FROM:

ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

LOG MEASURED FROM:

ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

CASING TYPE: CASING DEPTH: 0.00 FEET

BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER

TIME SINCE CIRCULATION:

MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

TOTAL NUMBER OF DATA POINTS = 3401

*****FILE # 5*****

PROJECT NAME: WELLOG
DRILLING COMPANY NAME: UURI
DRILL HOLE NAME: TEST
FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

LOCATION: SEC TWP RGE
LOGGING COMPANY: ESI.
LOG NAME: TEST
LOG DATE: 5/14/80

DATA TYPE: TEST UNITS: TEST
Y ORIGIN: 0.00000E-01 UNITS/INCH: -3.60000E 01 DFG: 1.52400E-01

DATA STARTING DEPTH: 563.88 METERS
DATA ENDING DEPTH: 1082.04 METERS

PERMANENT DATUM: GL
ELEVATION: 5200.00 METERS ABOVE SEA LEVEL
DRILLING MEASURED FROM:
ELEVATION: 0.00 METERS ABOVE PERMANENT DATUM
LOG MEASURED FROM:
ELEVATION: 0.00 METERS ABOVE PERMANENT DATUM

CASING TYPE: CASING DEPTH: 0.00 METERS
BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER
TIME SINCE CIRCULATION:
MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

TOTAL NUMBER OF DATA POINTS = 3401

*****FILE # 6*****

PROJECT NAME: WELLOG
DRILLING COMPANY NAME: UURI
DRILL HOLE NAME: TEST
FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

LOCATION: SEC TWP RGE
LOGGING COMPANY: ESL
LOG NAME: TEST
LOG DATE: 5/14/80

DATA TYPE: TEST UNITS: TEST

Y ORIGIN: 0.00000E-01 UNITS/INCH: -3.60000E 01 DFG: 0.00000E-01

DATA STARTING DEPTH: 1850.00 FEET
DATA ENDING DEPTH: 3550.00 FEET

PERMANENT DATUM: GL
ELEVATION: 5200.00 FEET ABOVE SEA LEVEL
DRILLING MEASURED FROM:
ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM
LOG MEASURED FROM:
ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

CASING TYPE: CASING DEPTH: 0.00 FEET
BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER
TIME SINCE CIRCULATION:
MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

TOTAL NUMBER OF DATA POINTS = 6802

*****FILE # 7*****

PROJECT NAME: WELLOG
DRILLING COMPANY NAME: UURI
DRILL HOLE NAME: TEST
FIELD: TEST

COUNTY: SALT LAKE STATE: UTAH

LOCATION: SEC TWP RGE
LOGGING COMPANY: ESL
LOG NAME: TEST
LOG DATE: 5/14/80

DATA TYPE: TEST UNITS: TEST

Y ORIGIN: 0.00000E-01 UNITS/INCH: -3.60000E 01 DFG: 5.00000E-01

DATA STARTING DEPTH: 1850.00 FEET
DATA ENDING DEPTH: 3550.00 FEET

PERMANENT DATUM: GL
ELEVATION: 5200.00 FEET ABOVE SEA LEVEL
DRILLING MEASURED FROM:
ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM
LOG MEASURED FROM:
ELEVATION: 0.00 FEET ABOVE PERMANENT DATUM

CASING TYPE: CASING DEPTH: 0.00 FEET
BIT SIZE: 0.00 FLUID TYPE IN HOLE: WATER
TIME SINCE CIRCULATION:
MAXIMUM RECORDED TEMPERATURE: 60.00 DEG F

COMMENTS:

THIS IS A TEST OF THE WELLOG PROGRAM

TOTAL NUMBER OF DATA POINTS = 3401

Data Plotting Session

OK, WELLOG
GO

*****WELL LOG DATA MANIPULATION AND PLOTTING PROGRAM*****

REQUESTED RESPONSE FORMATS: (A) = ALPHANUMERIC
(F) = FLOATING POINT
(I) = INTEGER

WELLOG--OPTION # (I): 0

- 1 TERMINATE WELLOG PROGRAM
- 2 SELECT AND OPEN MERGE-FILE
- 3 INPUT OR EDIT SUB-FILE HEADER
- 4 INPUT DATA FROM DIGITIZED FILE
- 5 INPUT DATA FROM USER TERMINAL
- 6 WRITE SUB-FILE TO MERGE-FILE
- 7 READ SUB-FILE FROM MERGE-FILE
- 8 XGT DATA CALCULATION ROUTINES
- 9 XGT FILE MAINTANANCE ROUTINES
- 10 XGT CROSS-PLOT ROUTINES
- 11 CREATE DEPTH-DATA PLOT-FILE
- 12 PLOT DEPTH-DATA PLOT-FILE

WELLOG--OPTION # (I): 11

*****GEOPHYSICAL DATA PLOT-FILE GENERATION*****

MERGE-FILE NAME INPUT UP TO 12 CHARACTERS (A): TEST-FILE-A
DRILL HOLE NAME INPUT UP TO 24 CHARACTERS (A): TEST
NUMBER OF PLOT FIELDS (I) = 3
X AXIS START DEPTH (F) = 5000
X AXIS END DEPTH (F) = 5200
DEPTH UNITS/INCH SCALE (F) = 10
DEPTH TYPE = (1=FEET, 2=METERS) (I): 1

FIELD # 1
Y AXIS LENGTH (F) = 3
NUMBER OF DATA PLOTS (I) = 1

PLOT # 1
NUMBER OF SUB-FILES (I) = 1
Y AXIS MINIMUM VALUE (F) = -2
Y AXIS MAXIMUM VALUE (F) = 10
Y AXIS UNITS INPUT UP TO 24 CHARACTERS (A): PERCENT
Y AXIS TITLE INPUT UP TO 24 CHARACTERS (A): NEUTRON POROSITY
RELATIVE OR ABSOLUTE ? (A) = A

SUB-FILE DESCRIPTION 1
SUB-FILE INDEX NUMBER (I) = 1

PEN SELECT NUMBER (I) = 1
LINE CODE & INCREMENT (I,F) = 1,0
START & END DEPTH (F) = 0,0

FIELD # 2
Y AXIS LENGTH (F) = 2
NUMBER OF DATA PLOTS (I) = 1

PLOT # 1
NUMBER OF SUB-FILES (I) = 1
Y AXIS MINIMUM VALUE (F) = 2.5
Y AXIS MAXIMUM VALUE (F) = 2.9
Y AXIS UNITS INPUT UP TO 24 CHARACTERS (A): GRAMS/CC
Y AXIS TITLE INPUT UP TO 24 CHARACTERS (A): BULK DENSITY
RELATIVE OR ABSOLUTE ? (A) = A

SUB-FILE DESCRIPTION 1
SUB-FILE INDEX NUMBER (I) = 5
PEN SELECT NUMBER (I) = 2
LINE CODE & INCREMENT (I,F) = 2,.03
START & END DEPTH (F) = 0,0

FIELD # 3
Y AXIS LENGTH (F) = 3
NUMBER OF DATA PLOTS (I) = 1

PLOT # 1
NUMBER OF SUB-FILES (I) = 1
Y AXIS MINIMUM VALUE (F) = 40
Y AXIS MAXIMUM VALUE (F) = 70
Y AXIS UNITS INPUT UP TO 24 CHARACTERS (A): MICROSEC/FT
Y AXIS TITLE INPUT UP TO 24 CHARACTERS (A): INTERVAL TRANSIT T
RELATIVE OR ABSOLUTE ? (A) = R

SUB-FILE DESCRIPTION 1
SUB-FILE INDEX NUMBER (I) = 3
PEN SELECT NUMBER (I) = 1
LINE CODE & INCREMENT (I,F) = 4,.03
START & END DEPTH (F) = 0,0

PLOT INFORMATION WRITTEN ON SUB-FILE # 1

PYMAX = 16. PXMAX = 28.

WANT TO CREATE OR EDIT ANOTHER PLOT-FILE ? Y
DO YOU WANT TO EDIT ? Y

*****PLOT-FILE EDIT ROUTINE*****

EDIT----OPTION # (I): 0
1 RETURN TO PDATA
2 READ PLOT SUB-FILE
3 PRINT OUT PLOT SUB-FILE
4 EDIT PLOT SUB-FILE

5 WRITE PLOT SUB-FILE

EDIT----OPTION # (I): 2

WHAT IS PLOT SUB-FILE NUMBER

SUB-FILE # (I): 1

EDIT----OPTION # (I): 3

INPUT (1=TERMINAL, OR 14=PRINTER) (I): 1

PLOT SUB-FILE # 1

TEST

3

5000.00

5200.00

10.00

1

3.00

1

1

-2.00000E 00

1.00000E 01

PERCENT

NEUTRON POROSITY

A

1

1

1 0.01

5000.00 5200.00

2.00

1

1

2.50000E 00

2.90000E 00

GRAMS/CC

BULK DENSITY

A

5

2

2 0.03

5000.00 5200.00

3.00

1

1

4.00000E 01

7.00000E 01

MICROSEC/FT

INTERVAL TRANSIT TIME

4 DRILL HOLE NAME

NUMBER OF PLOT FIELDS

X AXIS START DEPTH

X AXIS END DEPTH

DEPTH UNITS/INCH SCALE

DEPTH UNITS TYPE CODE

Y AXIS LENGTH

NUMBER OF DATA PLOTS

NUMBER OF SUB-FILES

Y AXIS MINIMUM VALUE

Y AXIS MAXIMUM VALUE

Y AXIS UNITS

Y AXIS TITLE

RELATIVE OR ABSOLUTE ?

SUB-FILE INDEX NUMBER

PEN SELECT NUMBER

LINE CODE & INCREMENT

START & END DEPTH

Y AXIS LENGTH

NUMBER OF DATA PLOTS

NUMBER OF SUB-FILES

Y AXIS MINIMUM VALUE

Y AXIS MAXIMUM VALUE

Y AXIS UNITS

Y AXIS TITLE

RELATIVE OR ABSOLUTE ?

SUB-FILE INDEX NUMBER

PEN SELECT NUMBER

LINE CODE & INCREMENT

START & END DEPTH

Y AXIS LENGTH

NUMBER OF DATA PLOTS

NUMBER OF SUB-FILES

Y AXIS MINIMUM VALUE

Y AXIS MAXIMUM VALUE

Y AXIS UNITS

Y AXIS TITLE

R		RELATIVE OR ABSOLUTE ?
3		SUB-FILE INDEX NUMBER
1		PEN SELECT NUMBER
4	0.03	LINE CODE & INCREMENT
5000.00	5200.00	START & END DEPTH

EDIT----OPTION # (I): 4

CONTINUE WITH EDIT ? Y

CHANGE--OPTION # (I): 0

- 1 DRILL HOLE NAME
- 2 X AXIS START DEPTH
- 3 X AXIS END DEPTH
- 4 DEPTH UNITS/INCH SCALE
- 5 Y AXIS LENGTH
- 6 Y AXIS MINIMUM VALUE
- 7 Y AXIS MAXIMUM VALUE
- 8 Y AXIS UNITS
- 9 Y AXIS TITLE
- 10 RELATIVE OR ABSOLUTE ?
- 11 SUB-FILE INDEX NUMBER
- 12 PEN SELECT NUMBER
- 13 LINE CODE & INCREMENT
- 14 START & END DEPTH

CHANGE--OPTION # (I): 1

DRILL HOLE NAME INPUT UP TO 24 CHARACTERS (A): TEST-FILE
CONTINUE WITH EDIT ? N

EDIT----OPTION # (I): 5

EDIT----OPTION # (I): 1

WANT TO CREATE OR EDIT ANOTHER PLOT-FILE ? N

WELLOG--OPTION # (I): 12

*****DEPTH-DATA PLOT ROUTINE*****

WHAT IS THE NAME OF THE MERGE-FILE ?
INPUT UP TO 12 CHARACTERS (A): TEST-FILE-A
INPUT : 0 = USER TERMINAL

- 1 = TEKTRONIX
- 2 = STATOS
- 3 = CALCOMP
- 4 = LINE PRINTER (I): 2

DO YOU WANT GEOLOGIC COLUMN PLOTTED ? Y

INPUT NUMBER OF DECIMAL PLACES FOR X & Y AXIS NUMBERS
(-1 = INTEGERS) (I,I): -1,2

NUMBER OF VECTORS/INCH (AT 0.5 DEPTH UNITS) = 20
INPUT MAXIMUM NUMBER OF VECTORS/INCH (I): 20
OF VECTORS= 6740 [See Plot 3]

*****PLOT ENDED*****

THE NUMBER OF PENS USED WAS 2

DO YOU WANT TO PLOT ANOTHER PLOT-FILE ? N

WELLOG--OPTION # (I): 10

*****OPEN MERGE-FILE*****

WHAT IS THE NAME OF THE MERGE-FILE ?
INPUT UP TO 12 CHARACTERS (A): TEST-FILE-A

*****CROSS-PLOT ROUTINE*****

INPUT TERMINAL CARRIAGE WIDTH (I): 80
INPUT LINE PRINTER CARRIAGE WIDTH (I): 120

WHAT IS THE NAME OF THE DRILL HOLE ?
INPUT UP TO 24 CHARACTERS (A): TEST
DO YOU WANT TO XQT RANDOM DATA CROSS-PLOTS ? N
1, 2, OR 3 FILES ? (I): 3
DEPTH UNITS ARE (1 = FEET, 2 = METERS) (I): 1

*****SELECT SUBFILE # FOR FILE X *****

SUB-FILE # (I): 1
TITLE INPUT UP TO 24 CHARACTERS (A): NEUTRON POROSITY
UNITS INPUT UP TO 24 CHARACTERS (A): PERCENT

SUB-FILE # 1 NEUTRON POROSITY PERCENT
OK TO CONTINUE ? Y

*****SELECT SUBFILE # FOR FILE Y *****

SUB-FILE # (I): 5
TITLE INPUT UP TO 24 CHARACTERS (A): BULK DENSITY
UNITS INPUT UP TO 24 CHARACTERS (A): GRAMS/CC

SUB-FILE # 5 BULK DENSITY GRAMS/CC
OK TO CONTINUE ? Y

*****SELECT SUBFILE # FOR FILE Z *****

SUB-FILE # (I): 3
TITLE INPUT UP TO 24 CHARACTERS (A): INTERVAL TRANSIT TIME
UNITS INPUT UP TO 24 CHARACTERS (A): MICROSEC/FT

SUB-FILE # 3 INTERVAL TRANSIT TIME MICROSEC/FT
OK TO CONTINUE ? Y

FILE X
NEUTRON POROSITY PERCENT
STARTING DEPTH = 4900.00 ENDING DEPTH = 5600.00
EQUALLY SPACED INTERVAL = 0.50
DEPTH UNITS = FEET

SUB-FILE # 1

FILE Y
BULK DENSITY GRAMS/CC
STARTING DEPTH = 4900.00 ENDING DEPTH = 5600.00
EQUALLY SPACED INTERVAL = 0.50
DEPTH UNITS = FEET

SUB-FILE # 5

FILE Z
INTERVAL TRANSIT TIME MICROSEC/FT
STARTING DEPTH = 4898.00 ENDING DEPTH = 5598.00
EQUALLY SPACED INTERVAL = 0.50
DEPTH UNITS = FEET

SUB-FILE # 3

MINIMUM DEPTH = 4900.00 MAXIMUM DEPTH = 5598.00
MINIMUM DEPTH INCREMENT = 0.50
MAXIMUM DEPTH INCREMENT = 698.00
DEPTH UNITS = FEET

INPUT VALUES AS FEET
INPUT START AND END VALUES (F,F): 5020,5174
INPUT VALUE INTERVAL (F): .5

PRESENT PLOT DEPTHS =
STARING DEPTH = 5020.00 ENDING DEPTH = 5174.00
DEPTH INTERVAL = 0.50
DEPTH UNITS ARE = FEET
OK TO CONTINUE ? Y

SUB-FILE # 1 MIN = -2.02143E-01 MAX = 1.68474E 00

SUB-FILE # 5 MIN = 2.56538E 00 MAX = 2.74720E 00

SUB-FILE # 3 MIN = 4.14098E 01 MAX = 6.77613E 01

NUMBER OF DATA POINTS = 309

CRSPLT--OPTION # (1): 0
1 TERMINATE CROSS-PLOT ROUTINE
2 SELECT SUBFILE NUMBERS
3 SELECT PLOT DEPTHS
4 SELECT PLOTTER
5 SELECT PLOT SIZE PARAMETERS
6 LINEAR-LINEAR PLOT
7 LINEAR-LOG PLOT
8 LOG-LOG PLOT

- 9 LINEAR-SQUARE ROOT PLOT
- 10 Z LINEAR PLOT
- 11 FREQUENCY HISTOGRAM
- 12 DATA VS DEPTH PLOT
- 13 MODIFY PLOT DATA
- 14 SPECIAL PLOTS
- 15 XQT RANDOM CRSPLT

CRSPLT--OPTION # (I): 4

INPUT : 0 = USER TERMINAL
 1 = TEKTRONIX
 2 = STATOS
 3 = CALCOMP
 4 = LINE PRINTER (I): 2

CRSPLT--OPTION # (I): 5

DO YOU WANT AN 8 1/2 X 11 PLOT ? N
 INPUT AXIS LENGTHS FOR FILES X AND Y (F,F): 6,6
 INPUT AXIS LENGTH FOR FILE Z (F): 6
 INPUT AXIS MIN AND UNITS/INCH FOR FILE X (F,F): -1,.5
 INPUT AXIS MIN AND UNITS/INCH FOR FILE Y (F,F): 2.5,.05
 INPUT AXIS MIN AND UNITS/INCH FOR FILE Z (F,F): 40.5
 OK TO CONTINUE ? Y

CRSPLT--OPTION # (I): 6

- SELPLT--OPTION # (I): 0
- 1 NORMAL PLOT (Y VS X)
 - 2 PLOT X VS Y
 - 3 PLOT Z VS X
 - 4 PLOT X VS Z
 - 5 PLOT Y VS Z
 - 6 PLOT Z VS Y

SELPLT--OPTION # (I): 1

DO YOU WANT A LINE GRAPH ? N
 INPUT SYMBOL NUMBER 0 - 128 (11 = *) (I): 6
 BULK DENSITY VS NEUTRON POROSITY
 OK TO CONTINUE ? Y
 # OF VECTORS= 2274 [See Plot 4]

CRSPLT--OPTION # (I): 10

SELPLT--OPTION # (I): 1

DO YOU WANT A LINE GRAPH ? N
 INPUT SYMBOL NUMBER 0 - 128 (11 = *) (I): 0
 BULK DENSITY VS NEUTRON POROSITY

OK TO CONTINUE ? Y

OF VECTORS= 3816

[See Plot 5]

OF VECTORS= 1018

[See Plot 6]

CRSPLT--OPTION # (I): 11

PLOT WHICH FILE ? (I): 1

HOW MANY DIVISIONS FOR HISTOGRAM ? (I): 12

INPUT MINIMUM AND MAXIMUM VALUES (F,F): -1,2

OF VECTORS= 1807

[See Plot 7]

CRSPLT--OPTION # (I): 12

PLOT WHICH FILE ? (I): 1

INPUT X AXIS LENGTH (F): 20

DATA TYPE IS FEET

INPUT VALUE MINIMUM AND UNITS PER INCH FOR X AXIS (F,F): 5000,10

DO YOU WANT A CONTINUOUS LINE PLOT ? Y

OF VECTORS= 1595

[See Plot 8]

CRSPLT--OPTION # (I): 4

INPUT : 0 = USER TERMINAL

1 = TEKTRONIX

2 = STATOS

3 = CALCOMP

4 = LINE PRINTER (I): 4

CRSPLT--OPTION # (I): 6

SELPLT--OPTION # (I): 1

BULK DENSITY VS NEUTRON POROSITY

OK TO CONTINUE ? Y

PRINT FILE PRT003

[See Plot 9]

CRSPLT--OPTION # (I): 7

SELPLT--OPTION # (I): 1

BULK DENSITY VS NEUTRON POROSITY

OK TO CONTINUE ? Y

DO YOU WANT LOG ON VERTICAL AXIS ? Y

INPUT POWER OF TEN STARTING POINT (I): 0

INPUT NUMBER OF LOG CYCLES FOR AXIS (I): 1

PRINT FILE PRT003

[See Plot 10]

CRSPLT--OPTION # (I): 7

SELPLT--OPTION # (I): 1

BULK DENSITY VS NEUTRON POROSITY
OK TO CONTINUE ? Y

DO YOU WANT LOG ON VERTICAL AXIS ? N
INPUT POWER OF TEN STARTING POINT (I): -2
INPUT NUMBER OF LOG CYCLES FOR AXIS (I): 3
PRINT FILE PRT003

[See Plot 11]

CRSPLT--OPTION # (I): 8

SELPLT--OPTION # (I): 1

BULK DENSITY VS NEUTRON POROSITY
OK TO CONTINUE ? Y
X AXIS POWER OF TEN STARTING POINT (I): -2
X AXIS NUMBER OF LOG CYCLES FOR AXIS (I): 3
Y AXIS POWER OF TEN STARTING POINT (I): 0
Y AXIS NUMBER OF LOG CYCLES FOR AXIS (I): 1
PRINT FILE PRT003

[See Plot 12]

CRSPLT--OPTION # (I): 9

SELPLT--OPTION # (I): 1

BULK DENSITY VS NEUTRON POROSITY
OK TO CONTINUE ? Y
DO YOU WANT SQUARE-ROOT ON VERTICAL AXIS ? Y
PRINT FILE PRT003

[See Plot 13]

CRSPLT--OPTION # (I): 9

SELPLT--OPTION # (I): 1

BULK DENSITY VS NEUTRON POROSITY
OK TO CONTINUE ? Y
DO YOU WANT SQUARE-ROOT ON VERTICAL AXIS ? N
PRINT FILE PRT004

[See Plot 14]

CRSPLT--OPTION # (I): 10

!!!!!!YOU CANNOT WRITE A Z PLOT ON TERMINAL!!!!!!

CRSPLT--OPTION # (I): 11

PLOT WHICH FILE ? (I): 1
HOW MANY DIVISIONS FOR HISTOGRAM ? (I): 12
INPUT MINIMUM AND MAXIMUM VALUES (F,F): -1,2

PRINT FILE PRT003

[See Plot 15]

CRSPLT--OPTION # (I): 12

PLOT WHICH FILE ? (I): 1

INPUT X AXIS LENGTH (F): 20

DATA TYPE IS FEET

INPUT VALUE MINIMUM AND UNITS PER INCH FOR X AXIS (F,F): 5000,10

PRINT FILE PRT003

[See Plot 16]

CRSPLT--OPTION # (I): 13

*****DATA MODIFICATION ROUTINE*****

DTMDFY--OPTION # (I): 0

- 1 TERMINATE DTMDFY
- 2 $(X - A) / B$
- 3 $A / (X - B)$
- 4 $A + B * X$
- 5 $A + B / X$
- 6 $\text{LOG } X$
- 7 $10^{**}X$
- 8 $A * X^{**}B$
- 9 $A * X^{**}(1 / B)$
- 10 Y / Z
- 11 $Y * Z$
- 12 $Y + Z$
- 13 $Y - Z$
- 14 AVERAGE DATA
- 15 CALCULATE GRADIENT

DTMDFY--OPTION # (I): 4

WHAT FILE DO YOU WANT TO CHANGE ? (I): 1

WHAT FILE DO YOU WANT TO USE ? (I): 1

COMPUTATION FORMULA IS: $A + B * X$

INPUT VALUE OF A AND B (F,F): .02,1

DTMDFY--OPTION # (I): 14

*****DATA AVERAGING ROUTINE*****

STARTING DEPTH = 5020.00

ENDING DEPTH = 5174.00

EQUALLY SPACED INTERVAL = 0.50

INPUT VALUES AS DEPTH

INPUT START AND END VALUES (F,F): 5020,5174

INPUT AVERAGING INTERVAL (F): 2

HOW MANY VALUES DO YOU WANT OVERLAPPED ? (I): 0

AVERAGING PARAMETERS ARE :

STARTING DEPTH = 5020.00

ENDING DEPTH = 5174.00

EQUALLY SPACED INTERVAL = 2.00

DO YOU WANT TO CHANGE THEM ? N

DTMDFY--OPTION # (I): 1

SUB-FILE # 1 MIN = -1.56903E-01 MAX = 1.52177E 00

SUB-FILE # 5 MIN = 2.58269E 00 MAX = 2.72149E 00

SUB-FILE # 3 MIN = 4.88580E 01 MAX = 5.72713E 01

NUMBER OF DATA POINTS = 77

CRSPLT--OPTION # (I): 14

*****SPECIAL CROSS-PLOT ROUTINE*****

SPCLPT--OPTION # (I): 0

- 1 TERMINATE SPECIAL PLOTS
- 2 SELECT PLOTTER
- 3 SELECT PLOT SIZE PARAMETERS
- 4 SET UP OVER-PRINT GRID
- 5 SELECT LINE FITTING OPTION
- 6 SET STANDARDS (M&N AND A&K)
- 7 LINEAR-LINEAR PLOT
- 8 LINEAR-LOG PLOT
- 9 LOG-LOG PLOT
- 10 LINEAR-SQUARE ROOT PLOT
- 11 M & N PLOT
- 12 A & K PLOT

SPCLPT--OPTION # (I): 2

INPUT : 0 = USER TERMINAL

1 = TEKTRONIX

2 = STATOS

3 = CALCOMP

4 = LINE PRINTER (I): 2

SPCLPT--OPTION # (I): 4

SETGRD--OPTION # (I): 0

- 1 RETURN TO SPECIAL PLOT ROUTINE
- 2 POROS & % HYD MINER (N POR & BK DEN)
- 3 POROS & % HYD MINER (N POR & TV TIM)

- 4 POROS & % HYD MINER (B DEN & TV TIM)
- 5 SET CORNERS MANUALLY (ALL OTHERS)

SETGRD--OPTION # (I): 2

*****!!POROSITY DATA MUST BE CONSISTANT!!*****
IS POROSITY DATA IN PERCENT ? Y
INPUT MIN AND MAX POROSITIES (PU) (F,F): 0,.05
INPUT MIN AND MAX VOL % HYD MINERAL (F,F): 0,.5
INPUT NON-HYDROUS MINERAL POROSITY (PU) (F): -.015
INPUT FLUID POROSITY (PU) (F): 1
INPUT HYDROUS MINERAL POROSITY (PU) (F): .1
INPUT NON-HYDROUS MINERAL DENSITY (F): 2.59
INPUT FLUID DENSITY (F): 1
INPUT HYDROUS MINERAL DENSITY (F): 3.12
POROSITY IS IN (1 = X, 2 = Y) (I): 1
SETGRD--OPTION # (I): 1
INPUT NUMBER OF INTERVALS FOR X AND Y (I,I): 5,5

SPCLPT--OPTION # (I): 5

DO YOU WANT A FITTED LINE ? Y
DASHED LINE OPTION (I): 2
INPUT: (1=LINEAR, 2=POLYNOMIAL) (I): 1

SPCLPT--OPTION # (I): 6

DO YOU WANT DEFAULT STANDARDS ? Y
SNP OR CNL ? : CNL

SPCLPT--OPTION # (I): 7

SELPLT--OPTION # (I): 0
1 NORMAL PLOT (Y VS X)
2 PLOT X VS Y
3 PLOT Z VS X
4 PLOT X VS Z
5 PLOT Y VS Z
6 PLOT Z VS Y

SELPLT--OPTION # (I): 1

DO YOU WANT A LINE GRAPH ? N
INPUT SYMBOL NUMBER 0 - 128 (11 = *) (I): 5
BULK DENSITY VS NEUTRON POROSITY
OK TO CONTINUE ? Y
OF VECTORS= 2334

[See Plot 17]

SPCLPT--OPTION # (I): 8

SELPLT--OPTION # (I): 1

DO YOU WANT A LINE GRAPH ? N
 INPUT SYMBOL NUMBER 0 - 128 (11 = *) (I): 5
 BULK DENSITY VS NEUTRON POROSITY
 OK TO CONTINUE ? Y
 DO YOU WANT LOG ON VERTICAL AXIS ? N
 INPUT POWER OF TEN STARTING POINT (I): -2
 INPUT NUMBER OF LOG CYCLES FOR AXIS (I): 3
 # OF VECTORS= 3145

[See Plot 18]

SPCLPT--OPTION # (I): 9

SELPLT--OPTION # (I): 1

DO YOU WANT A LINE GRAPH ? N
 INPUT SYMBOL NUMBER 0 - 128 (11 = *) (I): 5
 BULK DENSITY VS NEUTRON POROSITY
 OK TO CONTINUE ? Y
 X AXIS POWER OF TEN STARTING POINT (I): -2
 X AXIS NUMBER OF LOG CYCLES FOR AXIS (I): 3
 Y AXIS POWER OF TEN STARTING POINT (I): 0
 Y AXIS NUMBER OF LOG CYCLES FOR AXIS (I): 1
 # OF VECTORS= 2555

[See Plot 19]

SPCLPT--OPTION # (I): 10

SELPLT--OPTION # (I): 1

DO YOU WANT A LINE GRAPH ? N
 INPUT SYMBOL NUMBER 0 - 128 (11 = *) (I): 5
 BULK DENSITY VS NEUTRON POROSITY
 OK TO CONTINUE ? Y
 DO YOU WANT SQUARE-ROOT ON VERTICAL AXIS ? N
 # OF VECTORS= 2890

[See Plot 20]

SPCLPT--OPTION # (I): 11

NEUTRON POROSITY IS IN FILE 1,2,OR 3 ? (I): 1
 BULK DENSITY IS IN FILE 1,2,OR 3 ? (I): 2
 INPUT FLUID TRANSIT TIME (F): 205
 INPUT FLUID DENSITY (F): 1
 IS NEUTRON POROSITY IN PERCENT ? Y
 DO YOU WANT A CONTINUOUS LINE GRAPH ? N
 DO YOU WANT ROCK STANDARDS PLOTTED ? Y
 # OF VECTORS= 1712
 # OF VECTORS= 1510

[See Plot 21]

[See Plot 22]

SPCLPT--OPTION # (I): 12

NEUTRON POROSITY IS IN FILE 1,2,OR 3 ? (I): 1
 BULK DENSITY IS IN FILE 1,2,OR 3 ? (I): 2

INPUT FLUID TRANSIT TIME (F): 205
 INPUT FLUID DENSITY (F): 1
 IS NEUTRON POROSITY IN PERCENT ? Y
 DO YOU WANT A CONTINUOUS LINE GRAPH ? N
 DO YOU WANT ROCK STANDARDS PLOTTED ? Y
 # OF VECTORS= 1647 [See Plot 23]
 # OF VECTORS= 1510 [See Plot 24]

SPCLPT--OPTION # (I): 1

CRSPLT--OPTION # (I): 15

*****RANDOM CROSS-PLOT ROUTINE*****

1, 2, OR 3 FILES ? (I): 3
 DEPTH UNITS ARE (1 = FEET, 2 = METERS) (I): 1

*****SELECT SUBFILE # FOR FILE X *****

SUB-FILE # (I): 1
 TITLE INPUT UP TO 24 CHARACTERS (A): NEUTRON POROSITY
 UNITS INPUT UP TO 24 CHARACTERS (A): PERCENT

SUB-FILE # 1 NEUTRON POROSITY PERCENT
 OK TO CONTINUE ? Y

*****SELECT SUBFILE # FOR FILE Y *****

SUB-FILE # (I): 5
 TITLE INPUT UP TO 24 CHARACTERS (A): BULK DENSITY
 UNITS INPUT UP TO 24 CHARACTERS (A): GRAMS/CC

SUB-FILE # 5 BULK DENSITY GRAMS/CC
 OK TO CONTINUE ? Y

*****SELECT SUBFILE # FOR FILE Z *****

SUB-FILE # (I): 3
 TITLE INPUT UP TO 24 CHARACTERS (A): INTERVAL TRANSIT TIME
 UNITS INPUT UP TO 24 CHARACTERS (A): MICROSEC/FT

SUB-FILE # 3 INTERVAL TRANSIT TIME MICROSEC/FT
 OK TO CONTINUE ? Y

FILE X

NEUTRON POROSITY PERCENT
 STARTING DEPTH = 4900.00 ENDING DEPTH = 5600.00
 EQUALLY SPACED INTERVAL = 0.50
 DEPTH UNITS = FEET

SUB-FILE # 1

FILE Y

BULK DENSITY GRAMS/CC
 STARTING DEPTH = 4900.00 ENDING DEPTH = 5600.00
 EQUALLY SPACED INTERVAL = 0.50
 DEPTH UNITS = FEET

SUB-FILE # 5

FILE Z

INTERVAL TRANSIT TIME

MICROSEC/FT

SUB-FILE # 3

STARTING DEPTH = 4898.00 ENDING DEPTH = 5598.00

EQUALLY SPACED INTERVAL = 0.50

DEPTH UNITS = FEET

MINIMUM DEPTH = 4900.00 MAXIMUM DEPTH = 5598.00

DEPTH UNITS = FEET

INPUT VALUES AS FEET

INPUT START AND END VALUES (F,F): 5020,5174

PRESENT PLOT DEPTHS =

STARTING DEPTH = 5020.00 ENDING DEPTH = 5174.00

DEPTH UNITS ARE = FEET

OK TO CONTINUE ? Y

STARTING DEPTH = 5020.00 ENDING DEPTH = 5174.00

HOW CLOSE SHOULD THE DEPTHS BE ? (F): .5

STARTING DEPTH = 5020.00 ENDING DEPTH = 5174.00

STARTING DEPTH = 5020.00 ENDING DEPTH = 5174.00

SUB-FILE # 1 MIN = -2.02143E-01 MAX = 1.68474E 00

SUB-FILE # 5 MIN = 2.56538E 00 MAX = 2.74720E 00

SUB-FILE # 3 MIN = 4.14098E 01 MAX = 6.77613E 01

NUMBER OF DATA POINTS = 309

RNCSP--OPTION # (I): 0

- 1 TERMINATE RANDM XPLT ROUTINE
- 2 SELECT SUBFILE NUMBERS
- 3 SELECT PLOT DEPTHS
- 4 SELECT PLOTTER
- 5 SELECT PLOT SIZE PARAMETERS
- 6 LINEAR-LINEAR PLOT
- 7 LINEAR-LOG PLOT
- 8 LOG-LOG PLOT
- 9 LINEAR-SQUARE ROOT PLOT
- 10 Z LINEAR PLOT
- 11 FREQUENCY HISTOGRAM
- 12 DATA VS DEPTH PLOT
- 13 MODIFY PLOT DATA
- 14 SPECIAL PLOTS

RNCSP--OPTION # (I): 13

*****DATA MODIFICATION ROUTINE*****

DTMDFY--OPTION # (I): 0

- 1 TERMINATE DTMDFY
- 2 $(X - A) / B$
- 3 $A / (X - B)$
- 4 $A + B * X$
- 5 $A + B / X$
- 6 LOG X
- 7 $10^{**}X$
- 8 $A * X^{**}B$
- 9 $A * X^{**}(1 / B)$
- 10 Y / Z
- 11 $Y * Z$
- 12 $Y + Z$
- 13 $Y - Z$
- 14 AVERAGE DATA
- 15 CALCULATE GRADIENT

DTMDFY--OPTION # (I): 14

*****DATA AVERAGING ROUTINE*****

STARTING DEPTH = 5020.00
 ENDING DEPTH = 5174.00
 # OF POINTS IN INTERVAL = 0

INPUT VALUES AS DEPTH
 INPUT START AND END VALUES (F,F): 5020,5174
 INPUT # OF VALUES PER INTERVAL (I): 4

HOW MANY VALUES DO YOU WANT OVERLAPPED ? (I): 0

AVERAGING PARAMETERS ARE :

STARTING DEPTH = 5020.00
 ENDING DEPTH = 5173.50
 # OF POINTS IN INTERVAL = 4
 DO YOU WANT TO CHANGE THEM ? N

DTMDFY--OPTION # (I): 1

SUB-FILE # 1 MIN = -1.76903E-01 MAX = 1.50177E 00

SUB-FILE # 5 MIN = 2.58269E 00 MAX = 2.72149E 00

SUB-FILE # 3 MIN = 4.88580E 01 MAX = 5.72713E 01

NUMBER OF DATA POINTS = 77

RNCSTP--OPTION # (I): 4

INPUT : 0 = USER TERMINAL
1 = TEKTRONIX
2 = STATOS
3 = CALCOMP
4 = LINE PRINTER (I): 2

RNCSP--OPTION # (I): 6

DO YOU WANT AN 8 1/2 X 11 PLOT ? N
INPUT AXIS LENGTHS FOR FILES X AND Y (F,F): 6,6
INPUT AXIS LENGTH FOR FILE Z (F): 6
INPUT AXIS MIN AND UNITS/INCH FOR FILE X (F,F): -2,2
INPUT AXIS MIN AND UNITS/INCH FOR FILE Y (F,F): 2.5,.05
INPUT AXIS MIN AND UNITS/INCH FOR FILE Z (F,F): 40,5
OK TO CONTINUE ? Y

SELPLT--OPTION # (I): 1

DO YOU WANT A LINE GRAPH ? N
INPUT SYMBOL NUMBER 0 - 128 (11 = *) (I): 6
BULK DENSITY VS NEUTRON POROSITY
OK TO CONTINUE ? Y
OF VECTORS= 1343 [See Plot 25]

RNCSP--OPTION # (I): 1

*****RANDOM CROSS-PLOTS TERMINATED*****
YOU MUST SELECT NEW FILES TO CONTINUE

CRSPLT--OPTION # (I): 1

THERE WERE 11 PLOTS MADE

WELLOG--OPTION # (I): 1

OK,

Sample Depth Versus Data Plot (Plot 3)

Plot 3

Sample Cross Plots (Plots 4 through 25)

Plot 4

BULK DENSITY VS NEUTRON POROSITY

Plot 5

BULK DENSITY VS NEUTRON POROSITY

TEST

Plot 6

INTERVAL TRANSIT TIME

MICROSEC/FT

	0	<	40.00	
40.00	<	1	<	45.00
45.00	<	2	<	50.00
50.00	<	3	<	55.00
55.00	<	4	<	60.00
60.00	<	5	<	65.00
65.00	<	6	<	70.00
70.00	<	0		

TEST

AT 5020.00 - 5174.00 FEET
0.50 DEPTH UNIT INTERVALS

Plot 7

0 0 0 59 149 57 32 6 7 5 3 0

-1.0000
-0.75000
-0.50000
-0.25000
0.00000
0.25000
0.50000
0.75000
1.0000
1.2500
1.5000
1.7500
2.0000

MINIMUM VALUE = -.20214
MAXIMUM VALUE = 1.6847
MEAN VALUE = 0.24733
VARIANCE = 0.11119
DEVIATION = 0.33345

1 INCH = 28.000 VALUES

NEUTRON POROSITY
PERCENT

TOTAL NUMBER OF VALUES = 309

TEST

5020.00 - 5174.00 FEET
AT 0.50 DEPTH UNIT INTERVALS

112

NEUTRON POROSITY

TEST

5020.00 - 5174.00 FEET
AT 0.50 DEPTH UNIT INTERVAL

Plot 9

BULK DENSITY VS NEUTRON POROSITY

TEST

5020.00 - 5174.00 FEET
AT 0.50 DEPTH UNIT INTERVALS

Plot 11

BULK DENSITY VS NEUTRON POROSITY

TEST

5020.00 - 5174.00 FEET
AT 0.50 DEPTH UNIT INTERVALS

Plot 12

BULK DENSITY VS NEUTRON POROSITY

TEST

5020.00 - 5174.00 FEET
AT 0.50 DEPTH UNIT INTERVALS

GRAMS / CC (S Q R T)

2. 923E 00	+	I
		I
		I
		I
2. 699E 00	+	I
		I
		I
		I
2. 476E 00	+	I
		I
		I
		I
2. 252E 00	+	I
		I
		I
		I
2. 028E 00	+	I
		I
		I
		I
1. 805E 00	+	I
		I
		I
		I
1. 581E 00	+	I

5020.00 - 5174.00 FEET
AT 0.50 DEPTH UNIT INTERVALS

Plot 14

BULK DENSITY VS NEUTRON POROSITY

TEST

5020.00 - 5174.00 FEET
AT 0.50 DEPTH UNIT INTERVALS

Plot 15

-1.00000E 00	I	0
-7.50000E-01	I	0
-5.00000E-01	I	0
-2.50000E-01	I*****	59
0.00000E-01	I*****	140
2.50000E-01	I*****	57
5.00000E-01	I*****	32
7.50000E-01	I**	6
1.00000E 00	I***	7
1.25000E 00	I**	5
1.50000E 00	I*	3
1.75000E 00	I	0
2.00000E 00		

MINIMUM = -2.02143E-01
 MAXIMUM = 1.68474E 00
 MEAN = 2.47333E-01
 VARIANCE = 1.11186E-01
 DEVIATION = 3.33445E-01

* = 2.80 VALUES TOTAL NUMBER OF VALUES = 309

NEUTRON POROSITY PERCENT

TEST

5020.00 - 5174.00 FEET
AT 0.50 DEPTH UNIT INTERVALS

Plot 16

Plot 17

BULK DENSITY VS NEUTRON POROSITY

Plot 18

BULK DENSITY VS NEUTRON POROSITY

Plot 19

BULK DENSITY VS NEUTRON POROSITY

Plot 20

BULK DENSITY VS NEUTRON POROSITY

Plot 21

M-N PLOT

FTT = 205.000

FD = 1.00000

TEST

AT 5021.00 - 5173.00 FEET
2.00 DEPTH UNIT INTERVALS

Plot 22

STANDARD VALUES

SYMBL = ROCK NAME : NEUT POR : BULK DEN: TRAN TIM

*	SANDSTONE	-0.5000E-01	2.650	55.50
x	LIMESTONE	0.0000	2.710	47.50
o	DOLOMITE	0.0000	2.870	43.50
Δ	ANHDRITE	-0.2000E-02	2.980	50.00
◇	GYP SUM	0.5900	2.350	52.00
□	SALT	-0.1000E-01	2.030	67.00

Plot 23

A-K PLOT

FTT • 205.000

FD • 1.00000

TEST

AT 5021.00 - 5173.00 FEET
2.00 DEPTH UNIT INTERVALS

Plot 24

STANDARD VALUES

SYMBL = ROCK NAME : NEUT POR : BULK DEN: TRAN TIM

*	SANDSTONE	-0.5000E-01	2.650	55.50
X	LIMESTONE	0.0000	2.710	47.50
o	DOLOMITE	0.0000	2.870	43.50
Δ	ANHYDRITE	-0.2000E-02	2.980	50.00
◇	GYP SUM	0.5900	2.350	52.00
□	SALT	-0.1000E-01	2.030	67.00

Plot 25

BULK DENSITY VS NEUTRON POROSITY

APPENDIX C

FILE FORMAT TABLES

Table C1 - Header Work File Format (Direct Access)

Record Number 1 (100 4-byte words) (Numeric)

NR = (Int.) Number of records in subfile.
 NPLR = (Int.) Number of points in last record.
 NTP = (Int.) Total number of data points.
 SFG = (Real) Starting depth.
 EFG = (Real) Ending depth.
 DFG = (Real) Equally spaced depth increment.
 YOR = (Real) Y origin.
 DY = (Real) Y units per inch.
 YMIN = (Real) Y minimum value.
 YMAX = (Real) Y maximum value.
 FEPD = (Real) Permanent datum elevation.
 FEDR = (Real) Elevation above PD of driller origin.
 FELG = (Real) Elevation above PD of logger origin.
 CSD = (Real) Casing depth.
 BSZ = (Real) Bit size.
 TMAX = (Real) Maximum temperature during run.
 NSC = (Int.) Number of scale changes (150 maximum).
 IDPU = (Int.) depth units code.
 = 1 Feet.
 = 2 Meters.
 IDUM = (Int.) Dummy array dimensioned 82.

Record Number 2 (100 4-byte words) (Alphanumeric)

HD(1 - 6) = Project ID (24 characters).
 HD(7 - 16) = Drilling company name (40 characters).
 HD(17 - 26) = Drill hole name (40 characters).
 HD(27 - 32) = Field (24 characters).
 HD(33 - 35) = County (12 characters).
 HD(36 - 38) = State (12 characters).
 HD(39) = Location code ("STRA" OR "LALO").

If HD(39) = "STRA":

HD(40 - 41) = Section (8 characters).
 HD(42 - 43) = Township (8 characters).
 HD(44 - 45) = Range (8 characters).

If HD(39) = "LALO":

HD(40 - 42) = Latitude (12 characters).
 HD(43 - 45) = Longitude (12 characters).
 HD(46 - 51) = Logging company (24 characters).
 HD(52 - 57) = Log name (24 characters).
 HD(58 - 62) = Log date (20 characters).
 HD(63 - 68) = Data type (24 characters).

HD(69 - 74) = Data units (24 characters).
HD(75 - 77) = Permanent datum (12 characters).
HD(78 - 80) = Drilling origin (12 characters).
HD(81 - 83) = Logging origin (12 characters).
HD(84 - 88) = Casing type (20 characters).
HD(89 - 94) = Fluid type (24 characters).
HD(95 - 97) = Time since circulation (12 characters).
HD(98 - 100) = Maximum temperature units (12 char.).

Record Number 3 and Half of 4 (150 4-byte words) (Alpha.)

HC(1 - 150) = Comment array (600 characters).

Second Half of 4 and Record 5 (150 4-byte words) (Num.)

SC(1 - 150) = (Real) Scale change values.

Table C2 - Data Storage Merge File Format (Direct Access)

Record Number 1 (100 4-byte words) (Num. & Alpha.)
(Merge File Header Record)

LR = (Int.) Record length. (= 100 words)
NSF = (Int.) Number of subfiles written.
TT = (Alpha.) Merge-file title. (15 words)
IPR = (Int.) Merge-file record read pointer.
IPW = (Int.) Merge-file record write pointer.
ISF = (Int.) Merge-file subfile pointer.
NUMR = (Int.) Number of records in file ISF.

Record Number 2 (100 4-byte words) (Numeric)
(First Record of Subfile 1)

NR = (Int.) Number of records in subfile.
NPLR = (Int.) Number of points in last record.
NTP = (Int.) Total number of data points.
SFG = (Real) Starting depth.
EFG = (Real) Ending depth.
DFG = (Real) Equally spaced depth increment.
YOR = (Real) Y origin.
DY = (Real) Y units per inch.
YMIN = (Real) Y minimum value.
YMAX = (Real) Y maximum value.
FEPD = (Real) Permanent datum elevation.
FEDR = (Real) Elevation above PD of driller origin.
FELG = (Real) Elevation above PD of logger origin.
CSD = (Real) Casing depth.
BSZ = (Real) Bit size.
TMAX = (Real) Maximum temperature during run.
NSC = (Int.) Number of scale changes (150 maximum).
IDPU = (Int.) depth units code.
= 1 Feet.
= 2 Meters.
IDUM = (Int.) Dummy array dimensioned 82.

Record Number 3 (100 4-byte words) (Alphanumeric)

HD(1 - 6) = Project ID (24 characters).
HD(7 - 16) = Drilling company name (40 characters).
HD(17 - 26) = Drill hole name (40 characters).
HD(27 - 32) = Field (24 characters).
HD(33 - 35) = County (12 characters).
HD(36 - 38) = State (12 characters).

HD(39) = Location code ("STRA" OR "LALO").

If HD(39) = "STRA":

HD(40 - 41) = Section (8 characters).
HD(42 - 43) = Township (8 characters).
HD(44 - 45) = Range (8 characters).

If HD(39) = "LALO":

HD(40 - 42) = Latitude (12 characters).
HD(43 - 45) = Longitude (12 characters).

HD(46 - 51) = Logging company (24 characters).
HD(52 - 57) = Log name (24 characters).
HD(58 - 62) = Log date (20 characters).
HD(63 - 68) = Data type (24 characters).
HD(69 - 74) = Data units (24 characters).
HD(75 - 77) = Permanent datum (12 characters).
HD(78 - 80) = Drilling origin (12 characters).
HD(81 - 83) = Logging origin (12 characters).
HD(84 - 88) = Casing type (20 characters).
HD(89 - 94) = Fluid type (24 characters).
HD(95 - 97) = Time since circulation (12 characters).
HD(98 - 100) = Maximum temperature units (12 char.).

Record Number 4 and Half of 5 (150 4-byte words) (Alpha.)

HC(1 - 150) = Comment array (600 characters).

Second Half of 5 and Record 6 (150 4-byte words) (Num.)

SC(1 - 150) = (Real) Scale change values.

Up to 200 Records of Data (100 4-byte words each) (Num.)
(Up to 20000 data values.)

DAT(1 - NTP) = (Real) Data values. (Equally spaced)

or

DAT(1,3,...NTP-1) = (Real) Depth values. (Random data)
DAT(2,4,...NTP) = (Real) Data values. (Random data)

Record Number NR + 2 (First Record of Subfile 2)

Record Number NR(subfile 1) + NR(subfile 2) + 1
(Record Number 1 of Subfile 3)

ETC.

Table C3 - Plot Parameter File Format (Direct Access)

Record Number 1 (7 4-byte words) (Numeric)

NPSF = (Int.) Number of plot subfiles.
6 words unused.

Record Number 2 (7 4-byte words) (Numeric)
(First Record of Plot Subfile 1)
(Repeated NS times)

NRP = (Int.) Number of records in subfile.
NFLD = (Int.) Number of plot fields.
XAMN = (Real) Depth axis minimum value.
XAMX = (Real) Depth axis maximum value.
DXX = (Real) Depth axis units per inch.
NTYP = (Int.) Depth units type code.
 1 = Feet.
 2 = Meters.
1 word unused.

Record Number 3 (7 4-byte words) (Alpha. & Numeric)

WELNM = (Alpha.) Drill hole name. (6 words)
NX = (Int.) Number of characters in WELNM.

Record Number 4 (7 4-byte words) (Numeric)
(First Record of Field 1)

YALN = (Real) Data axis length in inches.
NDS = (Int.) Number of data plots in field.
5 words unused.

Record Number 5 (7 4-byte words) (Numeric & Alpha.)
(First Record of Plot 1)

NS = (Int.) Number of subfiles in plot.
YAMN = (Real) Data axis minimum.
YAMX = (Real) Data axis maximum.
RDRA = (Alpha.) Relative or absolute data axis code.
 A = Absolute.
 R = Relative.
2 words unused.

Record Number 6 (7 4-byte words) (Alpha. & Numeric)

YAUNT = (Alpha.) Data axis units. (6 words)
NY = (Int.) Number of characters in YAUNT.

Record Number 7 (7 4-byte words) (Alpha. & Numeric)

YATIT = (Alpha.) Data axis title. (6 words)
NYT = (Int.) Number of characters in YATIT.

Record Number 8 (7 4-byte words) (Numeric)
(Data Subfile Information Record)

IX = (Int.) Data subfile number.
NPEN = (Int.) Pen select number.
IDASH = (Int.) Dashed line code.
DINC = (Real) Dashed line increment.
SF = (Real) Depth at which to start plotting data.
EF = (Real) Depth at which to stop plotting data.
1 word unused.

Record number 8 is then repeated for each data subfile to be plotted (NS times).

Record numbers 5 through (7 + NS = NNN) are repeated for each data plot (NDS times).

Record numbers 4 through NNN are repeated for each plot field (NFLD times).

Record Number NRP + 2 (First Record of Plot Subfile 2)

ETC.

Table C4 - Digitized Data File Format (Sequential Access)

HEADER(I), I=1, 20 (20A4)

HEADER = (Alpha.) File identifier.

DSTF, DEDF, DYOR, DDY (4F10.3)

DSTF = (Real) Starting depth. DEDF = (Real) Ending depth. DYOR = (Real) Y origin. DDY = (Real) Y units per inch.

SCALE(I), I=1, 150 (8F10.5)

SCALE = (Real) Scale factor array. If the number of scale changes is less than 150, the remaining values are set to 1.0.

NSC, NPTS (2I5)

NSC = (Int.) Number of scale changes. NPTS = (Int.) Number of digitized points.

ISCLNX(I), I=1, 150 (10I5)

ISCLNX = (Int.) Scale change coordinate array. Marks the location in the data array (YB) where a scale change takes place. i.e., if ISCLNX(1) equals 10, and ISCLNX(2) equals 231, the first scale factor (SCALE(1)), is applied (in WELLOG) to YB(10), and continued until YB(230). At YB(231) the second scale change (SCALE(2)) is applied until changed.

XB(I), YB(I), I=1, NPTS (2F10.2)

XB = (Real) Array of horizontal coordinates, in inches, of the digitized points. YB = (Real) Array of vertical coordinates, in inches, of the digitized points.

Notes:

1. The maximum number of digitized points is 80000.
2. The resolution is 0.01 inches.
3. The values of DSTF, DEDF, DYOR, DDY, and SCALE should correspond to the values in the WELLOG header.

4. Origin shifts have already been incorporated into the digitized data.
5. All changes in the X direction (depth) are positive or zero.
6. Scale changes have been noted in ISCLNX but are not applied to the data until processed in WELLOG.