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User's Manual for the UNDERDOG Data Reduction Software

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User's Manual for the UNDERDOG Data Reduction Software*

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Abstract

UNDERDOG is a computer program that aids experimentalists in the process of data reduction. Operating as a part of the Waste Isolation Pilot Plant's (WIPP) experimental program, this software allows a user to reduce, extract, and generate displays of data collected at the WIPP site. UNDERDOG contains three major functional components: a Data Reduction package, a Data Analysis interface, and a Publication-Quality Output generator. It also maintains audit trails of all actions performed for quality assurance purposes and provides mechanisms which control an individual's access to the data. UNDERDOG was designed to run on a Digital Equipment Corporation VAX computer using the VMS operating system.

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Part I

INTRODUCTION

1 OVERVIEW

1.1 INTRODUCTION

Ideally the data collected from a field experiment should detail the behavior of a given environment. However, actual data often contain erroneous information caused by broken instruments, power outages, inconsistent calibration, hysteresis, and other similar problems. In order to extract this "noise" from the data, one must either remove or repair the discrepancies caused by these types of occurrences. Furthermore, the data collected may take the form of voltage readings, current readings, or other quantities which, in order to be useful, must be calibrated and converted into meaningful engineering units such as distance or temperature. The Underground Nuclear Depository Evaluation, Reduction, and Detailed Output Generator, UNDERDOG, was developed to assist in the process of performing these functions, which are collectively referred to as in situ testing data reduction. In addition, UNDERDOG allows the user to produce attractive plots, listings, and machine readable copies of the reduced data for use in data reports and subsequent analysis and evaluation studies.

UNDERDOG is currently implemented as part of the WIPP In Situ Data Acquisition, Analysis, and Management (WISDAAM) System [Munson et al., in prep.]. It was designed to be used on a Digital Equipment Corporation VAX computer using the VMS operating system. UNDERDOG, as well as several of the commercial software packages it uses, makes use of many system-dependent features of the VAX computer and the VMS operating system. There is currently no support for the implementation of UNDERDOG on non-VAX/VMS systems.

In conjunction with the manipulation of experimental data, UNDERDOG also provides access to ancillary data related to the experiment. This includes such information as instrument location and reduction activity records. Utilities are provided that allow these data to be maintained and reproduced during the data reduction process. By integrating these utilities into the reduction process the user can examine and update all the data associated with a data collection unit from within UNDERDOG.

Finally, in an attempt to ensure accountability during and after the data reduction, UNDERDOG maintains extensive activity tracking. This tracking records the changes that were made to the data during the course of reduction, who did them, when they were done, and the reason the changes were made. The ability to undo changes is also provided.

1.1.1 Invoking UNDERDOG

In order to run UNDERDOG, the WISDAAM command procedure must be executed. This is normally done from the user's login.com file. To execute the WISDAAM command procedure, add the following line to the login.com file:

$ @WISDAAM_HOME:WISDAAM program

where program is the name of the WIPP Task II Experimental Program major technical area within which UNDERDOG is to operate. The current Task II major technical area programs are Plugging and Sealing (PSP), Waste Package Performance (WPP), and Thermal/Structural Interaction (TSI). Note that the Moisture Release Experiment (MRE) is considered a subprogram of WPP and the Gas Testing Program (GTP) is a subprogram of PSP.

This command procedure will define several logical names as well as a symbol that may be used to run UNDERDOG. To run UNDERDOG enter the command UNDERDOG (which may be abbreviated to UNDER) followed by the name of an output device. Valid device names can be obtained from the data base administrator. When the user exits the program, control will be returned to the VMS operating system.

1.1.2 Command Interface

UNDERDOG was designed to be easy to use, yet powerful enough to manipulate large amounts of data quickly. Ease of use is provided by a series of menus that lead an inexperienced user through the required steps. However, the menu system also contains an integrated command structure that allows the experienced user to work quickly. Under this command structure, the user is required to enter only the minimum amount of information needed to specify an action.

1.1.2.1 Menus

The primary mode of access to UNDERDOG is through menus. A menu consists of a list of options, each of which performs some task. The user may select options in one of three ways: by number, by command name, or by using the pointer. To select by number, the user locates the number listed next to the menu item to be performed and enters it followed by the RETURN key. In addition to the option number, each menu item is preceded by a command name given in capital letters. An option may be selected by entering the command name followed by the RETURN key. Finally, note that to the left of the list of options there is an arrow pointing to one command. This arrow, called the "pointer," may be used to select a command.

To select using the pointer, use the up and down arrow keys on the keyboard to move the pointer to the option to be performed. Note that as the pointer moves, the command name for the corresponding option is echoed on the command line. After placing the pointer at the desired option, press the RETURN key to select that command. For ease of discussion, commands will be referenced by their command names throughout this document.

Command names and option numbers are entered on the command line, which is the line near the bottom of the screen beginning with the prompt Command:. When entering information on the command line, any text previously entered in the command field will be ignored when RETURN is pressed. The user may type ahead as many numbers or commands as needed, separating each with a RETURN. UNDERDOG will perform the commands in the order in which they were entered. All of the standard Digital Command Language (DCL) command-line-editing options are available when entering commands. For more information on command-line editing see the *MicroVMS User's Primer* [DEC, 1985a].

On each menu, the last option is always EXIT and is always option number 0. Selecting EXIT will cause control to be returned to the previous menu. If this option is selected from the Master Menu or Program Menu, the result will be to terminate the program. When terminating the program, the user will be asked to verify the termination. This prevents unintended termination of UNDERDOG. When asked to verify the exit, respond with a Y to terminate the program. Enter a N to return to the Master Menu or Program Menu.

1.1.2.2 Gold Commands

Some menus have additional options that expand their functionality. These additional commands are called Gold Commands. Most often these are short cuts to commands on other menus. To execute a Gold Command, begin by pressing the Gold key (labeled PF1 on the VT220 keyboard — see Figure 1-1).* The command line on the screen will be replaced with a new command line in reverse video containing the prompt Gold command:. Enter the command name listed next to the Gold Command to be performed. Gold Commands may only be invoked by command name as there is no support for selection by number or selection using the pointer. When the Gold Command has been executed, control will be returned to the regular command line.

*The use of the Gold key to invoke alternate commands is pervasive throughout many of the standard VMS system utilities (for example, the EDT text editor). The use of this key within UNDERDOG allows expanded functionality to be added to specific menus while remaining consistent with VMS. For more information on the use of the gold key within VMS, see the *Micro VMS User's Manual* [DEC, 1985b].

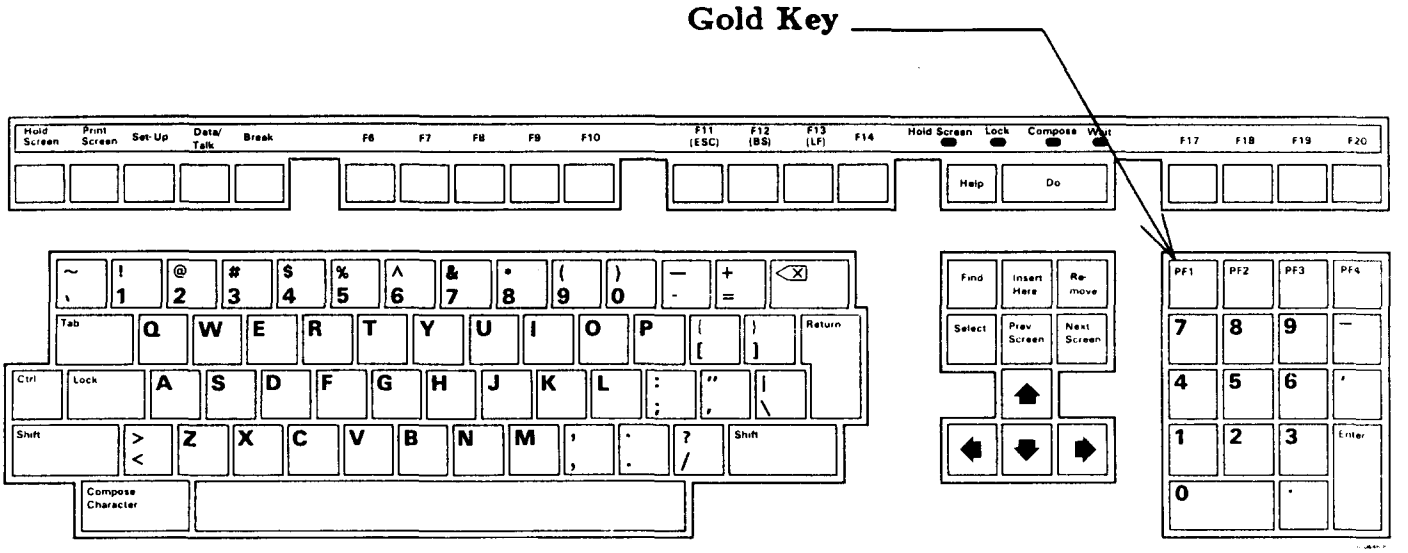

Figure 1-1. Standard VT220 Keyboard.

1.1.2.3 Command Arguments

Some commands have arguments associated with them. If so, these arguments will be listed next to the corresponding menu option. If a command requires arguments they may be entered in one of two ways. First, a command may be selected using any of the menu selection techniques outlined above. After selecting the command and pressing RETURN, the command line will display the current default values for all the arguments. This line may then be edited to reflect the desired values using standard DCL command-line editing options. However, the command name may not be changed. When editing has been completed, press RETURN again to invoke the command with the new arguments. When using this feature, all information displayed on the command line is entered when RETURN is pressed regardless of the current cursor position. If both the command name and its argument list are entered initially, the command will be executed immediately using the arguments provided.

Arguments must be separated by commas. When entering commands, some or all of the arguments may be omitted. Omitted arguments will be filled in with their default values. The values used as defaults are described in the detailed command descriptions later in this manual. In general they will be the last value that was used. Certain commands require arguments which have no default value and cannot

be omitted from the command line.

Commas must be used to delimit the positions of omitted arguments up to the last argument entered. Any omitted arguments past the last one entered will be filled in with their default values. For example, assume that the command CMD requires five arguments. If the following line is entered:

CMD,,ARG2,ARG3

then the default value will be used for the first argument because it has been omitted. Note that although it has been omitted, its position is delimited by commas because other arguments follow. ARG2 and ARG3 will be used for the second and third arguments, respectively. The default will be used for the fourth and fifth arguments because they have been omitted. Note that no commas are needed to delimit these arguments because they are at the end of the line.

1.2 DATA

UNDERDOG is designed to work with data according to rules which define their organization and integrity. These include a naming convention, selective access protections on the data, and assignment of Quality Assurance (QA) classifications (called Levels) to the various data reduction actions.

1.2.1 UNDERDOG Naming Conventions

UNDERDOG uses a well-defined naming convention to refer to instruments which are returning information from the field (a typical instrument would be an extensometer located in a borehole). A collection of these instruments is called a "unit," and is designated by a unit number. Within each unit, one or more "gages" may be measuring the response of the experiment. Data are recorded for each gage according to unique measurand numbers assigned in the data acquisition system, along with the date/time of the reading. UNDERDOG's conventions for dealing with these designators are described here.

1.2.1.1 Unit Numbers

A unit number consists of a two-character room designator followed by a three-digit unit designator. If the room designator is a single character, the second character of the room designator will be an underscore. A single character subunit designator may follow the unit number. Subunits are used to separate special cases within a unit (e.g., invar vs. stainless, left vs. right, etc.) The default subunit designator is the dash and indicates no subunits are present. A unique unit/subunit

combination supplied by the user designates a set of gages to be manipulated. Gages within a unit are specified by a one character gage designator following the subunit designator. This will be a digit between 0 and 9. The default is 1 and indicates that only a single gage is in the unit. Gage designators are used to separate multiple reporting gages within a given unit. For example, an extensometer unit might have several anchors located at intervals down the borehole. Each anchor represents a gage within the unit.

To illustrate this scheme, consider the extensometer in Room B designated as unit B_305 and having five anchors. This would indicate Room B, unit number 305. The gages in this unit would be B_305-1 through B_305-5. When specifying the unit number only, the dash may be omitted because it is the default subunit designator. As a further example, consider the thermocouples in Room A1 designated as A1045R and A1045L. These would indicate Room A1, unit number 045, with the subunit designation indicating right and left, respectively. Recall that these are considered two separate units within UNDERDOG. The gages in these units would be A1045R1 through A1045R6 on the right and A1045L1 through A1045L6 on the left. When specifying the unit number only, the R and L must be given to indicate which gage set is to be selected.

Certain rooms contain units that are used in different test series. In these rooms a test series designator is added to the room number. Typically this is a single letter. For example, in Room G there are several test series being used. Therefore, units in Room G would typically show room designators of GA, GB, GD, etc.

Any unit which contains a gage number of 0 is considered a special case within UNDERDOG. Gage 0 is treated as a separate unit and will not be included with other gages having the same unit number. In order to access the data from gage 0, the full gage designation must be entered. For example, consider the canister heater in Room B designated as B_020. Requesting data for unit B_020 will return two gages: gage 1 and gage 2. To request data for the 0 gage, the full designator B_020-0 must be used. This will return data for gage 0 only.

1.2.1.2 Measurands

Each gage within a unit reports data in engineering units for a specific quantity being measured (e.g., closure, stress, temperature, etc). Often these data are derived from more fundamental measured quantities (e.g., voltages). The measured or derived quantity for each gage is assigned a unique number, called the measurand number, by the data acquisition system. A typical configuration could, for example, consist of three measurands (two reading resistances, the third reading a voltage) from which a temperature is calculated. The derived quantity is also assigned a measurand number and is referred to as the engineering value. There is one engi-

neering value within each group of measurands. It is this value that is reported by UNDERDOG as the quantity being measured for that gage.

All measurands are described in a Measurand Definition File (MDF) which is maintained at the collection site. The primary purpose of this file is to control the actions of the data acquisition system. UNDERDOG uses this file to perform two important functions. First, the file contains enough information to serve as a map between measurand numbers and unit numbers. Second, it contains information that allows UNDERDOG to select the engineering measurand within a gage set. This is needed to extract the engineering value from the data base.

UNDERDOG makes the association between measurands and unit numbers transparent to the user. When the user makes a request for data, UNDERDOG determines the required measurand numbers and uses this information to extract the requested data from the data base.

1.2.1.3 Dates

UNDERDOG uses a modified Julian form for all absolute dates and times. Throughout this document a "date" refers to an absolute date/time specified in this form. These dates always refer to Mountain Standard Time (ignoring Mountain Daylight Time). Under this scheme, a date takes the following form:

YYDDD.TTT

where

YY	=	number of years since 1980 (leading 0's may be omitted)
DDD	=	number of the day within the current year
TTT	=	number of 1/1000ths day within the current day

For example:

Midnight June 20, 1986	=	6171.000
Noon December 4, 1987	=	7338.500
10:00 AM November 10, 1998	=	18314.416
6:00 PM April 19, 2001	=	21109.750

In certain cases (specifically the labeling of the x-axis on plots), a relative day is used. This value reflects the number of days and 1/1000ths of a day elapsed since a reference date called the Zero Date. The Zero Date is initially defined to be the first date on which data were collected by a particular unit. UNDERDOG allows

the user to change this date as a part of the data reduction process through the use of the ZD command on the Reduction Menu.

Certain screens and some data bases use Gregorian dates in addition to Julian dates. Gregorian dates take the form:

mm/dd/yr

where

mm	=	number of the month
dd	=	day of the month
yy	=	last two digits of the year.

Operations which require the use of Gregorian dates will be clearly noted in this document.

1.2.1.4 Manual Data

UNDERDOG's primary function is to manipulate data that have been collected by remote sensing devices. However, certain unit designators represent data that are collected manually. UNDERDOG treats manually collected data separately from remotely collected data. Manual data are reduced outside UNDERDOG and are only loaded into the WISDAAM data base after they have reached QA Level 3 (see Section 1.2.3). UNDERDOG does not support the reduction of manual data. However, manual data can be output via the Production or Analysis Interfaces.

1.2.2 Data Access Restrictions

In order to enforce QA requirements, stringent access restrictions have been placed on the data. Within UNDERDOG each unit is assigned an owner program. This program may be any of the three WIPP Task II major technical areas (TSI, WPP, PSP) or either of the two sub-programs (GTP or MRE). Every authorized user has a set of access rights to the units in each program or subprogram. These access rights are PI (Principal Investigator), Reduction, Production, and Analysis. The user who holds PI access to a program may perform any UNDERDOG function on the units in that program including application of the QA stamp described in Section 1.2.4. The user who holds reduction access to a program may retrieve and reduce data that has not yet been stamped. The user who holds Production or Analysis access to a program may only retrieve QA-stamped data through the corresponding UNDERDOG interface and may not reduce these data or edit any of the associated unit information.

1.2.3 Data Reduction Levels

UNDERDOG operates by moving data through various levels of reduction. Currently there are three levels of reduction with each level representing a refinement over the previous one. Data enter UNDERDOG after they have been reduced to Level 1 by WISDAAM's Transportation and Storage package. As reduction takes place, data are moved through Level 2 and Level 3 using the adjustment routines in UNDERDOG. Level 3 is considered the terminal level for data reduction within this system. When data have reached Level 3 and have passed a QA check, they can be "stamped" as approved data (see Section 1.2.4).

As stated above, each level represents a refinement over the previous level. The data reduction process begins in WISDAAM's transport package with raw data. These data are transported to the reduction system by magnetic tape which contain all data exactly as they are stored on computer files at the WIPP site. They are then reduced to Level 1 and loaded into the system by WISDAAM's Level 1 Reduction Program. This program passes the data through a sieve that removes collection system flag values, extracts the engineering values, strains out redundant points, and ensures that the data are uniformly reported in the International System of Units (SI). The resulting data are loaded into the Level 1 Data Base. This data base is used by UNDERDOG for further data reduction which is performed at reduction Levels 2 and 3. Level 2 reductions consist of using the data manipulation facilities of UNDERDOG to correct data that have been flawed by known events at the collection site. Level 3 reductions consist of correcting flawed data for which the nature of the data flaw is understood even though there is no documented event known to have caused the problem.

1.2.4 QA Level 3 Data

Once data have undergone reduction through Level 3, they may be released for general use. Release is authorized through the application of a QA "stamp" to the data. This stamp may only be applied by the PI of the program which owns the unit. Once the stamp has been applied, the data may be retrieved through the Analysis and Production interfaces. No further reduction can be done to the approved data. The PI may remove the QA stamp and thus allow further reduction to be performed if the need arises.

1.3 REDUCTION REMARKS

As outlined above, processing within UNDERDOG begins after the data have been reduced to Level 1. As changes are made to the data, the parameters of each change are recorded in a "reduction remark." All remarks pertaining to a

given unit are collectively referred to as the Remark File for that unit. This file provides a detailed history of the operations performed during the Level 2 and 3 reductions. The file shows exactly what changes were made during the reduction process, who made them, and why they were made. This provides a QA audit trail of all reductions performed on data from any given unit.

Remarks serve another important purpose within UNDERDOG in that they contain enough information to recreate the reduction done to the data from a unit. By beginning with Level 1 data and sequentially applying each remark, the reduced data can be obtained. In actuality, UNDERDOG stores only Level 1 data and recreates the reduced data by applying the remarks as the data are read. Further, because the Remark File can be edited (and the remarks reapplied) the user can change or remove reduction operations if they are found to be incorrect or unjustified.

1.4 ERRORS

If an error is encountered during processing, a message will be displayed on the user's terminal and the terminal bell will ring. If an error message is displayed, do not panic; UNDERDOG has the capability to recover from all but the most serious errors. In no case will the integrity of the data be compromised.

Errors generally fall into three categories: typing errors, content errors, and system errors. Typing errors are the most common and result from hitting the wrong key on the keyboard. Content errors result from entering an invalid piece of information (for example, an end date that is earlier than a start date). The system may or may not detect typing and content errors depending on whether the information entered could be considered valid within the current context. If an error is reported, the operation in progress will be aborted, an error message will be issued, and the user will be returned to the original prompt. Because UNDERDOG has editing capability, errors that have gone undetected by the system can usually be corrected later without trouble.

System errors result from internal problems with the system, and as such are more serious. If a system error occurs, UNDERDOG will try to display some information to help the data base administrator determine the cause. It is important to save a copy of this information so that it may be given to the administrator. In addition, several things may be done by the user to help track down the problem. The user should begin by trying to recreate the failure, recording all commands entered and UNDERDOG's responses to them. If the problem is reproducible, then determine if a work-around exists; that is, is there some way to perform the same function that does not cause the error? When this has been completed, the information should be given to the data base administrator as soon as possible.

2 MAIN MENU

2.1 FUNCTIONAL OVERVIEW

The Main Menu provides the primary access to UNDERDOG. When UNDERDOG is invoked, the user is presented with a welcome screen (Figure 2-1) and asked to press RETURN to continue. At this point the user is asked to select a program from the Program Menu (Figure 2-2). This selection will indicate the WIPP Task II major technical area under which the user will be working. Recall that MRE is considered a sub-program of WPP and GTP is a sub-program of PSP. After these preliminaries are finished, the user is presented with the Main Menu (Figure 2-3). This menu provides options that allow the user to access the various components of UNDERDOG. These components are described in separate parts of this manual.

The Main Menu commands are summarized below:

DIR	(Directory)	Invoke the Directory Tree system in VIEW mode.
RED	(Reduction)	Invoke the Data Reduction system.
ANL	(Analysis)	Invoke the Data Analysis system.
PRO	(Production)	Invoke the Production output system.
WIPP	(Program)	Go to the Program Selection Menu.
EXIT	(Exit)	Leave UNDERDOG and return to the DCL prompt.

If the user selects the EXIT option to terminate UNDERDOG, the system will ask for verification of the operation. This prevents unintended exiting of the program. To confirm the exit and leave UNDERDOG, enter Y. To return to the Main Menu, enter N.

2.1.1 Display of Access Restrictions

As noted in Chapter 1, each user is assigned varying levels of access to the units in each program. If the user has no access to the data for a particular program, then this restriction will be indicated on the Program Menu by the presence of the words ** NO ACCESS ** next to the program name. If the user has access to either a program or sub-program but not both, then the words PARTIAL ACCESS will be displayed. If the user has full access to the data, then no message will be displayed.

The same type of information is given on the Main Menu. If, for example, the user does not have reduction access to the units in the program that was selected, then the words ** NO ACCESS ** will be displayed next to the RED option. If the user has reduction access to the sub-program but not the main program, then the

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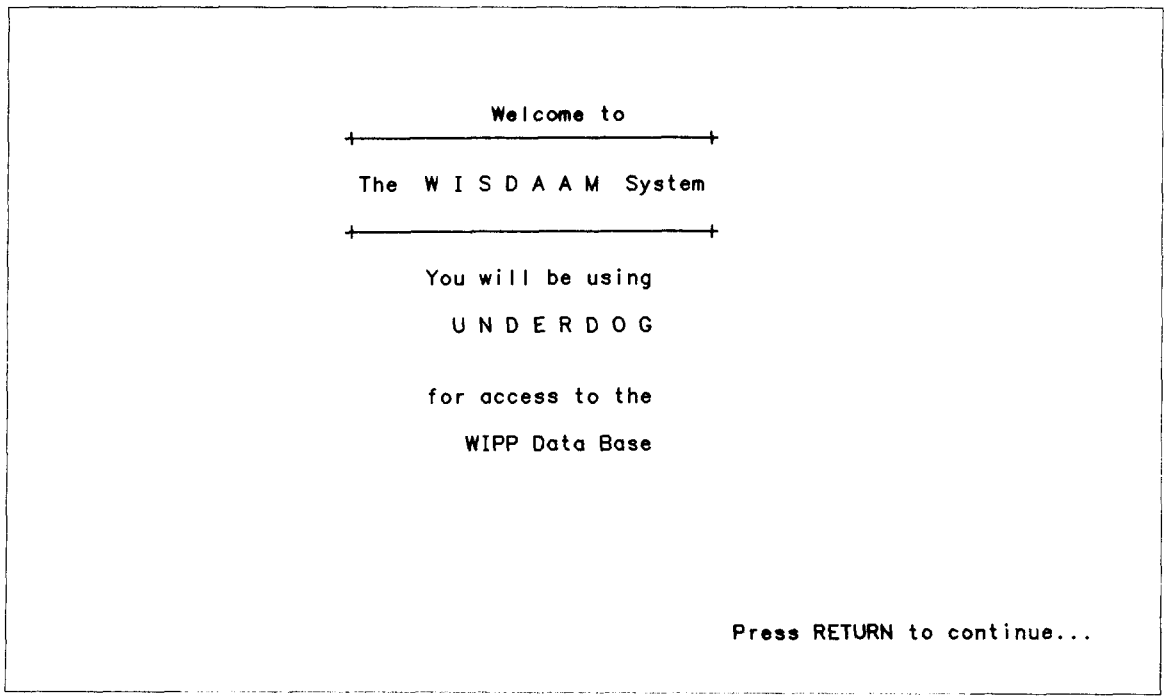


Figure 2-1. Welcome Screen.

RSI(ALO) 098-87-1108

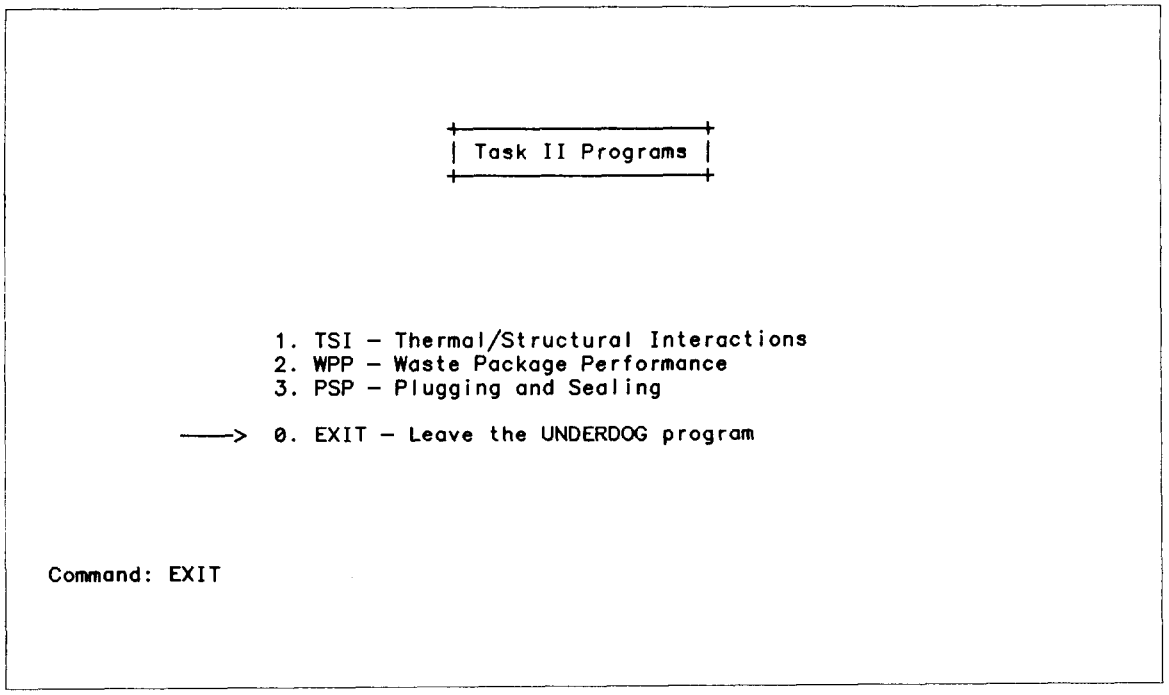


Figure 2-2. Program Menu.

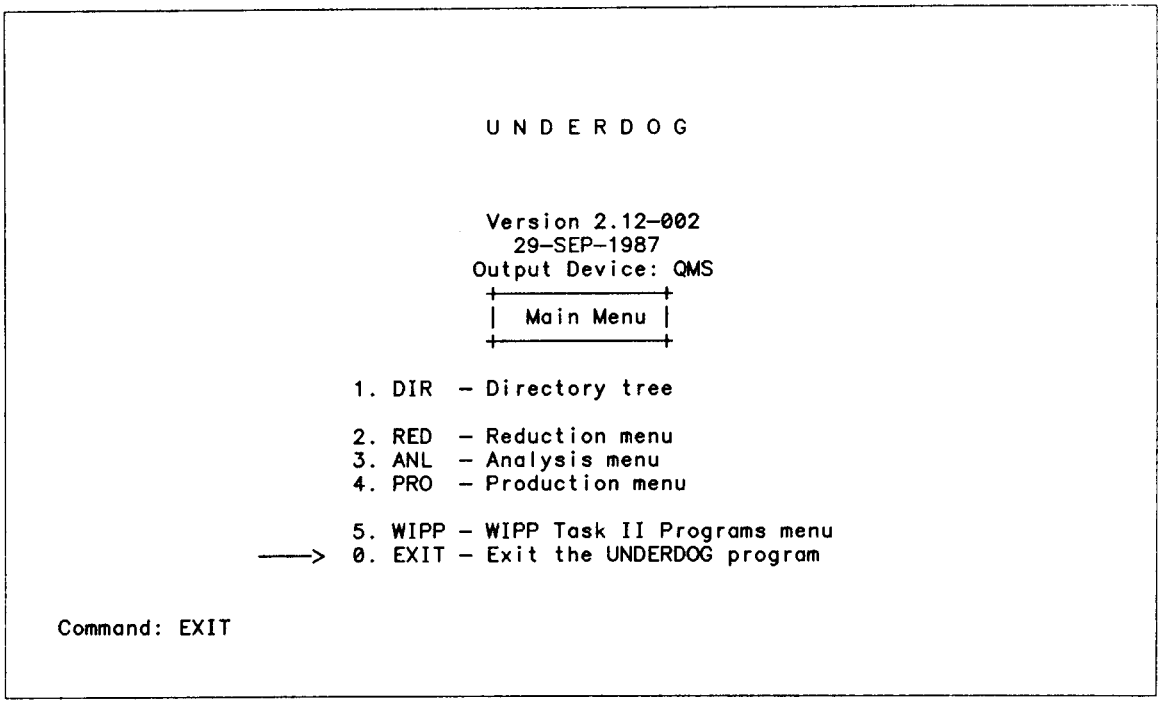


Figure 2-3. Main Menu.

words PARTIAL ACCESS will appear. If the user has reduction access to all the units, then no message will appear.

2.1.2 How to Use UNDERDOG

The remainder of this manual describes each of the major components of UNDERDOG. When an option is chosen from the Main Menu, control will be passed to one of these components. Each component is controlled by a menu which is described in the first chapter of the corresponding part of this document. Several components have additional capabilities which can be reached through the controlling menu. Each of these ancillary capabilities are described in a separate chapter within the corresponding part of this document.

The chapters describing the menus are generally organized in two sections: a functional overview and a reference section. The reference section contains a one-page description of each command on the menu. This provides a detailed description

of the use and function of each command. If more information is needed, consult the functional overview which precedes the reference section.

The following descriptions give the basic steps needed to use UNDERDOG's major components. These descriptions are designed to give the user an idea of how to get started and perform some of the more basic operations within each component.

2.1.2.1 Data Reduction

To use UNDERDOG to perform data reduction, begin by selecting a program on the Program Menu. Next invoke the Data Reduction system using the RED command on the Main Menu. UNDERDOG will display the Reduction Menu indicating that data reduction may proceed. The data reduction process begins by the selection of a unit to be manipulated. This selection may be made in one of two ways. The user may use the Gold DT command to enter the Directory Tree and select a unit. Or the user may use the Gold GC command to go directly to the Gage Configuration Screen and select a unit. Note that when a unit is selected from the Directory Tree, the system will automatically go to the Gage Configuration Screen while the unit is being loaded. Once the unit has been loaded and the user exits the Gage Configuration Screen, the Reduction Menu will again be displayed.

At this point a unit has been loaded and reduction can begin. The user may invoke any of the data manipulation commands on the Reduction Menu to reduce the data. In addition, various types of plots or listings and various types of editing can be performed using Gold Commands. Or, the user may go to any of several utility menus which provide additional capability. When reduction has been completed, the user may exit the reduction system or select another unit.

2.1.2.2 Data Analysis Interface

The Data Analysis Interface provides the capability of generating VMS text files which can be used by various analysis tools. These files contain the QA data for a set of selected units and serve as the interface to certain analysis packages including GRAFAID [Adams, 1985] and UPLOT [Roginski, 1987].

To activate the Data Analysis Interface, the user selects a program on the Program Menu and then selects the ANL command on the Main Menu. UNDERDOG will then display the Data Analysis Menu. In order to produce a Data Analysis Interface File, the user must supply a Gage File specifying the gages of interest. Gage Files can be created or edited using the EDT option on the Analysis Menu. Once a Gage File has been created, it can be used by UNDERDOG in generating any of the supported Interface Files. The Analysis Menu contains options which

allow the user to generate an Interface File which has been formatted to serve as input to the selected analysis utility.

2.1.2.3 Production Interface

The Production Interface provides the capability of generating publication-quality plots and listings for a set of selected units. The generation of these documents is generally done in batch mode. In order to request production output, the user must create a Production Command File. This file specifies not only the units of interest but also provides details about the type of outputs desired. It is used as input to a stand-alone program that performs the production run. The stand-alone program is usually invoked from a VMS command procedure which UNDERDOG creates and submits.

To generate a set of production documents, begin by selecting a program on the Program Menu. Next invoke the Production Interface using the PRO command on the Main Menu. UNDERDOG will display the Production menu indicating that output generation may proceed. Production Command Files can be created or edited using the EDT option. Once a command file has been created, it can be submitted for processing using the SUB command. This creates a VMS command procedure and submits it to the appropriate batch queue for processing.

2.2 DETAILED COMMAND DESCRIPTIONS

1. Directory

Invoke the Directory Tree system in VIEW mode.

Command:

DIR

Arguments:

None

Function:

See Part II, Directory Tree.

2. Reduction

Invoke the Data Reduction system.

Command:

RED

Arguments:

None

Function:

See Part III, Data Reduction.

3. Analysis

Invoke the Data Analysis Interface.

Command:

ANL

Arguments:

None

Function:

See Part IV, Data Analysis Interface.

4. Production

Invoke the Production Interface.

Command:

PRO

Arguments:

None

Function:

See Part V, Production Interface.

5. Program

Return to the Program Selection Menu.

Command:

WIPP

Arguments:

None

Function:

This option allows the user to select a new program (TSI, WPP, PSP) within which UNDERDOG is to operate.

Part II

DIRECTORY TREE

3 DIRECTORY TREE

3.1 FUNCTIONAL OVERVIEW

The Directory Tree provides the user with information detailing the organization of units at the site. The tree is analogous to a set of directories on a computer disk. The lowest level of the tree contains sets of unit numbers. Each set is given a name. For example, certain sets of units belonging to the TSI program are grouped according to Principal Stations. In these cases the set name is a derivation of the Principal Station name. These sets are in turn grouped into more general classifications. Continuing the above example would mean all of the Principal Stations would also be collected into a super-group. The name of this super-group would be a derivation of the room name. This type of classification continues with increasing generality until the highest level (the entire list of WIPP Task II major technical areas) is reached.

Within the Directory Tree, each group is referred to as a "directory." Groups that represent more specific classifications can be thought of as being "below" a particular directory while groups representing more general classifications can be thought of as being "above" a particular directory. The list of WIPP Task II major technical areas represents the top or highest possible level of the tree. When the Directory Tree is first entered the user is placed in a directory representing the WIPP Task II program within which UNDERDOG is operating. On subsequent entries into the tree, UNDERDOG remembers the directory from which the tree was last exited and returns the user to that location. The list of directories between the top of the tree and the current location is referred to as the path to that location in the tree.

3.1.1 Modes of Operation

The Directory Tree can be used in two different ways: View mode and Select mode. In View mode the user may only search the tree and view its contents. In Select mode the user may select a unit for processing. If the directory tree is entered from the Main Menu, then the user will be in View mode. If the directory tree is entered from a utility (e.g., the Reduction Menu), then the user will be in Select mode. The current menu mode is displayed in the upper right-hand corner of the screen. If the directory is in Select mode, then the current program name, UNDERDOG operation, and any previously selected unit will appear in this location.

3.1.2 Types of Directory Screens

The Directory Tree uses three major types of screens to display data. The screens used for the upper levels of data are similar to menus. The major difference is that the pointer is replaced by a selection that is highlighted in reverse video. The title of the menu will indicate the name of the current group of entries.

When the user has reached the lowest level along a particular path, then one of two different screens may be seen. If the grouping of units lends itself to graphical display, then a rough diagram will be generated which shows the relative location of the units. If the units cannot be displayed in this manner, then a simple list of unit numbers will be produced.

3.2 DIRECTORY COMMANDS

As noted above, the Directory Tree behaves just like a set of directories on a computer disk. At any given point it is possible to go down from the current directory into the next level and examine a particular group. It is also possible to go up to the previous level. In addition, the system can search for a particular group or unit name and calculate the path to that point. Group and unit names can be abbreviated. However, if the name given is not unique, then the search will end as soon as the first match is found.

3.2.1 Movement Commands

To go down into the next lower level, prefix the name of the group to be examined with a period (.). This indicates that the path to the level to be viewed is one level below the current level. To go up to the previous level, enter a minus sign (−). This indicates that the level to be viewed is one level above the current level. These commands may be combined in any order. For instance, from the B_ST000(000) screen, entering −−−.H_PILLAR will set the current directory level to the H_PILLAR screen (see Section 3.3).

To search for any given group or unit, enter the group name or unit number without any punctuation. The system will search for the first occurrence of the given entry, calculate the path to that point, and display the data at that level. Exercise caution if this feature is used with abbreviated or nonunique names. Because the system finds the first possible match and because some entries appear in more than one place in the tree, the resulting path may not be the one that was desired.

To leave the Directory Tree and return to UNDERDOG enter the command EXIT. The system will return to the location in UNDERDOG from which the Directory Tree was entered.

The Directory Tree may be used like the menus throughout UNDERDOG. As noted above, one entry is highlighted in reverse video. This entry behaves like the pointer on system menus. Use the up and down arrow keys to move the highlighting to the entry to be selected and press RETURN. As the highlighting is moved the corresponding directory movement command will be echoed on the command line. Note that this method can only be used to move to lower levels.

3.2.2 Unit Selection

If the directory is in Select mode, then the user may select a unit to be manipulated. To select a unit, enter the command SELECT followed by the unit number to be retrieved. UNDERDOG tests to make sure that the user has the necessary privileges to select the unit. If this test is successful, the user will be returned to the unit configuration screen used for the UNDERDOG operation being performed. If the test fails, then an error message will be displayed and the SELECT command will be ignored.

3.3 DIRECTORY TREE EXAMPLE

To illustrate the use of the Directory Tree, the following example is provided. As noted above, when the Directory Tree is first entered the user is placed in the directory representing the WIPP Task II program within which UNDERDOG is operating. For purposes of this example, the TSI program will be used (see Figure 3-1). The program directory contains a list of all of the rooms which contain TSI units. The user may obtain a more detailed description of how the units in a particular room are organized by moving down into that room's directory. In this example, the command .B_OVRTST is entered to move down into the Room B directory (see Figure 3-2). The Room B directory lists several classifications of unit type: those located at Principal Stations, Mining Sequence Closure Gages, etc. Again the user may obtain a more detailed description of the units within each of these classifications by moving down into one of them. In this example the command .B_STA is used to go down into the station directory (see Figure 3-3). The station directory lists all the Principal Stations located in Room B. Each Principal Station consists of a group of units near a fixed location within the room. The units contained within a Principal Station may be viewed by moving down into a Principal Station directory. In this example, the command .B_ST000(000) is entered to move down into the Principal Station 0 directory (see Figure 3-4). This is the lowest level and shows the relative locations of the units contained within Principal Station 0 superimposed on a diagram of the room. For example, unit B_305 is located in the center just above the upper boundary of the room.

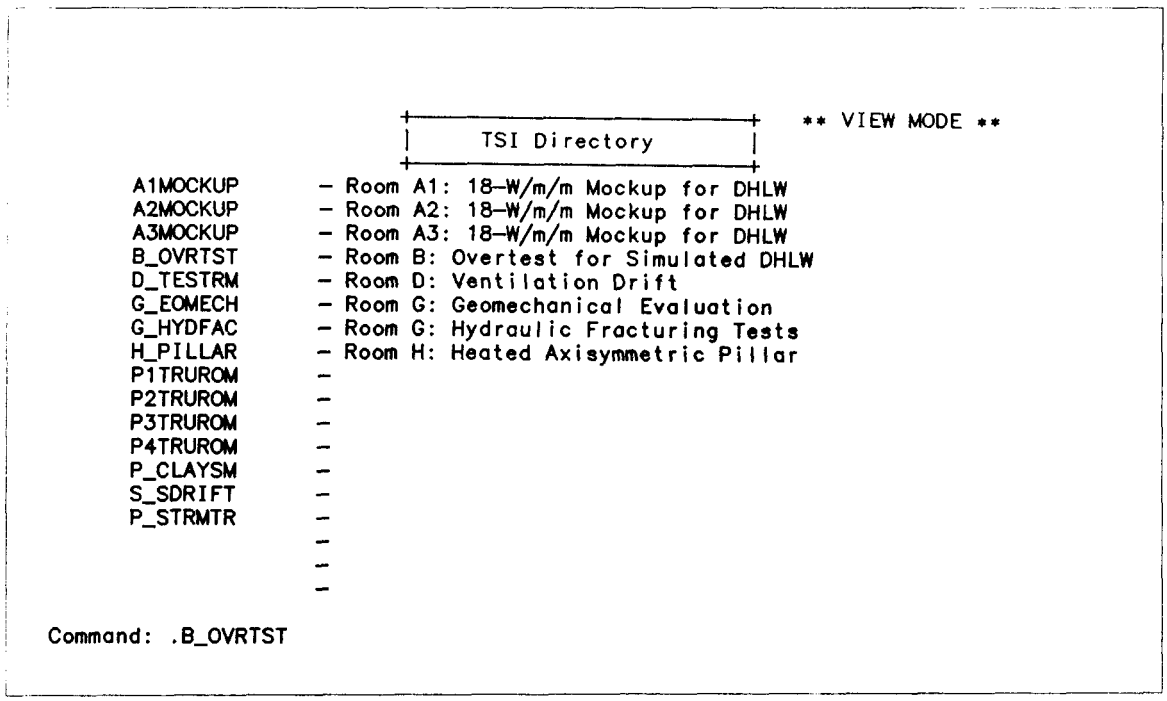


Figure 3-1. Program Directory for the TSI Program.

A second example demonstrates the Directory Tree's ability to search for entries, either unit names or directory names, and calculate the path to the directory containing that entry. The following example will use this feature to locate the unit H_708. From the unit name, it is known that this unit is located in Room H. To move from the Room B Principal Station 0 directory to the Room H directory the command ---.H_PILLAR is used (see Figures 3-4 and 3-5). This indicates that the system should move up three levels then down into a directory named H_PILLAR (refer to Figure 3-1). At this point the command H_708 is entered indicating that the system should perform a search. The absence of punctuation in the command signals a request for a search. Once the system has located the requested entry, it will display the directory in which that entry was found (see Figure 3-6). In this case, the entry was a unit number so the system displays the appropriate room diagram.

In the preceeding example, a move was made from the Room B Principal Station 0 directory to the Room H directory prior to the search. Because the system can

do searches on the entire Directory Tree, this move was not really necessary. For example, a search for the unit A1853 can be initiated from the H_ST150 directory simply by entering the command A1853 (see Figures 3-6 and 3-7). Note that, according to the path name displayed above the diagram, the unit was found to be part of the WPP program, is located in Room A, and is in a directory named A1GAGES. This example points out one of the reasons why searches must be used with caution. Note that the system started out under the TSI directory and is now under the WPP directory. Users who perform searches should pay particular attention to the resulting path name to ensure that the directory found by the search is along an appropriate path.

RSI(ALO) 097-87-1121

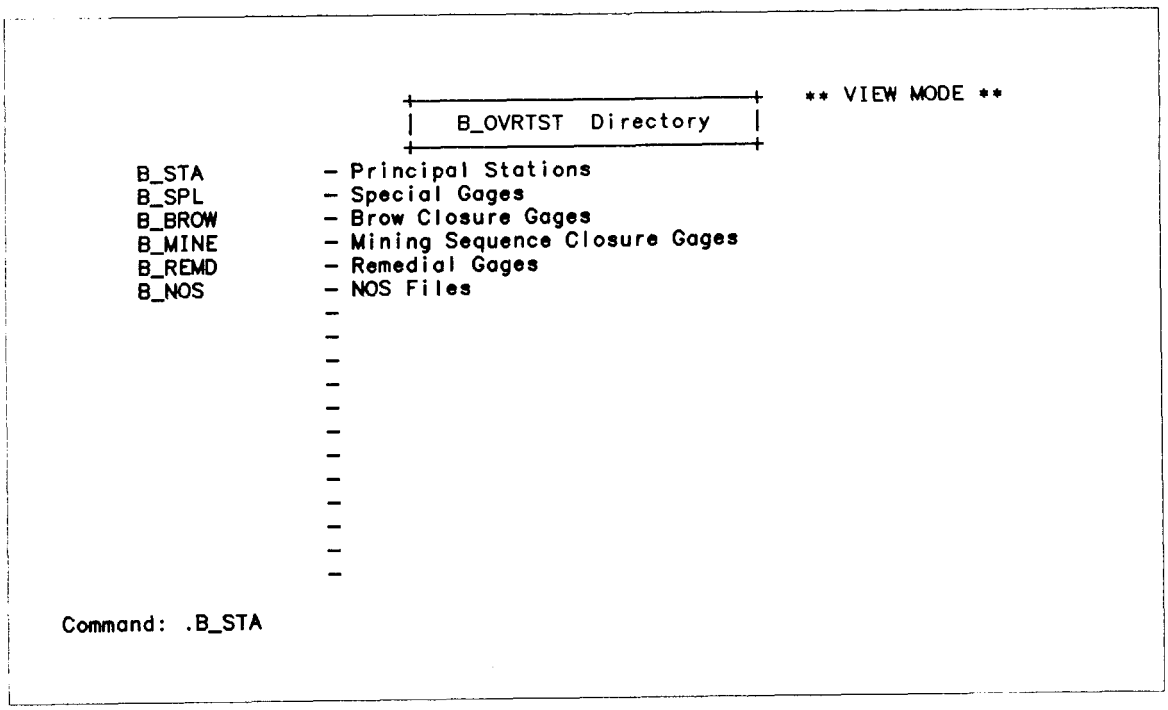


Figure 3-2. Room B Directory.

RSI(ALO) 097-87-1122

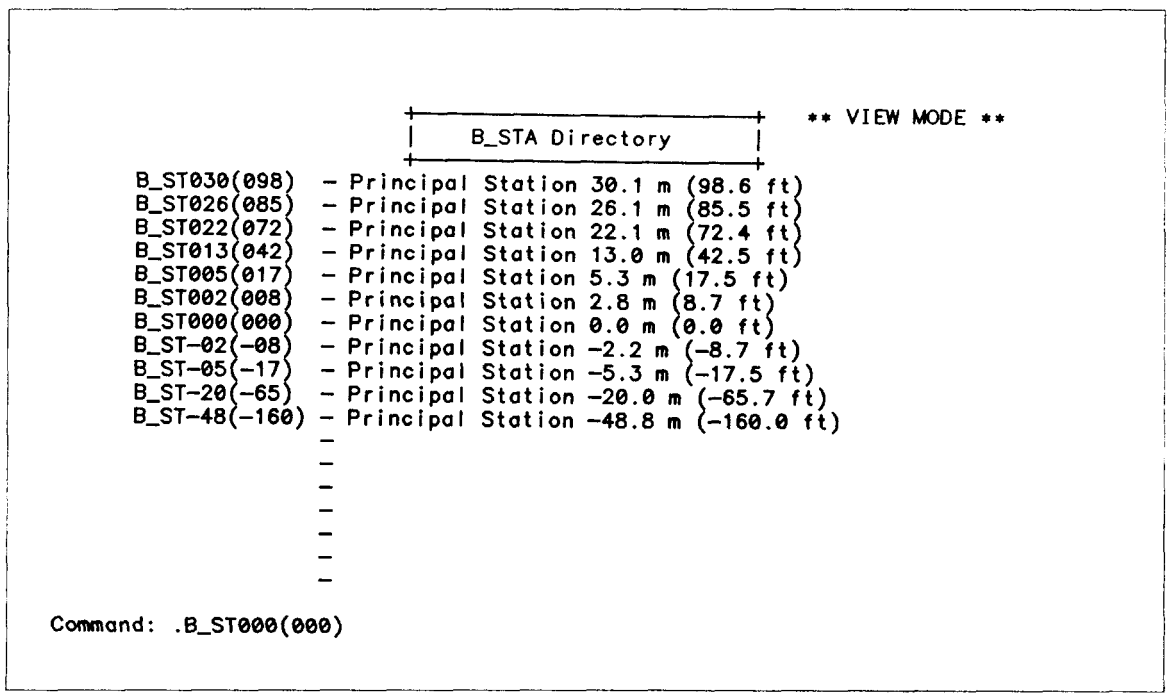


Figure 3-3. Room B Principal Stations Directory.

RSI(ALO) 097-87-1123

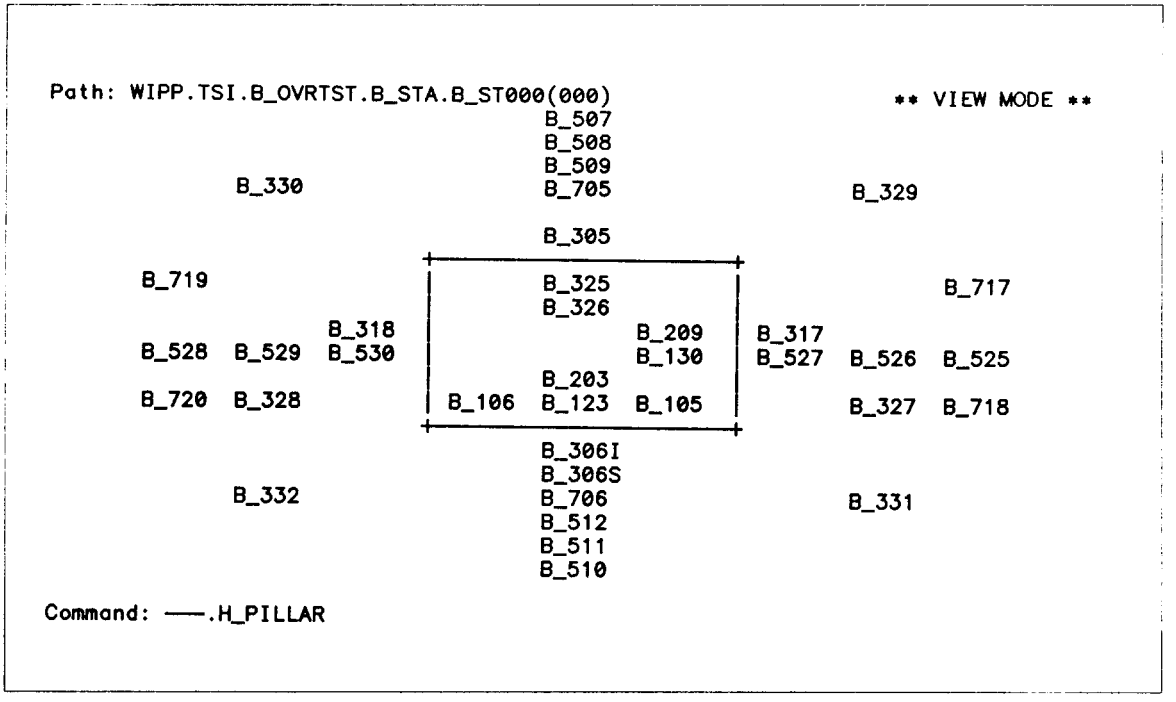


Figure 3-4. Room B Principal Station 0 Directory.

RSI(ALO) 097-87-1124

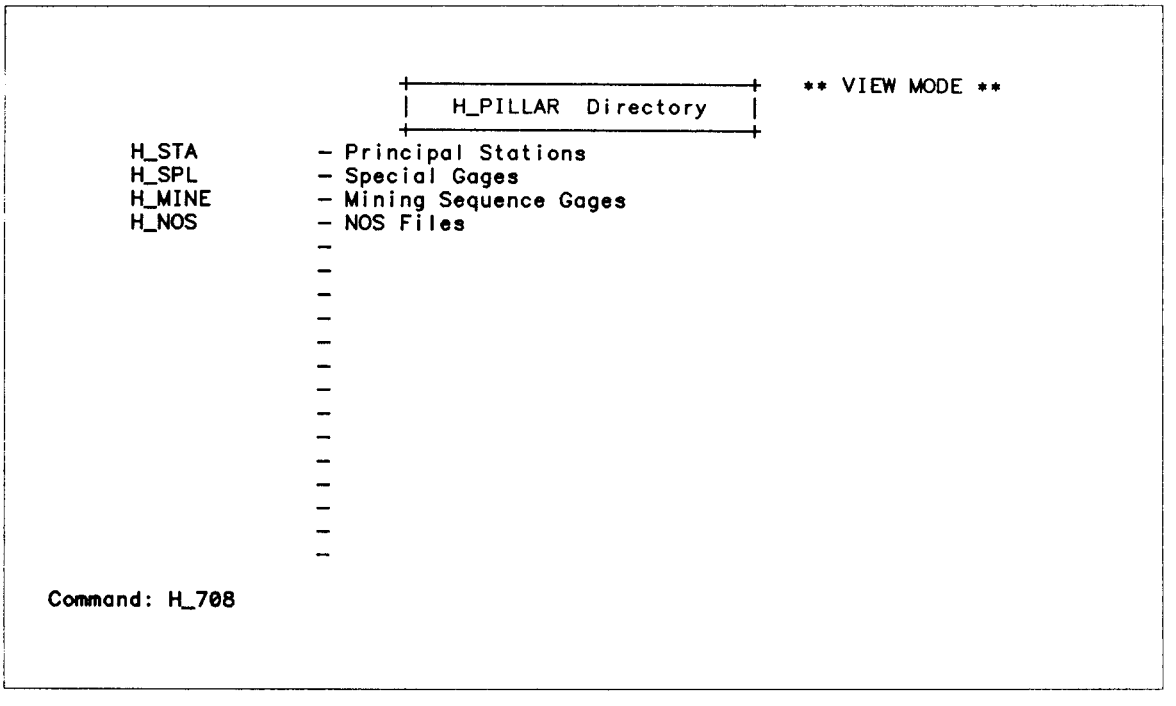


Figure 3-5. Room H Directory.

RSI(ALO) 097-87-1125

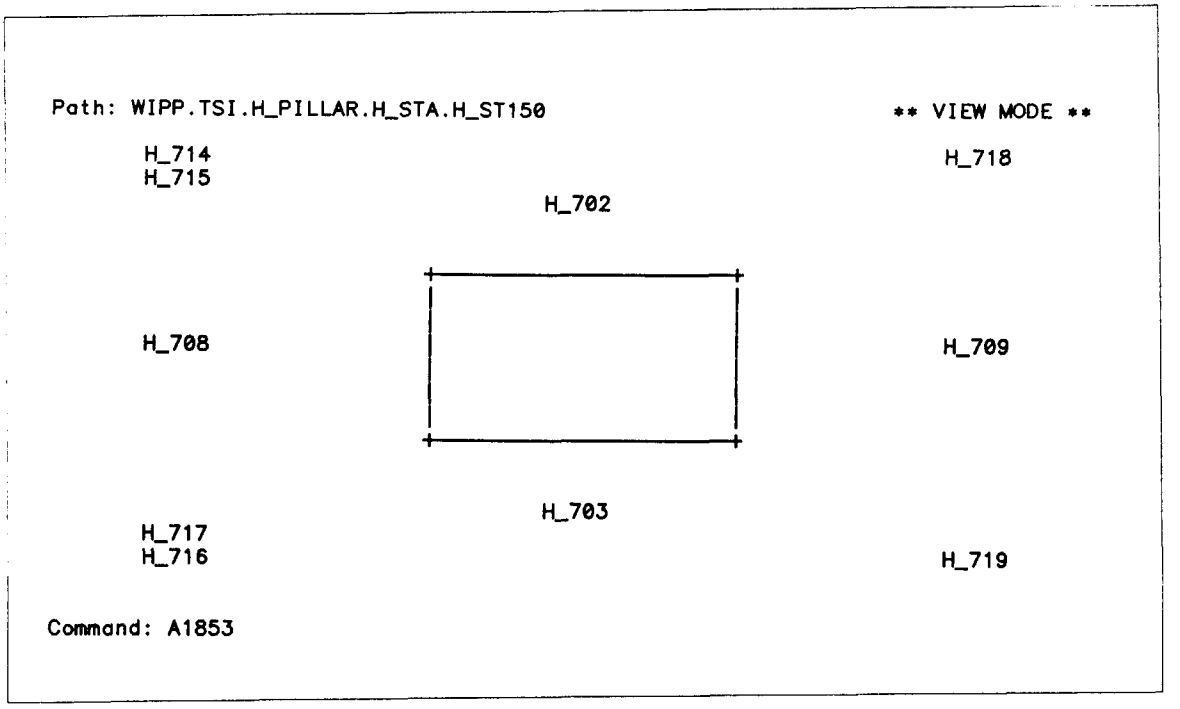


Figure 3-6. Results of Search for Unit H_708.

RSI(ALO) 097-87-1126

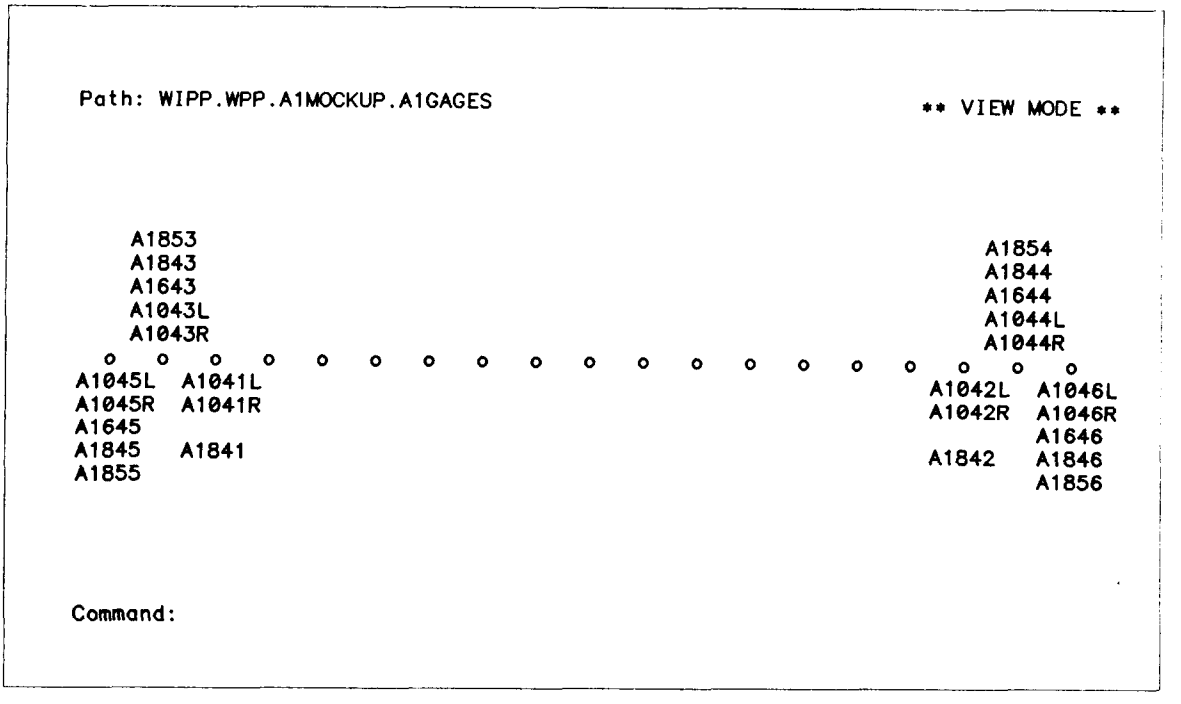


Figure 3-7. Results of Generic Search for Unit A1853.

Part III

DATA REDUCTION

4 REDUCTION MENU

4.1 FUNCTIONAL OVERVIEW

The Reduction Menu (Figure 4-1) contains commands that allow the user to reduce the data for a given unit. This menu also contains Gold Commands that allow the user to request a listing or plot, edit the Remark File, jump to the Edit, List, or Plot menus, or request other special processing.

RSI(ALO) 097-87-1110

```
                                   Gold Keys
EM - Edit Menu                  LM - List (or View) Menu  PM - Plot Menu
ER - Edit Remark File           LD - List Data Only       PS - Plot Self Scaled
ES - Edit Standard Remarks      LR - List Remarks Only    PU - Plot User Scaled
SR - Sort Remarks               LA - List Complete File

        DT - Directory Tree                        NA - Noaction Menu
        GC - Escape to Gage Configuration          QA - Quality Assurance Menu

                              Reduction Menu
              1 - DA   Delete points, all gages (SD,ED,LV,RC,RT).
              2 - DP   Delete points, one gage  (GA,SD,ED,LV,RC,RT).
              3 - SA   Shift data, all gages    (SD,VA,LV,RC,RT).
              4 - SV   Shift data, one gage     (GA,SD,VA,LV,RC,RT).
              5 - IP   Invert points, one gage  (GA,ED,SD,LV,RC,RT).
              6 - SG   Swap two gages           (G1,G2,ED,SD,LV,RC,RT).
              7 - AP   Add one new point        (DT,LV,RC,RT).
              8 - ZD   Zero date for plots      (ZD,RC,RT).
              9 - DR   Delete redundant data.   (ED,SD,TL,LV,RC,RT).

         ---->  0 - EXIT Return to the main menu.

Command: EXIT
```

Figure 4-1. Reduction Menu.

The commands are summarized below:

DA	(Delete All)	Delete data within a date range for all gages within the current unit.
DP	(Delete Points)	Delete data within a date range for one gage within the current unit.
SA	(Shift All)	Shift all data in the y-direction after a given date for all gages within the current unit.
SV	(Shift Vertical)	Shift all data in the y-direction after a given date for one gage within the current unit.
IP	(Invert Points)	Change the sign on data within a date range for one gage within the current unit.
SG	(Swap)	Swap data within a date range between two gages within the current unit.
AP	(Add Point)	Add a data point to the working data with data values of zero for all gages in the current unit.
ZD	(Zero Date)	Define a reference date for calculation of relative days for plots and listings.
DR	(Delete Redundant)	Pass data within a date range through a Level 1 type sieve.

Gold commands:

EM	(Edit Menu)	Go to the Edit Menu.
ER	(Edit Remark File)	Edit the reduction remarks for the current unit. See the REMARK command on the Edit Menu.
ES	(Edit Standard Text)	Edit the standard remark texts. See the RCODE command on the Edit Menu.
LM	(List Menu)	Go to the List Menu.
LD	(List Data)	Print the current working data. See the DATAW command on the List Menu.
LR	(List Remarks)	Print the current reduction remarks. See the REMARK command on the List Menu.
LA	(List All)	Print a full listing of the working data. See the WORK command on the List Menu.
PM	(Plot Menu)	Go to the Plot Menu.

PS	(Plot Self-Scaled)	Produce an auto-scaled plot of the working data. See the PLOTW command on the Plot Menu.
PU	(Plot User-Scaled)	Produce a user-scaled plot of the working data. See the CUSTOM command on the Plot Menu.
GC	(Gage Configuration)	Go to the Gage Configuration Screen.
SR	(Sort Remarks)	Sort the reduction remarks.
DT	(Directory Tree)	Go to the Directory Tree.
NA	(No Action Menu)	Go to the No Action Menu.
QA	(QA Menu)	Go to the QA Menu.

4.1.1 Remarks and Working Data

While performing adjustments, UNDERDOG maintains a working copy of the data. This copy initially contains the Level 1 data as read from the data base. Once these have been loaded, the remarks as listed in the Remark File are applied against the data. Remarks are applied in the order in which they are listed in the Remark File (this is the same order in which they are printed on the output listing). The resulting data reflect all recorded changes and are ready for additional adjustment.

As new adjustments are made, two functions are performed. The first operation updates the working data to reflect the adjustment. Second, a remark is added to the Remark File detailing the change that was made. This remark will be used to restore the data when they are reloaded. At any point in time the Remark File will contain one entry for each adjustment that has been made to the data.

4.1.1.1 Remark Codes and Remark Text

There are two pieces of information stored with each remark that give an indication of why the adjustment was made. The first of these is the Remark Code which is a five-character string corresponding to some predefined text giving the reason for the action (e.g., SV510 may mean "REINSTALLATION NEW GAGE"). A list of current remark codes and associated text is given in Table 4-1. The second piece of information is a 40-character string called the Remark Text. This contains information entered by the user which was not contained in, nor could be expressed by, the standard text associated with the Remark Code (for example, a remark in which data was deleted as "OBVIOUSLY BAD DATA" could contain the text "Forklift collided with heater"). The Remark Text is intended to augment the standard text associated with the Remark Code and should only be entered when the standard text does not sufficiently describe the reason for the adjustment.

Table 4-1. Current Remark Codes and Associated Text
(Page 1 of 3)

Code	Text
AP500	ADD POINT ON TIME AXIS
DC500	NORMAL DATA COMPRESSION
DC501	SPECIAL DATA COMPRESSION
DP500	PREZERO DELETION OF DATA
DP502	OBVIOUSLY ERRONEOUS DATA
DP510	REINSTALLATION
DP511	RETROFIT
DP512	EXTENTIONS
DP515	GAGE BROKEN
DP516	GAGE MODIFIED
DP517	GAGE DISCONNECTED
DP518	GAGE DISCONTINUED
DP520	HYSTERESIS OF INSTALLATION
DP521	HYSTERESIS FROM CLEANING
DP522	HYSTERESIS FROM EXERCISING
DP523	HYSTERESIS KNOWN CAUSES
DP524	HYSTERESIS UNKNOWN CAUSES
DP525	SCATTER FROM POTENTIOMETER
DP526	SCATTER OF RESISTANCE SHORT
DP528	SCATTER KNOWN CAUSE
DP529	SCATTER UNKNOWN CAUSE
DP530	DELETION DUE TO MAINTENANCE
DP531	DELETION CLAMPED AT ANCHOR
DP532	DELETION JOINED WIRES
DP533	DELETION KNOWN CAUSES
DP534	DELETION UNKNOWN CAUSES
DP535	DELETION FOR GAGE REVERSAL
DP540	SHED STANDARD PROBLEM
DP541	SHED COMMUX PROBLEM
DP542	SHED POWER PROBLEM
DP543	SHED MISWIRING PROBLEM
DP544	SHED CROSS-WIRE PROBLEM
DP545	SHED DISCONNECT PROBLEM
DP546	SHED CONTACT RESISTANCE

Table 4-1. Current Remark Codes and Associated Text
(Page 2 of 3)

Code	Text
DP550	MISCELLANEOUS
EV500	SITE START DATE
EV506	SITE POWER OUT
EV507	SITE POWER PROBLEM
EV509	MISCELLANEOUS SITE ACTIVITY
EV510	BEGIN ROOM EXCAVATION
EV511	END ROOM EXCAVATION
EV512	BEGIN DRILLING
EV513	END DRILLING
EV514	BEGIN INSTRUMENTATION
EV515	ROOM HEATER POWER ON
EV516	ROOM POWER OUT
EV517	ROOM POWER PROBLEM
EV518	MAINTENANCE ROOM ACTIVITY
EV519	MISCELLANEOUS ROOM ACTIVITY
EV520	MODCOMP DOWN
EV521	MODCOMP ERROR
EV522	MODCOMP CLOCK POWER ERROR
EV526	MODCOMP POWER OUT
EV527	MODCOMP POWER PROBLEM
IP500	INVERT POINTS
NA500	NO REDUCTION POSSIBLE
NA501	NO LEVEL 2 IS NECESSARY
NA502	NO LEVEL 3 IS NECESSARY
QA500	QA STAMPED TO THIS DATE
RC500	DATA RECOMPRESSED
SV500	INITIAL ZERO SHIFT
SV501	CALIBRATION SHIFT
SV510	REINSTALLATION NEW GAGE
SV511	REINSTALLATION OLD GAGE
SV512	REINSTALLATION RETROFIT
SV513	REINSTALLATION EXTENTIONS

Table 4-1. Current Remark Codes and Associated Text
(Page 3 of 3)

Code	Text
SV520	MAINTENANCE GENERAL
SV521	MAINTENANCE SALT BUILD-UP
SV522	MAINTENANCE EXERCISED
SV525	MAINTENANCE REWELDING
SV530	SHIFT DUE TO DISCONNECTION
SV533	SHIFT KNOWN CAUSES
SV534	SHIFT UNKNOWN CAUSES
SV535	SHIFT DUE TO GAGE REVERSAL
SV536	SHIFT DUE TO MISSING DATA
SV540	SHED PROBLEMS
SV550	MISCELLANEOUS
ZR500	DATA ZEROED TO NEW TIME

UNDERDOG allows authorized users to edit the standard text associated with a Remark Code and to add new Remark Codes. For more details on editing Remark Codes, consult the description of the RCODE command on the Edit Menu.

4.1.1.2 Editing Remarks

Because a working copy of the data can always be obtained by reapplying the stored remarks, it is easy to change an adjustment if one is found to be incorrect. A utility exists that allows the user to edit the Remark File. It may be invoked using the Gold ER command and is equivalent to the REMARK option on the Edit Menu. For a detailed description of this utility, consult the description of the REMARK command.

4.1.2 QA Level 3 Stamp

If the data have been stamped at QA Level 3, then the user must take this fact into account when reducing data. No adjustments can be made to data that have been stamped unless the stamp is removed by the responsible PI. If a command is issued that would cause an adjustment to data which are contained within an interval which has been stamped, then an error will result and the command will not

be applied nor added to the Remark File. Take special caution not to violate this restriction while editing remarks (see the REMARK command on the Edit Menu).

4.1.3 Additional Commands

As adjustments are made, the user may wish to obtain a listing or plot of the data. Several Gold commands exist that allow the user to perform the more common of these functions without leaving the Reduction Menu. These Gold Commands are equivalent to commands on the Plot and List menus. For details regarding their function consult the command description for the equivalent command on the appropriate menu.

4.1.4 Sorting Remarks

Sorting the Remark File causes remarks to be logically grouped according to a predetermined scheme. The remarks are sorted only when specifically requested by the user via the Gold SR command or during the application of a QA stamp. The Gold SR command is unique in that there is no equivalent command on any other menu. The sorting scheme used is as follows:

1. Remarks are sorted into ascending order by reduction level.
2. Within each level they are separated into the following four groups:
   (a) Group one contains remarks for the commands add point (AP), delete all (DA), shift all (SA), shift vertical (SV), and invert points (IP). These are sorted by start date, then by gage within start date.
   (b) Group two contains remarks for the command delete point (DP). These are sorted by gage, then by start date within gage.
   (c) Group three contains remarks for the swap (SG) command. These are sorted by start date, then by gage within start date.
   (d) Group four contains remarks for the zero date (ZD) and delete redundant (DR) commands.

In most cases, sorting the remarks will not affect any adjustments. The only exception to this occurs when the swap (SG) or delete redundant (DR) commands have been issued. This is because these are the only commands which are not commutative with respect to time. Consider the swap command in the following example: Gage 1 is shifted by $+10.0$ and Gage 2 is shifted by -10.0. If the swap is done before the shift, then the data originally from Gage 2 will be shifted by $+10.0$ and the data originally from Gage 1 will be shifted by -10.0. However, if the swap is done after

the shift, then the data originally from Gage 1 will be shifted by +10.0 and the data originally from Gage 2 will be shifted by −10.0. Clearly the results will not be the same. For this reason a guideline has been established that the SG command should be the *next to the last adjustment* made on a range of data (followed only by the DR command). If any subsequent reductions are made after an SG command has been issued, care must be taken to ensure that the adjustment is being applied to the correct data set. Performing additional reductions after an SG command has been issued is highly discouraged. The same class of problems arise when using the delete redundant command (DR) which examines the amount of change between succeeding points to decide if a point should be deleted. Removing or shifting data can have an effect on this value, causing the algorithm to save a different set of points. If used, the DR command should be the *last adjustment* made on a range of data.

Once a unit has been stamped at QA Level 3, remark sorting will be broken into two groups. All remarks that occur after the stamp will be sorted into a separate group and will appear after those that occur prior to the stamp. When a new stamp is applied, the remarks are automatically resorted and the two groups are merged.

4.1.5 Arguments

Most Reduction Menu commands require arguments. The argument list for each command is given in abbreviated form next to the command on the screen (for details on the use of arguments see Chapter 1). These abbreviations are also given in the command descriptions in this document.

Each argument has an initial value and a current default value. The initial value is the value assigned when a new unit is selected. The default value is the value that will be used when the argument is omitted in a command and is usually equal to the last value that was used. Some commands require certain arguments. These are arguments which have no default and must be supplied on the command line. When a unit is selected for the first time, the initial and default values will be the same.

All dates given as arguments to commands must exist in the working copy of the data. That is, the date must exactly match a date which appears in the listing of the data. When specifying a date range, the data points associated with the start and end dates are included within the range and will be modified by the operation being performed.

The argument abbreviations for the commands on the Reduction Menu are described below:

GA (Gage Number). The number of the gage to be processed. The gage number is a one character designator that selects a gage within the current unit. The gage

must exist in the current unit. This value is initialized to the first gage in the unit when a new unit is selected. When omitted, it defaults to the last GA entered.

G1, G2 (Gage 1 and 2). The gage numbers of the gages to be swapped. Both gages must exist in the current unit. G1 defaults to the last value of GA. G2 defaults to 0.

SD (Start Date). The start date is the Julian date of the first data point to be considered in the date range for the adjustment. An error occurs if this date is not found in the data base. This value is initialized to the first data point in the data base when a new unit is selected. When omitted, it defaults to the last SD entered.

ED (End Date). The end date is the Julian date of the last data point to be considered in the date range for the adjustment. An error occurs if this date is not found in the data base. This value is initialized to the first data point in the data base when a new unit is selected. When omitted, it defaults to the last ED entered.

VA (Value of Shift). The value of the shift is a signed numeric value to be added to the data points. This is a required argument.

LV (Level). The level designation is the level number at which this reduction is taking place. This level number must be 1, 2 or 3. It is initialized to 2 when a new unit is selected. When omitted, it defaults to the last LV entered.

RC (Remark Code). The Remark Code is the five-character code corresponding to the standard remark text to be associated with this reduction. A list of current Remark Codes and their associated texts is given in Table 4-1. A Remark Code of one or more spaces indicates that no Remark Code should be saved for this reduction. The Remark Code is initialized to all spaces (no code) when a new unit is selected. When omitted, it defaults to the last RC entered.

RT (Remark Text). The Remark Text contains up to 40 characters of information to be associated with the remark to augment the standard remark text . This value is initialized to 40 spaces when a new unit is selected. In most cases, this field defaults to 40 spaces. The only case when the default is nonblank is when no RC is given on the line. In this case, the default is the last RT entered.

DT (Date). The DT is the Julian date to be associated with a data point that is being added to the data base. An error occurs if this date is already in the data base. This value always defaults to 0.

ZD (Zero Date). The zero date is the Julian date to be considered as a reference when computing relative day numbers. This date does not have to be found in the data base. This date is initialized to be the date on which data were first collected for the current unit.

TL (Sieve Tolerance). The sieve tolerance is the minimum amount of change required between two points for the second point to be saved. For more information on sieve tolerances, see "RD06: Procedure for Creation of the Level 1 Data Base" [Ball, 1987]. This value is initialized and defaults to the original Level 1 Sieve Tolerance.

4.2 DETAILED COMMAND DESCRIPTIONS

1. Delete All

Delete data within a date range for all gages within the current unit.

Command:

DA

Arguments:

SD	(Start Date)	The Julian date of the first data point in the date range.
ED	(End Date)	The Julian date of the last data point in the date range.
LV	(Level)	The level of this adjustment.
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

All data points between SD and ED inclusive for all gages in the current unit are marked as deleted. SD and ED must be dates that exist in the data base for the current unit. Data marked for deletion are not physically removed from the working copy. However, these data are not included on plots or listings. Data marked for deletion are not affected by subsequent delete, shift, invert, or delete redundant operations. These data are, however, included in swap operations. There is no problem with deletions that overlap (thus deleting a point twice). All dates between SD and ED inclusive are still considered valid dates in the data base and may be used as arguments to subsequent operations.

2. Delete Points

Delete data within a date range for one gage within the current unit.

Command:

DP

Arguments:

GA	(Gage Number)	The number of the gage to be processed.
SD	(Start Date)	The Julian date of the first data point in the date range.
ED	(End Date)	The Julian date of the last data point in the date range.
LV	(Level)	The level of this adjustment.
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

All data points between SD and ED inclusive for gage GA are marked as deleted. SD and ED must be dates that exist in the data base for the current unit. Data marked for deletion are not physically removed from the working copy. However, these data are not included on plots or listings. Data marked for deletion are not affected by subsequent delete, shift, invert, or delete redundant operations. These data are, however, included in swap operations. There is no problem with deletions that overlap (thus deleting a point twice). All dates between SD and ED inclusive are still considered valid dates in the data base and may be used as arguments to subsequent operations.

3. Shift All

Shift all data in the y-direction after a given date for all gages within the current unit.

Command:

SA

Arguments:

SD	(Start Date)	The Julian date of the first data point to be shifted.
VA	(Value of Shift)	The amount data is to be shifted (required).
LV	(Level)	The level of this adjustment.
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

The amount specified in VA is added to all data values for all gages in the unit from SD to the end of the data. SD must be a date that exists in the data base for the current unit. When new data are appended to the data base, the shift is automatically extended to encompass the new data. The shift amount may be positive or negative. Shifts may be overlapped and there is no problem with a single point being affected by more than one shift.

4. Shift Vertical

Shift all data in the y-direction after a given date for one gage within the current unit.

Command:

SV

Arguments:

GA	(Gage Number)	The number of the gage to be processed.
SD	(Start Date)	The Julian date of the first data point in the date range.
VA	(Value of Shift)	The amount data is to be shifted (required).
LV	(Level)	The level of this adjustment.
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

The amount specified in VA is added to all data values for gage GA from SD to the end of the data. SD must be a date that exists in the data base for the current unit. When new data are added to the data base, the shift is automatically extended to encompass the new data. The shift amount may be positive or negative. Shifts may be overlapped and there is no problem with a given point being affected by more than one shift.

5. Invert Points

Change sign on data within a date range for one gage within the current unit.

Command:

IP

Arguments:

GA	(Gage Number)	The number of the gage to be processed.
ED	(End Date)	The Julian date of the last data point in the date range.
SD	(Start Date)	The Julian date of the first data point in the date range.
LV	(Level)	The level of this adjustment.
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

All data points between SD and ED inclusive for gage GA are multiplied by -1. SD and ED must be dates that exist in the data base for the current unit. Data points that have been marked for deletion are not inverted. Inversions may be overlapped and there is no problem with a given point being affected by more than one inversion operation.

6. Swap

Swap data within a given date range between two gages within the current unit.

Command:

SG

Arguments:

G1,G2	(Gage 1 and 2)	Gage numbers of gages to be swapped (required).
ED	(End Date)	The Julian date of the last data point in the date range.
SD	(Start Date)	The Julian date of the first data point in the date range.
LV	(Level)	The level of this adjustment.
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

All data points between SD and ED inclusive for gage G1 are swapped with the data points between SD and ED inclusive for gage G2. SD and ED must be dates that exist in the data base for the current unit. All data including points marked for deletion are swapped. All subsequent operations performed on either of the two gages will affect the new data. Note that special consideration must be used with this command and it should be used with particular awareness of the implications for further reduction (see Sorting Remarks above). As a consequence, SG *should be the next to the last command* issued second only to the DR command (if present).

7. Add Point

Add a data point to the working data with data values of zero for all gages in the current unit.

Command:

AP

Arguments:

DT	(Date)	The Julian date of the point to be added to the data base.
LV	(Level)	The level of this adjustment.
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

A data point with date DT is added to the working copy of the data. DT must not exist in the data base for the current unit. A data value of 0 is entered on this date for each gage in the unit. Once a data point has been added, it is processed the same as any other valid data point in the data base. In particular, a non-zero value may be assigned to it by performing a subsequent shift.

8. Zero Date

Define a reference date for calculation of relative days for plots and listings.

Command:

ZD

Arguments:

ZD	(Zero Date)	The Julian date to be considered as day number 0 (required).
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

The Julian date ZD becomes time 0 for calculation of relative days. This command will override any previous ZD command that has been issued for the unit. The ZD command is considered a Level 1 reduction and will appear in the Remarks File as such. The date supplied as the zero date does not necessarily have to exist in the data base.

9. Delete Redundant

Pass data within a given date range through a Level 1 type sieve.

Command:

DR

Arguments:

ED	(End Date)	The Julian date of the last data point in the date range.
SD	(Start Date)	The Julian date of the first data point in the date range.
TL	(Sieve Tolerance)	The sieve tolerance to be used during processing.
LV	(Level)	The level of this adjustment.
RC	(Remark Code)	The standard Remark Code for this adjustment.
RT	(Remark Text)	The Remark Text specific to this adjustment.

Function:

This command essentially performs the same operation as the Level 1 sieve. Briefly, this sieve will remove redundant data. The sieve will keep data that lie outside a given tolerance of the last point saved, with the added condition that it will save at least one point every few days. For details, consult the "RD06: Procedure for Creation of the Level 1 Data Base" [Ball, 1987]. If used, this command *should be the last command* entered for a range of data.

5 GAGE CONFIGURATION

The Gage Configuration Screen (Figure 5-1) allows the user to select the unit to be manipulated and displays information about each gage within the unit. If a unit has already been selected from the Directory Tree, this screen is displayed while the data are being read. After the data have been read, a sufficiently privileged user may edit the gage location information.

5.1 UNIT SELECTION

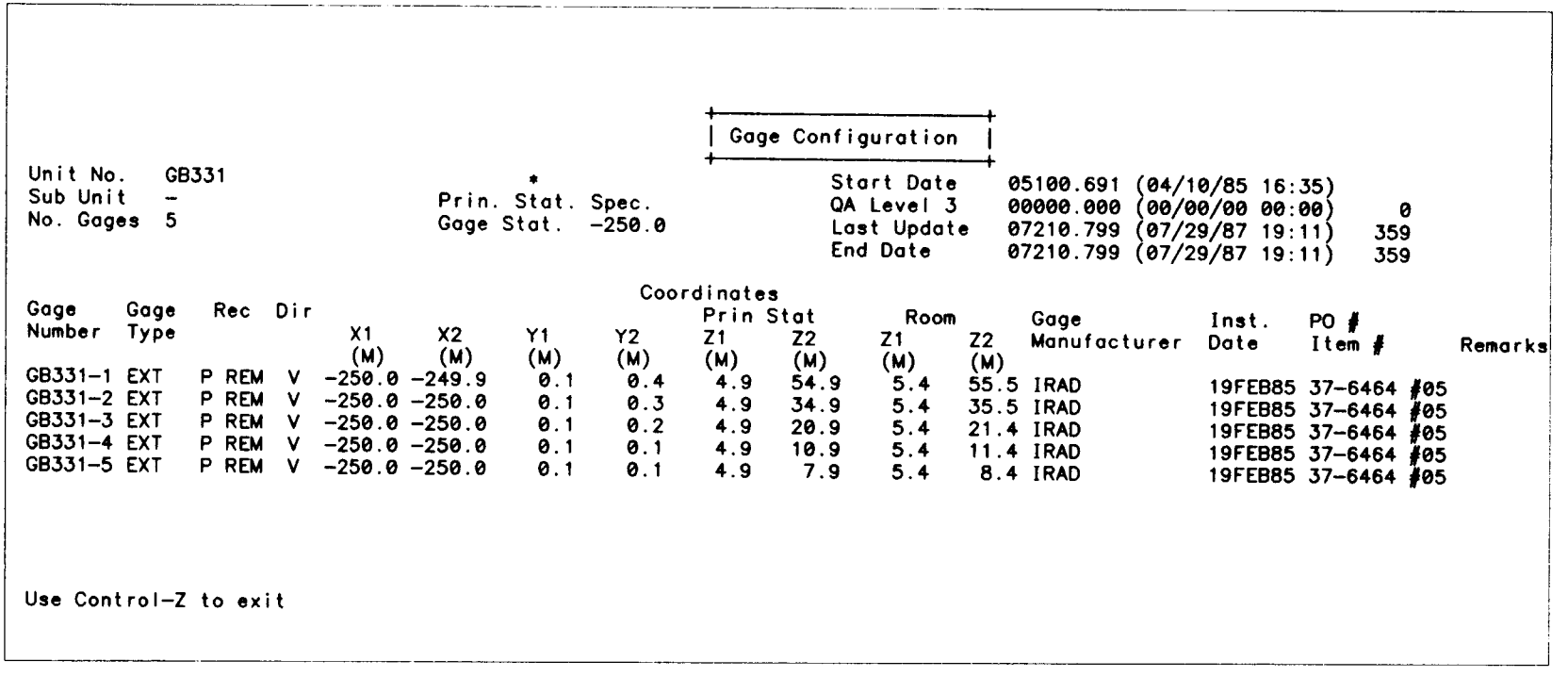
To select a unit, enter the unit number in the field marked "Unit No." located in the upper left corner of the screen. Enter the full unit number in this field. Recall that the unit number consists of a room designator followed by a unit designator and subunit designator (Chapter 1). If the subunit is anything other than "-" (the default), then it must be included with the unit number.

Once the unit number has been entered, the system will attempt to extract all the data for that unit from the data base. During this process, the word "working" will flash at the bottom of the screen. When all information has been loaded, the screen will be filled in with the date and location information which is described below.

At this point, the user may exit by entering a control-Z. Alternately, a sufficiently privileged user may go on to edit the location information (see the LOC command on the Edit Menu).

5.2 DATE INFORMATION

The upper right corner of the screen contains four date fields. These fields provide information about the span of time covered by the data which have been loaded. The "Start Date" field gives the date of the first data point read for the unit. The "QA Level 3" field gives the date of the last point that has passed QA Level 3 verification. Data past this date may not be released to the Analysis or Production packages. As additional data are added to the QA stamped region, this date will advance to encompass the additional data points. The "Last Update" field gives the date of the last point that can undergo reduction. UNDERDOG restricts access to data past this date. The "End Date" field gives the date of the last data point in the data base. This date will advance as new data are added. The data base administrator, under direction of the PI's, will periodically advance the "Last Update" date to include all data up to the "End Date."



Gage Configuration

Unit No. GB331
Sub Unit –
No. Gages 5

*
Prin. Stat. Spec.
Gage Stat. –250.0

Start Date 05100.691 (04/10/85 16:35)
QA Level 3 00000.000 (00/00/00 00:00) 0
Last Update 07210.799 (07/29/87 19:11) 359
End Date 07210.799 (07/29/87 19:11) 359

Gage Number	Gage Type	Rec	Dir	Coordinates X1 (M)	X2 (M)	Y1 (M)	Y2 (M)	Prin Stat Z1 (M)	Prin Stat Z2 (M)	Room Z1 (M)	Room Z2 (M)	Gage Manufacturer	Inst. Date	PO # Item #	Remarks
GB331–1	EXT	P REM	V	–250.0	–249.9	0.1	0.4	4.9	54.9	5.4	55.5	IRAD	19FEB85	37–6464 #05	
GB331–2	EXT	P REM	V	–250.0	–250.0	0.1	0.3	4.9	34.9	5.4	35.5	IRAD	19FEB85	37–6464 #05	
GB331–3	EXT	P REM	V	–250.0	–250.0	0.1	0.2	4.9	20.9	5.4	21.4	IRAD	19FEB85	37–6464 #05	
GB331–4	EXT	P REM	V	–250.0	–250.0	0.1	0.1	4.9	10.9	5.4	11.4	IRAD	19FEB85	37–6464 #05	
GB331–5	EXT	P REM	V	–250.0	–250.0	0.1	0.1	4.9	7.9	5.4	8.4	IRAD	19FEB85	37–6464 #05	

Use Control–Z to exit

Figure 5-1. Gage Configuration Screen.

5.3 LOCATION INFORMATION

The majority of the screen is taken up by location information. This information includes the Principal Station and Gage Station coordinates which are listed to the left of the dates. Location data continue on the lower half of the screen with the actual gage coordinates. This section contains one line for each gage within the unit. Each line gives the gage identification and location information recorded in the as-built gage location (NOS) files which were originally maintained on Sandia's CDC/NOS system.

Each line can be divided into four sections: (1) the full unit/subunit/gage specification, (2) the gage identification entries, (3) gage location entries, and (4) miscellaneous information. The unit/subunit/gage specification is fully described in Chapter 1. The gage identification entries begin with a four-letter designator which describes the gage type (see Table 5-1). The next two columns describe the recording status (Rec) of the gage. This will indicate whether the gage is permanent (P) or temporary (T) and whether the gage is read manually (MAN) or remotely (REM) by the data acquisition system. The final identification field indicates the gage's direction (Dir): horizontal (H), vertical (V), or diagonal (D). The second section contains the actual gage location coordinates. These coordinates give the start and end location of the gage in each direction (x, y, z). Two pairs of z-coordinates are given: the first (labeled "Prin Stat") measures the actual z-location while the second (labeled "Room") measures the gage location relative to a normalized room zero.* The final section contains miscellaneous information about the gage. This includes the gage's manufacturer, the date the gage was installed, and the purchase order and item number used to procure the gage. A space for comments (remarks) is also provided.

5.4 RESPONSES TO PROBLEMS IN LOADING DATA

There are three primary responses that UNDERDOG can give if problems occur in attempting to load data after unit selection. The most common message is "Requested unit not found in MDF." If this response occurs, it indicates that the unit number entered does not correspond to any known unit in the data base. Check the unit number to make sure that it was entered correctly. If it was correctly entered and the unit is known to exist, then contact the data base administrator.

*A Principal Station represents a central location about which a collection of units are grouped. The Gage Station indicates actual location of the gage. Gage coordinates are measured from an origin which is defined at the Principal Station. The normalized room zero measurement takes into account the stratigraphy of the drift. The concepts of Principal Station, Gage Station, and determination of gage coordinates are detailed in the TSI Construction Report filed in the WIPP library at Sandia National Laboratories.

The second most common message is "No data for requested unit." If this response occurs, it indicates that although the unit exists, no data were found in the Level 1 data base for the requested unit. There are various reasons why no data may exist for a given unit. If the unit is known to be reporting data (data exists in the Raw Data Base), then contact the data base administrator.

Finally, the system may report that "You do not have access to that unit." This indicates that, given the program and operation selected, access has been denied due to lack of sufficient privilege. Check with the data base administrator or the PI who owns the gage.

Table 5-1. Gage Identification Designators
(Page 1 of 2)

Designator	Gage Type
AB	Anchor Bolt
AD	Axial Displacement Gage
CHTR	Canister Heater
CL	Displacement Gage
CLOS	Manual Closure Gage
CONV	Closure Gage
CRNT	Current Monitor
DEW	Dew Point/Humidity Gage
DH	Drill Hole
ENVR	Environment
EXT	Extensometer
FLO	Flowmeter
GHTR	Guard Heater
INCL	Inclinometer
JM	Joint Meter
OHC	Open Hole Closure Gage
PC	Pressure Cell
PHC	Protected Hole Closure Gage
RCL	Rock Closure Gage

Table 5-1. Gage Identification Designators
(Page 2 of 2)

Designator	Gage Type
RDP	Rock Displacement Gage
REF	Fixed Reference
REJ	Rejected Hole
RSG	Rock Strain Gage
RTC	Rock Thermocouple
SSG	Seal Strain Gage
STC	Seal Thermocouple
STN	Strain Borehole Gage
STR	Stress Meter
STRT	Stratigraphy (Core)
T/C	Thermocouple
TC	Thermocouple
TPL	Thermopile
ULT	Ultrasonic Gage
VOLT	Voltage Monitor
WHTR	Waste Package
WSG	Wall Strain Gage

6 EDIT MENU

6.1 FUNCTIONAL OVERVIEW

The Edit Menu (Figure 6-1) allows a sufficiently privileged user to edit ancillary information about each unit. The system uses two forms of editing: EDT editing and on-screen field editing.

The commands available on the Edit Menu are summarized below:

- REMARK — Edit the list of reduction remarks being applied against this unit.
- INREAD — Edit the Initial Readings data base entries for this unit (not currently implemented).
- CAL — Edit the Calibration data base entries for this unit (not currently implemented).
- LOC — Edit the Location data base entries for this unit.
- RCODE — Edit the text associated with a standard Remark Code.
- ACT — Edit the Activity data base (not currently implemented).
- PICOM — Edit the PI comments for this unit.

6.1.1 EDT Editing

The PICOM and REMARK edit options are implemented via the standard VAX EDT editor augmented with most of the SLAVE enhancements. (Note that Setup Mode features of SLAVE are not supported.) For more information on the use of the SLAVE enhancements, see *SLAVE — A Package of Enhancements for the VAX/VMS EDT Text Editor* [Blanford and Scott, 1982]. The use of the EDT editor allows the user the greatest flexibility, but also presents the greatest possibility for introducing errors into the system. Unpredictable results can occur if the user fails to adhere to the correct line formats described for commands which use EDT editing.

To prepare for EDT editing, UNDERDOG builds an ASCII file containing the data to be edited. The user is then placed in the SLAVE environment and allowed to edit the ASCII file. When the user finishes editing, the system detects whether an EXIT or QUIT was used to terminate the editing session. If the user has QUIT the editing session, the old data are retained. If the user has EXITed the editing

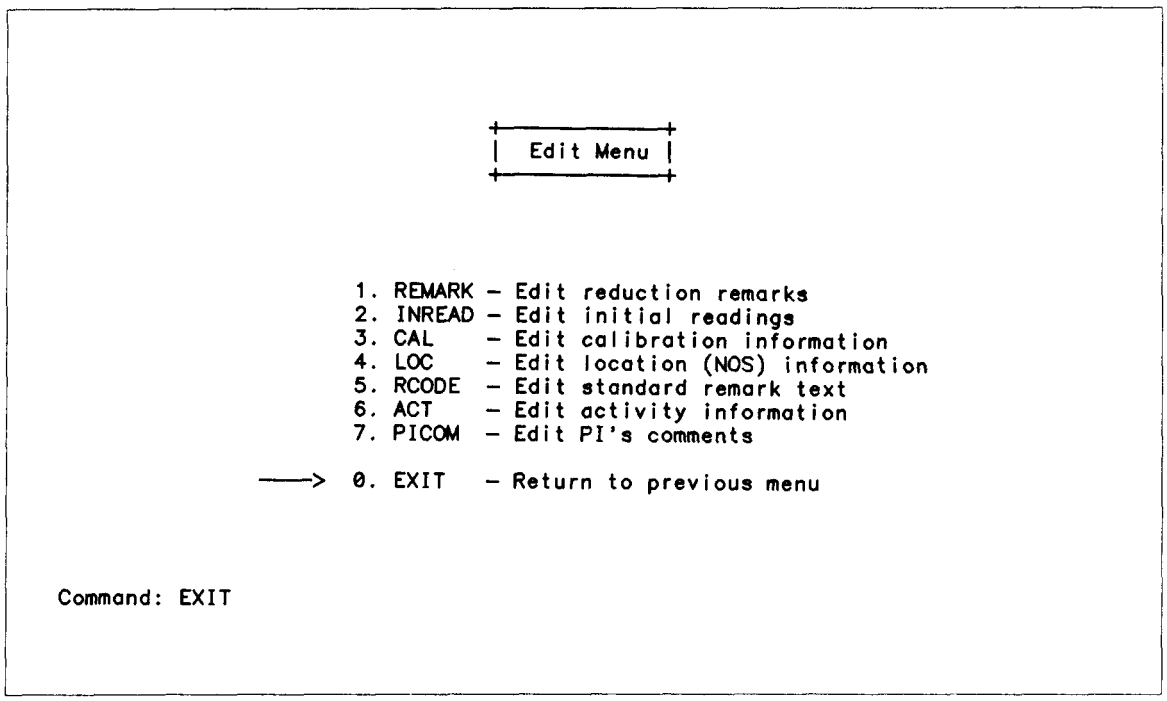


Figure 6-1. Edit Menu.

session then the old data are deleted and the new data are read and entered into the data base. For more information on the use of the EDT editor, see the *MicroVMS User's Manual* [DEC, 1985b].

6.1.2 On-Screen Field Editing

The remaining edit options are implemented using on-screen field editing. In field editing, the screen is broken into various fields where data are stored. Only certain fields may be edited by the user. The user may move around the fields at will, changing the information as needed. When editing is completed, entering a control-Z will terminate the edit, save the new information, and return the user to the Edit Menu. Control-Z may be used to exit a field and exit the screen in one key stroke.

To edit an entry, the user must first locate the field to be changed. This is done by using the up and down arrow keys on the keyboard. The up arrow will move

the user to the previous field while the down arrow will move the user to the next field. The RETURN key behaves exactly like the down arrow key. Certain screens use the TAB and BACKSPACE keys to provide additional field movement functions. You cannot move up from the first field on the screen nor down from the last field on the screen. Once a field has been located, the entry may be edited or reentered. All the standard DCL command-line editing options [DEC, 1985a] are available for editing entries.

6.2 DETAILED COMMAND DESCRIPTIONS

1. REMARK

Edit the list of reductions being applied against this unit.

Command:

REMARK

Edit Style:

EDT

Line Format:

Cols	Name	Type
1	Gage	A valid gage number
3	Level	Integer 1 through 3
6–14	Start Date	Start of date range in Julian format
16–24	End Date	End of date range in Julian format
26–30	Remark Code	Remark Code associated with this reduction
32–33	Command	Adjustment command represented by this remark
35–44	Value	Supplemental value for this remark
46–85	Text	User-entered Remark Text
87–91	Mrand	Measurand number of gage
93–101	Date	Julian Date remark was written
103–104	Operator	Coded name of user who issued this command

Function:

The ability to edit reduction remarks allows the user to change or remove adjustments that are incorrect. Each line in the file represents one adjustment done to the unit or a gage in the unit (see Chapter 1). Care must be taken to ensure that lines edited by the user match the format given above. Although it is possible to enter new remarks using this utility, it is not recommended because of the possibility of errors.

After the reduction remarks have been edited, two stages of processing take place. As the remarks are read, all the fields are checked for correct format. After the file has been successfully read, the old working data are discarded and a new data set is built from the edited file. If an error is encountered during this operation, then an error message will be issued and the adjustment associated with the offending remark will not be applied to the data. The system will attempt to apply the remaining

remarks. If any errors were encountered during this process, they will be summarized on the screen. The user will be asked if he wishes to reedit the file. If the response to this question is N for no, the edited file will be discarded and the original set of remarks will be restored as if no edit had taken place. If the response is Y for yes, the user will be returned to the editor.

2. INREAD

Edit the Initial Readings data base entries for this unit (not currently implemented).

3. CAL

Edit the Calibration data base entries for this unit (not currently implemented).

4. LOC

Edit the Location data base entries for this unit.

Command:

LOC

Edit Style:

Field

Line Format:

N/A

Function:

Editing the Location file allows the user to update the gage location information (see Section 5.3). The screen format used is the same as the Gage Configuration Screen (Figure 5-1). The user may not edit any of the unit, subunit, full gage specification, or gage identification fields. The data in these fields is considered fundamental to the system and cannot be changed from within UNDERDOG. For information on how these fields may be edited, consult the data base administrator. The user may edit Principal Station, Gage Station, gage coordinates, or miscellaneous information fields. When editing has been completed, entering a control-Z will return the user to the Edit Menu.

Within the lines for gage information, the up and down arrow keys will move the cursor up and down within a column. Entering a down arrow at the bottom of one column will move the cursor to the top of the next column. Likewise, entering an up arrow at the top of a column will move the cursor to the bottom o,f the previous column. The TAB key will move the cursor to the right within a row, while the BACKSPACE key will move the cursor to the left within a row.

5. RCODE

Edit the text associated with a standard Remark Code.

Command:

RCODE

Edit Style:

Field

Line Format:

N/A

Function:

Editing the standard remark text allows a user to change the text associated with given Remark Codes or add new Remark Codes to the data base. Entering a control-Z will return the user to the menu from which the edit option was invoked.

The screen used for this operation overlays the bottom part of the screen from which the edit operation was invoked. It contains two fields: the Remark Code and the text. When a code is entered, the associated text (if any) is displayed in the text field. When the text has been entered, the user must press RETURN to save the new value. This will clear the code and text fields and allow the user to proceed to the next code.

It is recommended that caution be exercised when editing the standard text. Recall that this text is associated with a code that may have been used in prior reduction. Changing this text would, therefore, retroactively apply to all remarks that used it. Caution must also be used when adding new Remark Codes to prevent duplication of codes.

6. ACT

Edit the Activity data base (not currently implemented).

7. PICOM

Edit the PI comments for this unit.

Command:

PICOM

Edit Style:

EDT

Line Format:

Free format.

Function:

The PI comments file contains general comments made by the PI about the unit. This is a free format text file. The user is at liberty to enter any information deemed pertinent to the reduction of the unit. No formatting will be done on this file.

7 QA MENU

7.1 FUNCTIONAL OVERVIEW

The QA Menu (Figure 7-1) is used to maintain the QA Level 3 stamp. This menu may only be used by the PI for the currently selected program. Users not designated as PI's will be denied access to this menu.

The commands available on the QA Menu are summarized below:

STAMP	Apply a QA stamp to the currently selected unit.
REMOVE	Remove a QA stamp from the currently selected unit.

7.1.1 Function of the QA Stamp

As noted in Chapter 1, the application of a QA stamp allows data to be released to the Analysis and Production packages. The QA stamp takes one argument which is the date through which data have been approved. Once this stamp has been applied, no further reduction is permitted on data collected prior to the date given as the argument. When editing remarks, a message will appear giving this date for reference. The PI may remove a QA stamp, thus allowing remarks to be edited if the need arises.

When a QA stamp is applied, the Remarks File is automatically sorted. For more details on sorting of remarks see the SR command on the Reduction Menu.

7.1.2 Arguments

ED (End Date). The end date is the Julian date of the last data point to be considered approved for release. An error occurs if this date is not found in the data base. This value is initialized to the value of the current QA stamp, if one exists. If no stamp exists, it is initialized to the first date in the data base. This is a required parameter and has no default value.

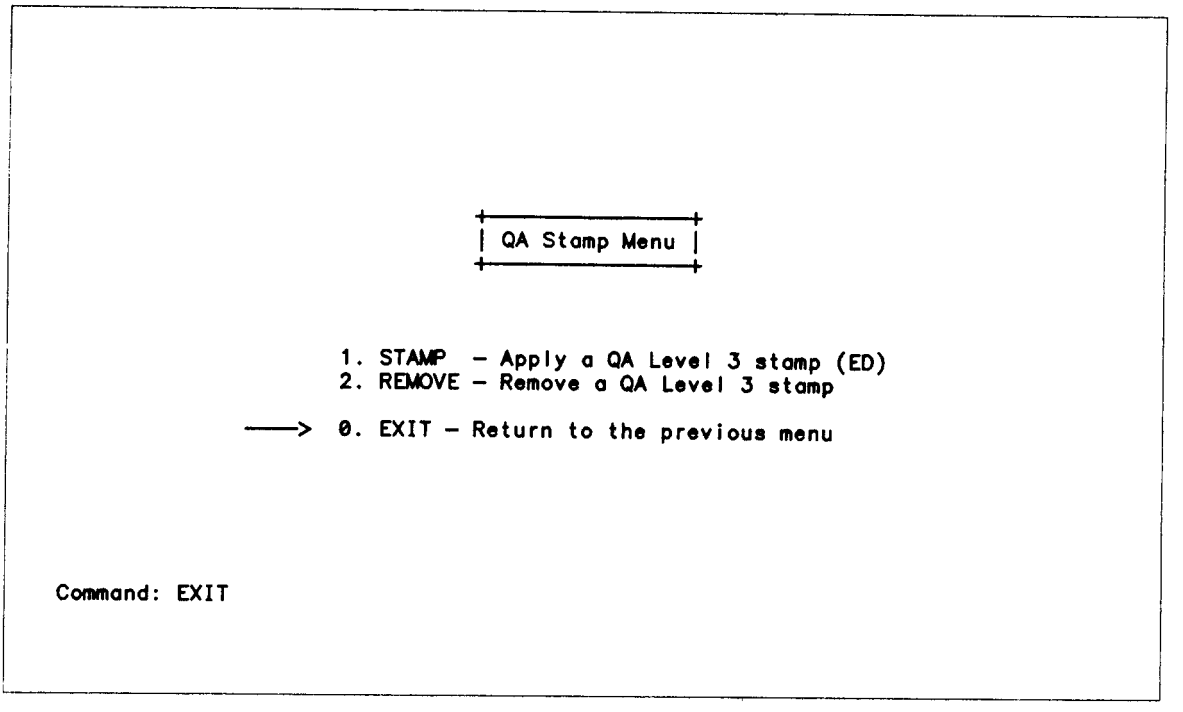


Figure 7-1. QA Menu.

7.2 DETAILED COMMAND DESCRIPTIONS

1. Stamp

Apply a QA stamp to the currently selected unit.

Command:

STAMP

Arguments:

ED (End Date)	The Julian date through which the stamp applies.

Function:

Apply a QA stamp for the currently selected unit through the given date. Remarks will be sorted and no further reduction will be allowed on data prior to the given date.

2. Remove

Remove a QA stamp from the currently selected unit.

Command:

REMOVE

Arguments:

None

Function:

Remove a previously applied QA stamp. All remarks which fell within the old QA stamped region will be returned to the current working Remark File.

8 NO ACTION MENU

8.1 FUNCTIONAL OVERVIEW

The No Action Menu (Figure 8-1) is used to place single-line comments directly into the Remark File. These entries do not perform any manipulation of the data.

The No Action Menu commands are summarized below:

NA (No Action)	Comment with no data manipulation action.
EV (Event)	Comment associated with a site event with no data manipulation action.

8.1.1 Arguments

SD (Start Date). The start date is the Julian date of the first data point to be considered in the date range for the comment. An error occurs if this date is not found in the data base. This value is initialized to the first data point in the data base when a new unit is selected. When omitted, it defaults to the last SD entered.

LV (Level). The level designation is the level number to which this comment applies. This level number must be between 1 and 3. It is initialized to 2 when a new unit is selected. When omitted, it defaults to the last LV entered.

RC (Remark Code). The Remark Code is the five-character code corresponding to the standard remark text to be associated with this comment. A list of current Remark Codes and their associated texts is given in Table 4-1. A Remark Code of one or more spaces indicates that no Remark Code should be saved for this comment. The Remark Code is initialized to all spaces (no code) when a new unit is selected. When omitted, it defaults to the last RC entered.

RT (Remark Text). The Remark Text contains up to 40 characters of information to be associated with the remark to augment the standard remark text . This value is initialized to 40 spaces when a new unit is selected. In most cases, this field defaults to 40 spaces. The only case when the default is nonblank is when no RC is given on the line. In this case, the default is the last RT entered.

RSI(ALO) 097-87-1114

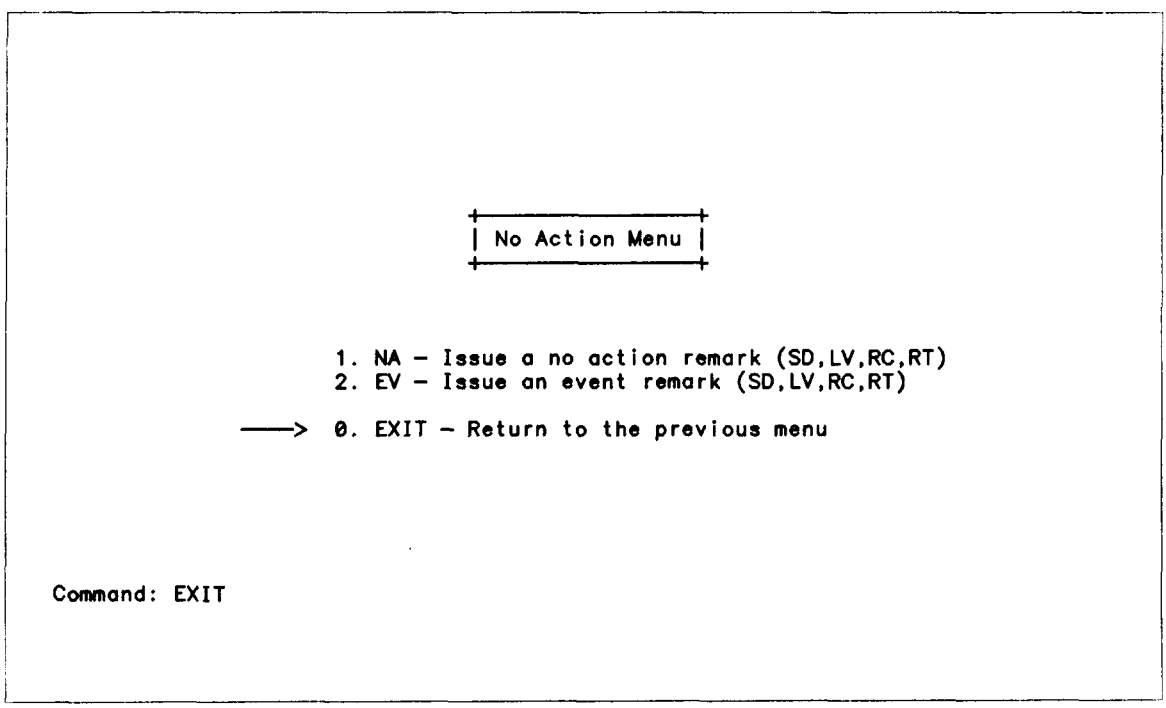


Figure 8-1. No Action Menu.

8.2 DETAILED COMMAND DESCRIPTIONS

1. No Action

Comment with no data manipulation action

Command:

NA

Arguments:

SD	(Start Date)	The Julian date of the first data point in the date range.
LV	(Level)	The level of this comment.
RC	(Remark Code)	The Remark Code for this comment.
RT	(Remark Text)	The Remark Text for this comment.

Function:

Add a remark that does not perform any data manipulation and serves as a single line comment in the Remark File.

2. Event

Comment associated with a site event with no data manipulation action.

Command:

EV

Arguments:

SD	(Start Date)	The Julian date of the first data point in the date range.
LV	(Level)	The level of this comment.
RC	(Remark Code)	The Remark Code for this comment.
RT	(Remark Text)	The Remark Text for this comment.

Function:

Add a remark that does not perform any data manipulation and serves as a single line comment in the Remark File. This remark refers to a site event.

9 LIST AND VIEW MENUS

9.1 FUNCTIONAL OVERVIEW

The List Menu (Figure 9-1) and its companion, the View Menu (Figure 9-2), allow the user to produce listings of the data. The two menus are identical in layout and function with the only difference being the destination of the output produced. Note that this menu is not intended to be used to generate production output (see Part V). The ability to list QA stamped data is provided for convenience only.

The commands are summarized below:

DATA1	(Level 1 data)	Print data section reflecting Level 1 adjustments
DATA2	(Level 2 data)	Print data section reflecting Level 2 adjustments
DATAQA	(Stamped Data)	Print QA Level 3 stamped data
DATAW	(Working data)	Print working data
WORK	(Work file)	Print all sections of current working data set
REMARK	(Remarks)	Print reduction remarks section
INR	(Init. Readings)	Print initial readings section
CAL	(Calibration)	Print calibration section
LOC	(Location)	Print gage location information section
ACT	(Activities)	Print activity logging section
PIC	(PI comments)	Print PI comments section

Both menus create temporary files to hold the listing. When using the List Menu, this file will be printed and then deleted. View mode is implemented via the standard VAX EDT editor augmented with most of the SLAVE enhancements (note that Setup Mode features of SLAVE are not supported). When using the View Menu, the system will initiate an EDT session with the read-only qualifier to allow the user to view the file with the editor. The user must QUIT the editor to return to the menu. Upon leaving the editor, the temporary file will be deleted.

For ease of explanation, commands will be described for the List Menu only. The View Menu commands will produce the same output. To switch between the two menus, use the Gold-V and Gold-L commands as instructed on the menus. UNDERDOG remembers which mode the user has selected and will return to the appropriate menu when the List/View option is reentered.

9.1.1 List Sections

The output listing is divided into eight sections, each giving data on a particular aspect of the system. The sections are

- PI Comment — The text entered using the PICOM command of the Edit Menu
- Location — The location information as displayed on the Gage Configuration Screen
- Measurand Definitions — The gage number, gage type, measurand numbers, and quantities measured for each gage in the unit
- Initial Readings — For data from manually read units, the initial reading taken from the measuring devices used
- Calibration — For data from manually read units, the calibration coefficients of the measuring devices used
- Remarks — The remarks applied to this unit
- Activities — The data reduction activity log
- Data — The dates, relative day numbers, and data values.

Each section is printed with its own header which contains the unit number. For information on redirecting output, see your data base administrator.

RSI(ALO) 097-87-1115

```
                    Use Gold-V to change to View mode

                              +-------------+
                              | List Menu   |
                              +-------------+

                    1. DATA1  - Print level 1 data
                    2. DATA2  - Print level 2 data
                    3. DATAQA - Print QA approved data
                    4. DATAW  - Print working data
                    5. WORK   - Print complete working file

                    6. REMARK - Print reduction remarks
                    7. INREAD - Print initial reading information
                    8. CAL    - Print calibration information
                    9. LOC    - Print location information
                   10. ACT    - Print activity information
                   11. PICOM  - Print PI comments

               ---> 0. EXIT   - Return to the previous menu

Command: EXIT
```

Figure 9-1. List Menu.

RSI(ALO) 097-87-1116

```
                    Use Gold-L to change to List mode

                              +-------------+
                              | View Menu   |
                              +-------------+

                    1. DATA1  - View level 1 data
                    2. DATA2  - View level 2 data
                    3. DATAQA - View QA approved data
                    4. DATAW  - View working data
                    5. WORK   - View complete working file

                    6. REMARK - View reduction remarks
                    7. INREAD - View initial reading information
                    8. CAL    - View calibration information
                    9. LOC    - View location information
                   10. ACT    - View activity information
                   11. PICOM  - View PI comments

               ---> 0. EXIT   - Return to the previous menu

Command: EXIT
```

Figure 9-2. View Menu.

9.2 DETAILED COMMAND DESCRIPTION

1. Level 1 Data

Print data section only reflecting Level 1 adjustments.

Command:

DATA1

Arguments:

None

Function:

The Level 1 data as read from the data base are printed. Values flagged as deactivated by the collection system are omitted. Dates are expressed as Julian days and relative days as computed from the ZD value (see the ZD command on the Reduction Menu).

2. Level 2 Data

Print data section reflecting Level 2 adjustments.

Command:

DATA2

Arguments:

None

Function:

The Level 2 data as computed by applying all Level 2 adjustments against the Level 1 data are printed. Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are expressed as Julian days and relative days as computed from the ZD value (see the ZD command on the Reduction Menu).

3. Stamped Data

Print QA Level 3 stamped data.

Command:

DATAQA

Arguments:

None

Function:

The QA Level 3 data as computed by applying all QA stamped adjustments against the Level 1 data are printed. Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are expressed as Julian days and relative days as computed from the ZD value (see the ZD command on the Reduction Menu).

4. Working Data

Print working data.

Command:

DATAW

Arguments:

None

Function:

The working data as computed by applying all known adjustments against the Level 1 data are printed. Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are expressed as Julian days and relative days as computed from the ZD value (see the ZD command on the Reduction Menu).

5. Work File

Print all sections of the current working data set.

Command:

WORK

Arguments:

None

Function:

All list sections of the working file are printed. This includes all list sections including the current working data, as computed by applying all known adjustments against the Level 1 data. Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are expressed as Julian days and relative days as computed from the ZD value (see the ZD command on the Reduction Menu).

6. Remarks

Print reduction remarks section.

Command:

REMARK

Arguments:

None

Function:

All known adjustments are printed. The order in which adjustments are printed depends on the existence of a QA Level 3 stamp and the use of the gold SR command on the Reduction Menu.

7. Initial Readings

Print initial readings section.

Command:

INR

Arguments:

None

Function:

The initial readings of the measuring devices used are printed. This section applies only to manually read units.

8. Calibration

Print calibration section.

Command:

CAL

Arguments:

None

Function:

The calibration coefficients of the measuring devices used are printed. This section applies only to manually read units. Only those calibration readings taken while the device was in use are included.

9. Location

Print gage location information section.

Command:

LOC

Arguments:

None

Function:

The location information as displayed on the gage configuration screen is printed. For a list of fields and their meaning, see Chapter 5.

10. Activities

Print activity logging section.

Command:

ACT

Arguments:

None

Function:

The data reduction activity log is printed. For units containing manually collected data this information includes when new data were loaded and when reduction was completed. For units containing remotely collected data this information includes when the data were reduced, when they were accessed, and the component (Reduction, Production, or Analysis) which performed the access.

11. PI Comments

Print PI comments section.

Command:

PICOM

Arguments:

None

Function:

The PI comments are printed exactly as they appear in the PI comments file. No text formatting is performed.

10 PLOT MENU

10.1 FUNCTIONAL OVERVIEW

The Plot Menu (Figure 10-1) is used to request graphical output of the data. The plotting package has the capability to automatically scale plots or accept user-supplied scaling. In addition, a "quality plot" option can be used to create publication-quality output. Note that this menu is not intended to be used to generate production plots (see Part V). The ability to plot QA stamped data is provided for convenience only. The user may generate a custom plot of QA stamped data by using either of the custom plot commands and specifying a level of Q.

The commands available on the Plot Menu are as follows:

PLOT1	(Level 1 plot)	Generate an auto-scaled plot of the Level 1 data
PLOT2	(Level 2 plot)	Generate an auto-scaled plot of the Level 2 data
PLOTQA	(Stamped Data)	Generate an auto-scaled plot of the QA Level 3 data
PLOTW	(Working Level)	Generate an auto-scaled plot of the working data
FID	(Fiducials)	Not currently implemented
CUSTOM	(Custom plot)	Generate a user-scaled custom plot
QCUSTOM	(Quality Custom)	Generate a user-scaled quality plot
QUALITY	(Quality)	Generate an auto-scaled quality plot of the working data

10.1.1 Format

The plotting algorithm ensures that there will be between five and ten major intervals on each axis. In addition, there will be five minor intervals per major interval. Default y-axis labels give the measured quantity and units of measure. The plot will also contain Principal Station and Gage Station information, unit number and type, and data level.

The x-axis is labeled in relative days as calculated from the zero date (see the ZD command on the Reduction Menu), and again the labels are determined by the unit type. The first relative day on the x-axis is also labeled with the corresponding Julian and Gregorian dates.

10.1.2 Scaling

By default, the plotting package will produce automatically scaled plots. The x- and y-axis dimensions will be computed to ensure that the graphical information will cover 3/4 of the total area of the page. By default, all gages in the unit will be plotted.

User-defined scaling may be used by requesting a custom plot or custom-quality plot. Under this scheme the user must supply the x- and y-axis limits in the form of a beginning and ending x coordinate and a beginning and ending y coordinate. In addition, the user may request that only particular gages be plotted. This information is supplied through a special command line. This command line (Figure 10-2) is displayed when a user-scaled option is selected.

10.1.3 Quality Plots

A quality plot has several features which make it more suitable for publication. The most noticeable difference is that the data are put through a sieve that reduces the number of points to be plotted (see Figures 10-3 and 10-4). In addition, a different font is used for the printed text and a diagram giving the unit configuration is included. If no diagram can be produced, a legend will be generated showing the plot symbol type used for each gage.

RSI(ALO) 097-87-1117

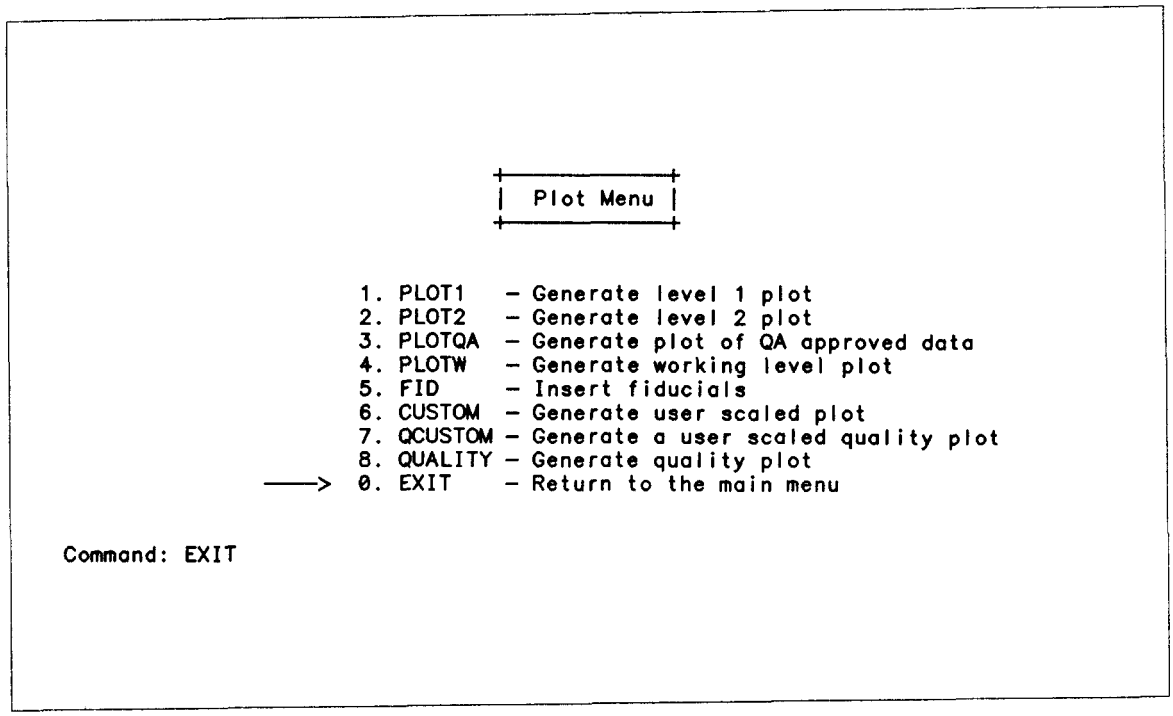


Figure 10-1. Plot Menu.

RSI(ALO) 097-87-1118

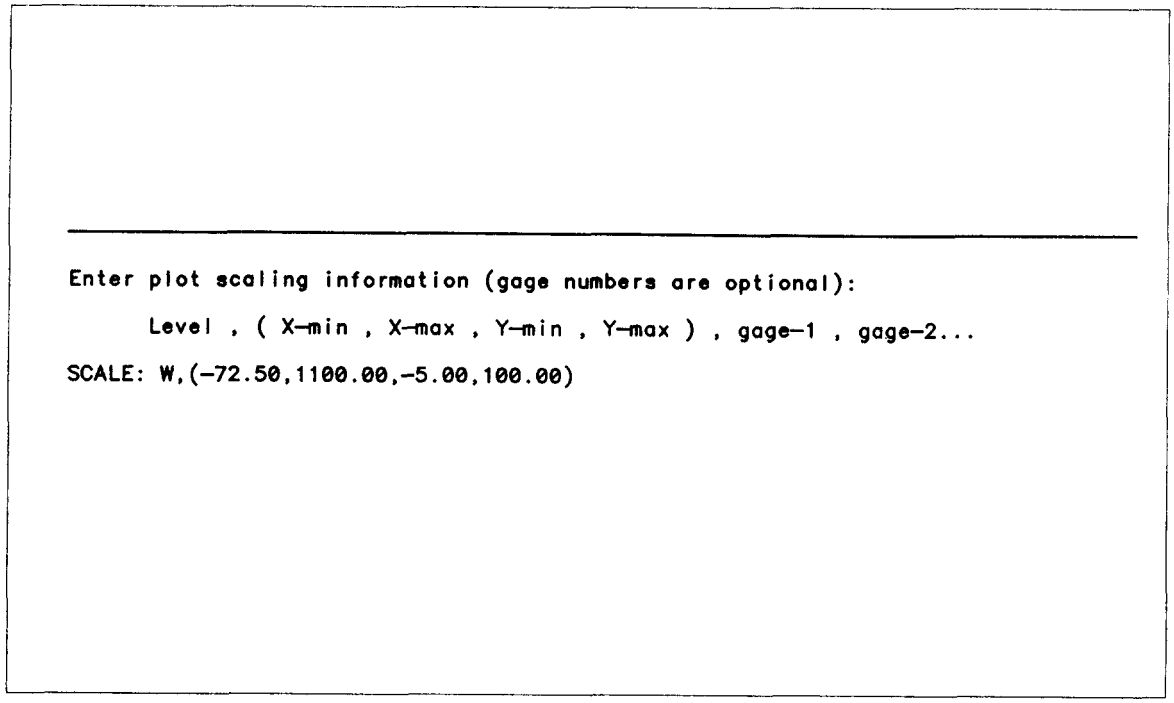


Figure 10-2. User-Scaling Command Line.

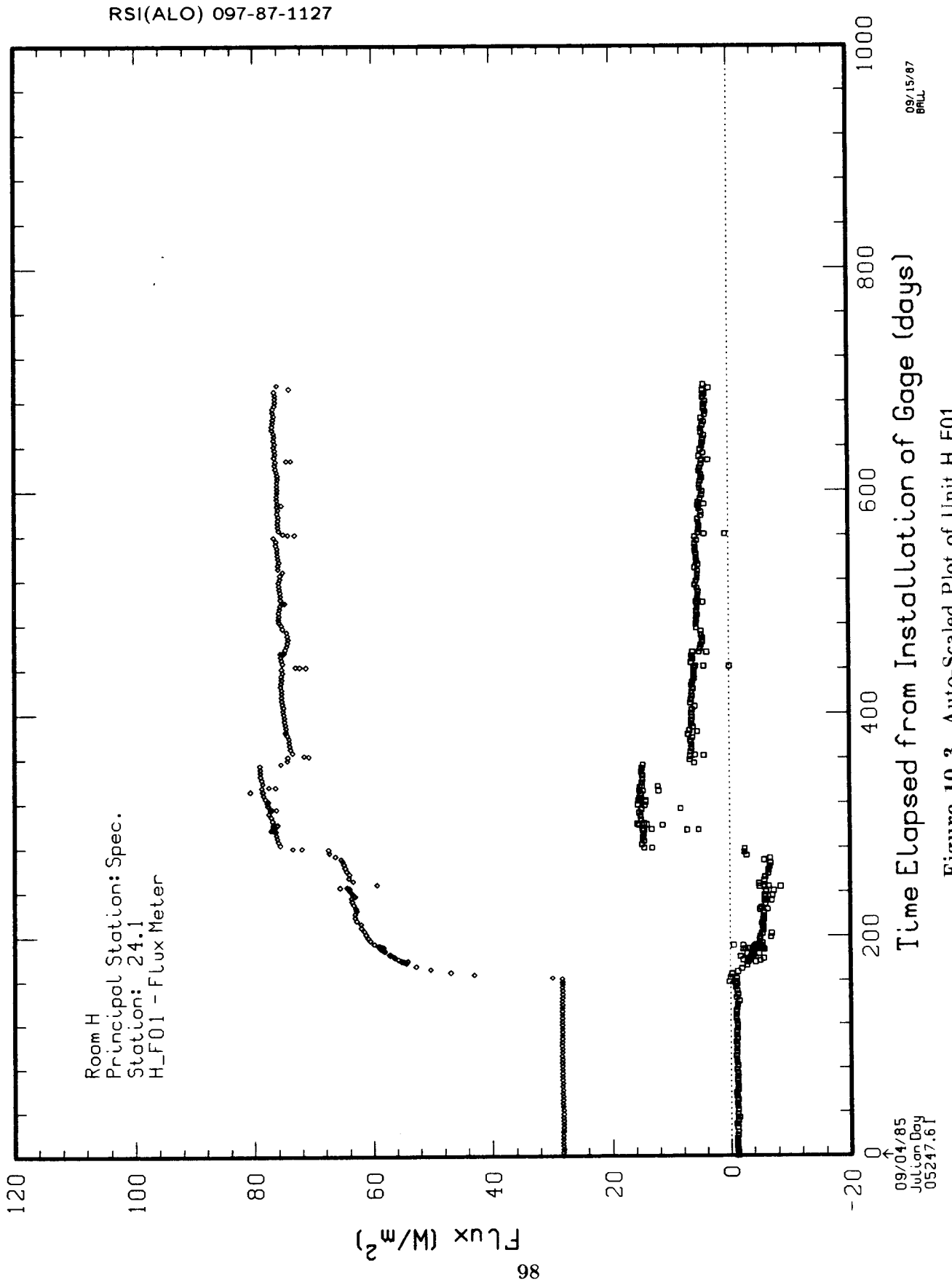


Figure 10-3. Auto-Scaled Plot of Unit H_F01.

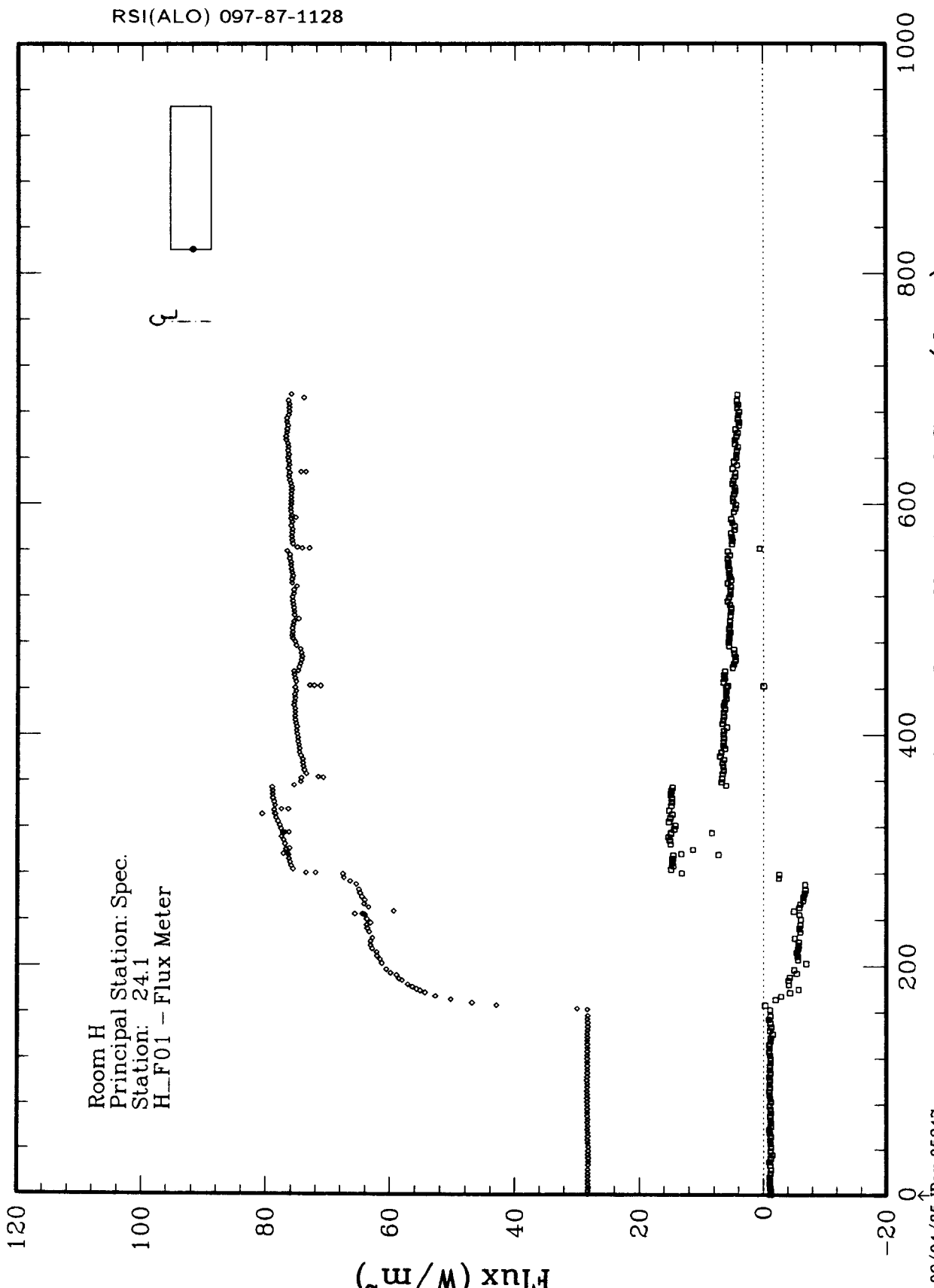


Figure 10-4. Auto-Scaled Publication-Quality Plot of Unit H_F01.

10.2 COMMAND USAGE

1. Level 1 Plot

Generate an auto-scaled plot of the Level 1 data.

Command:

PLOT1

Arguments:

None

Function:

The Level 1 data are plotted. Values flagged as deactivated by the collection system are omitted. Dates are given in relative days computed from the ZD value (see the ZD command on the Reduction Menu).

2. Level 2 Plot

Generate an auto-scaled plot of the Level 2 data.

Command:

PLOT2

Arguments:

None

Function:

The Level 2 data as computed by applying all Level 2 adjustments against the Level 1 data are plotted. Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are given in relative days as computed from the ZD value (see the ZD command on the Reduction Menu).

3. QA Level 3 Plot

Generate an auto-scaled plot of the QA Level 3 data.

Command:

PLOTQA

Arguments:

None

Function:

The QA Level 3 data as computed by applying all QA stamped adjustments against the Level 1 data are plotted. Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are given in relative days as computed from the ZD value (see the ZD command on the Reduction Menu).

4. Working Level

Generate an auto-scaled plot of the working data.

Command:

PLOTW

Arguments:

None

Function:

The working data as computed by applying all known adjustments against the Level 1 data are plotted. Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are given in relative days computed from the ZD value (see the ZD command on the Reduction Menu).

5. Fiducials

Not currently implemented.

6. Custom Plot

Generate a user-scaled custom plot.

Command:

CUSTOM

Arguments:

None

Function:

The working data as computed by applying all known adjustments against the Level 1 data are plotted. After the command has been entered, the user is asked to provide scaling information in the following form (see Figure 10-2).

$$\text{level},(X_{min},X_{max},Y_{min},Y_{max}),g_1,g_2,\ldots g_n$$

where

level	=	reduction level to be plotted (1,2,Q,W)
X_{min}	=	start time of the plot (given in relative days)
X_{max}	=	end time of the plot (given in relative days)
Y_{min}	=	minimum y value to be plotted
Y_{max}	=	maximum y value to be plotted
$g_1,g_1,\ldots g_n$	=	gages to be plotted

The x and y values will default to the values entered for the previous plot. If no gage numbers are entered, then all gages within the unit will be plotted.

Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are given in relative days computed from the ZD value (see the ZD command on the Reduction Menu).

7. Quality Custom

Generate a user-scaled quality plot.

Command:

QCUSTOM

Arguments:

None

Function:

The QA Level 3 data as computed by applying all QA stamped adjustments against the Level 1 data are plotted. After the command has been entered, the user is asked to provide scaling information in the following form (see Figure 10-2).

$$\text{level},(X_{min},X_{max},Y_{min},Y_{max}),g_1,g_2,\ldots g_n$$

where

level	=	reduction level to be plotted (1,2,Q,W)
X_{min}	=	start time of the plot (given in relative days)
X_{max}	=	end time of the plot (given in relative days)
Y_{min}	=	minimum y value to be plotted
Y_{max}	=	maximum y value to be plotted
$g_1,g_1,\ldots g_n$	=	gages to be plotted

The x and y values will default to the values entered for the previous plot. If no gage numbers are entered, then all gages within the unit will be plotted.

Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are given in relative days computed from the ZD value (see the ZD command on the Reduction Menu).

8. Quality

Generate an auto-scaled quality plot of the working data.

Command:

QUALITY

Arguments:

None

Function:

The working data as computed by applying all known adjustments against the Level 1 data are plotted. Values marked for deletion or flagged as deactivated by the collection system are omitted. Dates are given in relative days computed from the ZD value (see the ZD command on the Reduction Menu).

For most classes of units, a diagram showing unit configuration is included in the upper right-hand corner of the plot. If no diagram can be produced, a legend showing the plot symbol type used for each gage will be generated.

Part IV

DATA ANALYSIS INTERFACE

11 DATA ANALYSIS INTERFACE

11.1 FUNCTIONAL OVERVIEW

The Data Analysis Interface provides the capability of generating VMS text files which can be used in data analysis. These "Interface Files" can be used as input to various analysis packages including GRAFAID [Adams, 1985] and UPLOT [Roginski, 1987].

There are two steps involved in producing an Interface File. First, the user must create a Gage File specifying the gages of interest. Gage Files can be created or edited using the EDT option on the Analysis Menu. Next, the user selects one of the interface options on the Analysis Menu to indicate the type of Interface File to be produced. UNDERDOG collects the QA-stamped data for all of the gages specified in the Gage File, formats them according to the requirements of the analysis tool specified, and generates an Interface File. Generation of the Interface File is done in batch mode so that the operator is relieved from having to wait for what could be a lengthy process.

The Data Analysis commands are summarized below:

EDT	(Edit)	Create or edit a Gage File
NEU	(Neutral)	Create an Interface File formatted for GRAFAID
UPL	(UPLOT)	Create an Interface File formatted for UPLOT
DAT	(Data-Only ASCII)	Create an ASCII Interface File containing data only
GDIR	(Gage File Directory)	Display a list of the existing Gage Files
IDIR	(Interface File Directory)	Display a list of the existing Interface Files

11.1.1 Arguments

The argument list for each command is given in abbreviated form next to the command on the screen. For details on the use of arguments see Chapter 1. These abbreviations are also used in the command descriptions in Section 11.2. Each argument has an initial value and a current default value. The initial value is the value assigned when the Data Analysis Interface is first activated. The default value is the value that will be used when the argument is omitted in a command and is usually equal to the last value that was used. When the Data Analysis Interface is first selected, the initial and the default values will be the same.

The argument abbreviations for the Data Analysis commands are described below.

GF (Gage File). The name of the Gage File. The name of the Gage File can be any legal VMS file name. UNDERDOG will apply default values to missing fields in the filename using GAGES.ANL as the filename and the user's current device and directory. For more information on the specification of file names, see the *MicroVMS User's Manual* [DEC, 1985a]. The default file type is .ANL. Note that UNDERDOG never deletes or purges Gage Files. It is the responsibility of the user to periodically delete obsolete Gage Files.

IF (Interface File). The name of the Interface File. The name of the Interface File can be any legal VMS file name. UNDERDOG will apply default values to missing fields in the file name using the file name of the Gage File specified and then the user's current device and directory. For more information on the specification of file names, see the *MicroVMS User's Manual* [DEC, 1985a]. The default file type for GRAFAID files is NEU. For UPLOT it is UPL and for data only ASCII files the default file type is DAT. Note that UNDERDOG never deletes or purges Interface Files. It is the responsibility of the user to periodically delete obsolete Interface Files.

SV (Sieve Data). Data sieve option. If the SV argument is present, the data will be subjected to straining to reduce the number of points that will be included in the Interface File. If no SV argument is present, all of the QA stamped points will be included in the Interface File. The default is not to sieve the data.

11.1.2 Gage File Format

A Gage File is a list of the gages and units whose data are to be included in an Interface File. Upper and lower case alphabetical characters may be used interchangeably throughout the Gage File. Gage Files must adhere to the following format in order for any Interface Files to be created.

Each line of the Gage File must contain either a valid gage identifier or a valid unit identifier starting in the first column. If a unit number is specified, QA data for all of the gages in that unit will be included in the Interface File. The user must have Data Analysis access to the program which owns the gage or units, and the unit must have been QA Level 3 stamped (see Chapter 1). There is no limit to the number of gages or units that can be included.

Following is an example of a Gage File which requests the inclusion of data for gages B_041L1 and B_041-0 and for all of the gages in units GA507 and B_011:

```
B_041
B_041-0
GA507
B_041L1
```

11.1.3 Error Checking

No error checking is done on the Gage Files until an interface option is selected. In the course of creating an Interface File, the gages listed in the Gage File are processed sequentially as they appear in the file. As each gage is processed, a check is made to ensure that the unit has been QA stamped and that the user has Data Analysis privileges for that unit. If all of these conditions are satisfied, then the QA stamped data is included in the Interface File. If an error is detected, the user is notified, the analysis process is terminated, and the partially built Interface File is deleted.

11.1.4 Data-Only ASCII File Format

The data-only ASCII file serves as a simple and convenient means to transfer WISDAAM data to arbitrary user applications. Data for each gage indicated in the Gage File are listed simply as enumerators followed by data pairs (time, value), one per line. Heading each set of data is a comment line introduced by an exclamation point, containing the number of data pairs that will be listed, the gage name, gage type, and engineering units represented by the data values. The enumerator is patterned after that expected by the UPLOT tool, an integer followed by a period. The time listed is in relative days (see the ZD command on the Reduction Menu).

The records are written using the following Fortran format specifiers:

```
Header   FORMAT ('! ', I5, ' ', A7, ' ', A30, ' ', A4)
Data     FORMAT (F10.4, ' ', 1PE15.7)
```

For example, if the Gage File contained

```
B_508
MB351-2
```

then the data-only ASCII Interface File would contain the data shown in Figure 11-1. Note that unit B_508 contains three gages.

```
!  1046 B_508-1 Stress Meter                              MPa
   1.       0.0000    6.5659723E+00
   2.       0.1431    6.4480386E+00
   3.       0.3335    6.3053637E+00
   4.       0.5000    6.2092133E+00
        .                  .
        .                  .
        .                  .
!  1928 B_508-2 Stress Meter                              MPa
   1.       0.0000    8.3771582E+00
   2.       0.1431    8.2854252E+00
   3.       0.3335    8.1892548E+00
   4.       0.5000    8.1125202E+00
        .                  .
        .                  .
        .                  .
!  1374 B_508-3 Stress Meter                              MPa
   1.       0.0000    8.8319998E+00
   2.       0.1431    8.7710676E+00
   3.       0.3335    8.6960125E+00
   4.       0.5000    8.6224318E+00
        .                  .
        .                  .
        .                  .
!   949 MB351-2 Thermocouple                              C
   1.       0.0000    2.8300819E+01
   2.       1.1089    2.8393082E+01
   3.       1.2754    2.8475410E+01
   4.       1.4419    2.8334946E+01
```

Figure 11-1. Example of a Data-Only ASCII Interface File.

11.1.5 Methods of Running an Analysis Job

There are three ways that an analysis job can be initiated:

1. As a batch job submitted from UNDERDOG.
2. As a batch job initiated by the user using VMS.
3. As an interactive process.

Each method of initiating an analysis job has advantages and disadvantages. Please note that the preferred method of operation is to use the GFA, UPL, or DAT commands and allow UNDERDOG to submit the batch job.

11.1.5.1 Jobs Submitted from UNDERDOG

Error checking of the Gage File format is done at the time that the interface option is selected on the Analysis Menu. If errors are detected, they are reported to the user and the job is terminated. If no errors are detected, a VMS command procedure is created. This command procedure is submitted to a batch queue and control is returned to the Analysis Menu. The command procedure sets up an environment within which the analysis program can run. It then runs the analysis program directing the output to the requested queue.

11.1.5.2 Jobs Submitted by the User From VMS

Users may, at their discretion, create their own command procedure and submit it to a batch queue without invoking UNDERDOG. The command procedure must have at a minimum the following:

```
$ @WISDAAM_HOME:WISDAAM program
$ RUN WISDAAM_HOME:ANALYSIS
gage_file_name
sieve_indicator
type_indicator
interface_file_name
$ EXIT
```

The program parameter on the first line is either TSI, WPP, or PSP. Gage_file_name is the name of the analysis Gage File. Sieve_indicator is either SV (if the data is to be sieved) or a blank line (if sieving is not to be done). Type_indicator is GFA, UPL, or DAT, and interface_file_name is the name of the analysis Interface File to be produced. Note that unless the analysis Gage File is in the user's login directory, either a full path name must be given or the command procedure must otherwise indicate the correct directory to be used.

11.1.5.3 Jobs Run Interactively

To run an analysis job interactively, the user should initiate the analysis process by entering the following command at the DCL prompt:

```
$ RUN WISDAAM_HOME:ANALYSIS
```

At this point, the user must type in the name of a valid analysis Gage File followed by a carriage return. This name must include the directory specification if the file

is not in the user's current default directory. The user must then enter either SV or a carriage return. On the next line, either GFA, UPL, or DAT must be entered and followed by a carriage return. Finally, the name of the Interface File is entered. Note that because this program is designed to run in batch, no prompts will be issued to obtain the input parameters.

11.2 DETAILED COMMAND DESCRIPTIONS

1. Edit

Create or edit a Gage File.

Command:

EDT

Arguments:

GF (Gage File) The name of the Gage File

Description:

If the specified Gage File does not exist in the user's current directory, a new file will be created. If it does exist, a new version will be created unless the QUIT function is used to exit the editor. If no GF file is specified, GAGES.ANL will be assumed. All files created using the EDT option are preserved for future use. UNDERDOG never deletes or purges Gage Files. *It is the responsibility of the user to periodically delete obsolete gage files.*

The Gage File will not be checked for errors until an interface option is selected. At that time, the user will be notified if any errors are detected.

2. GRAFAID

Create an Interface File formatted as a GRAFAID Neutral File.

Command:

NEU

Arguments:

GF	(Gage File)	The name of the Gage File
IF	(Interface File)	The name of the Interface File
SV	(Sieve Data)	Present only if data is to be sieved

Description:

If the specified Gage File (GF) is found, an attempt is made to create a GRAFAID Interface File with the name given as IF. If no IF file is specified, the GF filename is used with NEU as the type. If the SV argument is present, the data will be subjected to a sieve which will reduce the number of points to be included in the Interface File. The Interface File produced is a sequential formatted file of ASCII records structured as described in the GRAFAID Code User Manual, Version 2.0 [Adams, 1985].

3. UPLOT

Create an Interface File formatted for UPLOT.

Command:

UPL

Arguments:

GF	(Gage File name)	The name of the Gage File
IF	(Interface File name)	The name of the Interface File
SV	(Sieve Data)	Present only if data is to be sieved

Description:

If the specified Gage File (GF) is found, an attempt is made to create a UPLOT Interface File with the name given as IF. If no IF file is specified, the GF filename is used with UPL as the type. If the SV argument is present, the data will be subjected to a sieve which will reduce the number of points to be included in the Interface File. The Interface File produced is formatted as expected by the UPLOT software program [Roginski, 1987].

4. Data-Only ASCII

Create an ASCII Interface File containing only the data from the specified gages.

Command:

DAT

Arguments:

GF	(Gage File name)	The name of the Gage File
IF	(Interface File name)	The name of the Interface File
SV	(Sieve Data)	Present only if data is to be sieved

Description:

If the specified Gage File (GF) is found, an attempt is made to create an ASCII Interface File with the name given as the IF argument. If no IF file is specified, the GF filename is used with DAT as the type. If the SV argument is present, the data will be subjected to a sieve which will reduce the number of points to be included in the Interface File. The Interface File produced contains only the QA data for the specified gages, and is presented in the user-readable format described in Section 11.1.4.

5. Gage File Directory

Display a list of the existing Gage Files.

Command:

GDIR

Arguments:

None

Description:

The GDIR command displays a list of the known Gage Files existing in the current directory. Only those files with the default extension .ANL will be included in the directory list.

UNDERDOG never deletes or purges Gage Files. It is the responsibility of the user to periodically delete obsolete Gage Files. The GDIR command output may serve as a useful reminder that the directory needs to be cleaned.

6. Interface File Directory

Display a list of the existing Interface Files.

Command:

IDIR

Arguments:

None

Description:

The IDIR command displays a list of the known Interface Files existing in the current directory. Only those files with the default extensions .NEU, .UPL, and .DAT will be included in the directory list.

UNDERDOG never deletes or purges Interface Files. It is the responsibility of the user to periodically delete obsolete Interface Files. The IDIR command output may serve as a useful reminder that the directory needs to be cleaned.

Part V

PRODUCTION INTERFACE

12 PRODUCTION MENU

12.1 FUNCTIONAL OVERVIEW

The Production Interface provides the capability of generating publication-quality plots and listings for a set of selected units. The Production Interface can only access data that has received a QA Level 3 stamp (see Chapter 1). The Production Interface is accessed through the Production Menu (Figure 12-1).

The Production commands are summarized below:

EDT	(Edit)	Create or edit a Production Command File
SUB	(Submit)	Submit a command file to run in batch
DIR	(Directory)	Display a list of the existing Production Command Files

12.1.1 Operation of the Production System

The Production Interface operates by reading a Production Command File (the format of this file is fully described in Chapter 13). This file contains a description of the type of output that is to be generated, as well as a list of the units that are to be included in the production run. The normal course of action is to use the EDT option to create the command file. Once the file has been created, it can then be submitted using the SUBMIT option. (For alternatives to this procedure see Section 13.2). Once a command file has been created, it can be submitted as many times as desired.

12.1.2 Arguments

Both the EDT and SUB production commands require arguments. The argument list for each command is given in abbreviated form next to the command on the screen (for details on the use of arguments see Chapter 1). These abbreviations are also given in the command descriptions in this document. Each argument has an initial value and a current default value. The initial value is the value assigned when the production feature is first selected. The default value is the value assigned when the argument is omitted in a command and in general is equal to the last value that was used. When the production system is first entered, the initial and default values will be the same.

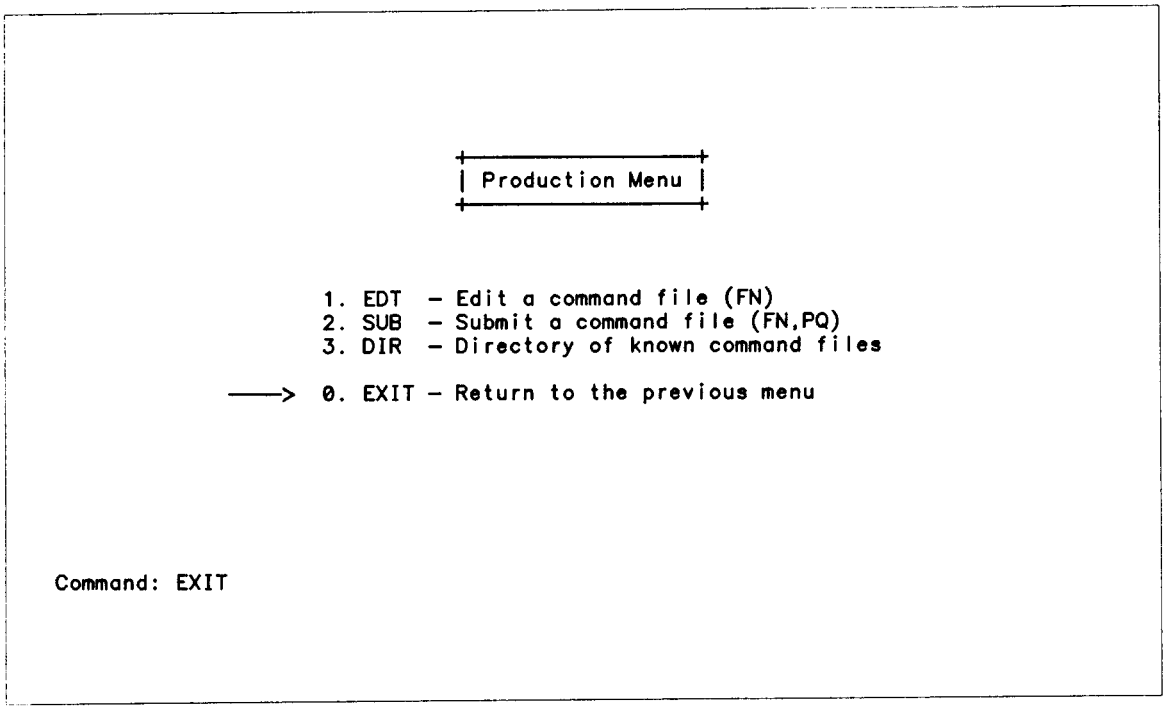


Figure 12-1. Production Menu.

The argument abbreviations for the commands of the Production Menu are described below:

FN (File Name). The name of the Production Command File. The name of the Production Command File can be any legal VMS file name. UNDERDOG will apply default values to missing fields in the file name using the previous file name (if any) first, then the user's current device and directory. For more information on the specification of file names, see the *MicroVMS User's Manual* [DEC, 1985b]. The default file name is COMMAND.PRO.

PQ (Printer Queue). The name of the printer queue through which the output is to be generated. The queue name must point to a valid queue on the current system. The user may obtain the names of available queues from the data base administrator.

12.2 DETAILED COMMAND DESCRIPTIONS

1. EDIT

Create or edit a Production Command File.

Command:

EDT

Arguments:

FN (File Name)	The name of the production command file.

Edit Style:

EDT

Function:

The EDT option invokes the standard VAX EDT editor augmented with most of the SLAVE enhancements. (Note that Setup Mode features of SLAVE are not supported). For more information on the use of the EDT editor, see the *MicroVMS User's Manual* [DEC, 1985a]. For more information on the use of the SLAVE enhancements, see *SLAVE — A Package of Enhancements for the VAX/VMS EDT Text Editor* [Blanford and Scott, 1982].

If the specified file does not exist in the user's current directory, a new file will be created. If it does exist, a new version will be created unless the QUIT function is used to exit the editor. All files created using the EDT option are preserved for future use. UNDERDOG never deletes or purges Production Command Files. *It is the responsibility of the user to periodically delete obsolete command files.*

The command file will not be checked for errors until the file is submitted for a production run. At that time, the user will be notified if any errors are detected.

2. Submit

Submit a command file to run in batch.

Command:

SUB

Arguments:

FN (File Name)	The name of the Production Command File.
PQ (Print Queue)	The name of the printer queue through which the output is to be generated.

Function:

If the specified Production Command File exists, it is checked for errors. The type of error checking performed is discussed in Section 13.1.5. If no errors are detected, then the production job is submitted to run in batch. If any errors are detected, the batch job is not submitted.

3. DIRECTORY

Display a list of the existing Production Command Files

Command:

DIR

Arguments:

None

Function:

The DIR command displays a list of the known Production Command Files in the current directory. Only those files with the default extension .PRO will be included in the directory list.

13 PRODUCTION COMMAND FILES

Production command files must adhere to a precise format in order for the production job to be submitted. This chapter describes this format. Note that Production Command Files may be created and submitted without the need to use UNDERDOG. Within a command file upper and lower case alphabetic characters may be used interchangeably. Command files contain three primary sections: list information, plot information, and a unit list. The list information indicates whether listings should be generated and if so, which list sections are to be included. The plot information indicates whether plots should be generated and if so, what type of scaling should be used. The unit list is a list of the units for which output is to be generated. Note that the user must have production access to all the units in the list.

UNDERDOG never deletes or purges Production Command Files. It is the responsibility of the users to periodically delete obsolete command files. The DIR command output may serve as a useful reminder that the directory needs to be cleaned up.

13.1 COMMAND FILE FORMAT

Production Command Files are created or edited by using the standard VAX EDT editor augmented with most of the SLAVE enhancements (note that Setup Mode features of SLAVE are not supported). For more information on the use of the EDT editor see the *MicroVMS User's Manual* [DEC, 1985b]. For more information on the use of the SLAVE enhancements, see *SLAVE — A Package of Enhancements for the VAX/VMS EDT Text Editor* [Blanford and Scott, 1982].

13.1.1 List Section

The first line of the Production Command File must contain the keyword LIST beginning in the first column. Following this must be a group of list section designators. The designators are three-character acronyms that indicate the list sections to be included in the output. The designators are

RMK	Reduction remarks
LOC	Gage location information
INR	Initial readings information
CAL	Gage calibration information
DTA	A tabular listing of the data
MSR	Measurand definition information
PIC	The principal investigator comments
ACT	Reduction activity logging information

Two additional designators are provided for convenience:

ALL	Include all list sections
NONE	Do not generate listings as part of the output

The list codes must be delimited from each other, as well as from the LIST keyword by spaces. The codes may be listed in any order, and any number of spaces may separate them. If no list section designators are found or the ALL designator is used then all sections will be generated for the requested units. The list sections will appear in the output in the order described under the WORK command on the List Menu (see Chapter 9). This order will be used regardless of the order in which the designators appear in the command file.

13.1.2 Plot Section

The second line of the file must contain the keyword PLOT beginning in the first column followed by scaling information if it is required. If auto-scaled plots are to be produced, then only the keyword PLOT need appear on the second line of the command file. If, however, the plots are to be scaled by the user, PLOT must be followed by the minimum value for the x-axis, the maximum value for the x-axis, the minimum value for the y-axis, and the maximum value for the y-axis respectively. All entries on the line must be separated by spaces. Note that the scaling information given will be applied to all of the units listed in this file. The keyword NONE can be used to indicate that no plots are to be included in the output.

Plots are generated using UNDERDOG's publication-quality plotting features. These features are fully described in Chapter 10. Special care should be used when selecting user scaling to ensure that the data do not overlay the plot legends or the gage location diagram.

13.1.3 Unit List

The list of units begins on the third line and continues to the end of the file. Each of these lines must contain a valid unit identifier. The user must have production

access to the program which owns the unit, and the unit must have been stamped at QA Level 3 (see Chapter 1). There is no limit to the number of units that can be included. For each unit given in the list, a listing and plot will be generated as dictated by the environment established by the LIST and PLOT primary sections.

13.1.4 Example

Following is an example of a Production Command File which will generate a listing of the remarks, location, initial readings, and user-scaled plots for gage B_011 and gage B_F91:

```
LIST  RMK LOC INR
PLOT  -1  20  -4.2  10.1
B 011
B F91
```

13.1.5 Error Checking

There are two phases of command file verification. The first phase verifies the formatting issues discussed above (list and plot characteristics). An error will be generated if any of the keywords are either unrecognized or missing. The second phase checks the characteristics of the various units in the units list. An error will be generated if a listed unit has not been QA stamped, if no owner program has been designated for the unit, or if the user does not have production privileges for that unit. The first phase is performed before the job is submitted. The second phase is performed as the job is running and any errors generated will be recorded in the batch log file. Errors detected during phase two will cause termination of the processing for that particular unit but will not cause a termination of the entire production job.

13.2 METHODS OF RUNNING A PRODUCTION JOB

There are three ways that a production job can be initiated:

1. As a batch job submitted from UNDERDOG.
2. As a batch job initiated by the user from VMS.
3. As an interactive process.

Each method of initiating a production job has advantages and disadvantages. Please note that the preferred method of operation is to use the SUB command and allow UNDERDOG to submit the batch job.

13.2.1 Jobs Submitted From UNDERDOG

Error checking of the command file format is done at the time that the SUBMIT option is selected on the production menu. If errors are detected, they are reported to the user and the job is terminated. If no errors are detected, a VMS command procedure is created. This command procedure is submitted to a batch queue and control is returned to the user on the Production Menu. The command procedure sets up an environment within which the production program can run. It then runs the production program directing the output to the requested queue.

13.2.2 Jobs Submitted by the User From VMS

A user may create a command procedure and submit it to a batch queue without invoking UNDERDOG. The command procedure must have at a minimum the following:

```
$ @ WISDAAM_HOME:WISDAAM program
$ DEFINE/USER WISDAAM_PLOTTER print_queue_name
$ DEFINE/USER WISDAAM_PRINTER print_queue_name
$ RUN WISDAAM_HOME:PRODUCTION
command_file_name
$ EXIT
```

Where program is the name of the WIPP Task II major technical area which owns the requested units (see Section 1.1.1), print_queue_name is the name of the printer queue through which output will be generated, and command_file_name is the name of the Production Command File. Note that unless the Production Command File is in the user's login directory, either a full path name must be given or the command procedure must otherwise indicate the correct directory to be used.

13.2.3 Jobs Run Interactively

To run a production job interactively, the user should first check the definition of the logical names wisdaam_plotter and wisdaam_printer. The logical names must point to valid printer queues capable of producing texture in graphic output. To initiate the production process, enter the following command at the DCL prompt:

```
$ RUN WISDAAM_HOME:PRODUCTION
```

At this point, the user must enter the name of a valid Production Command File. This name must include the directory specification if the file is not in the user's current default directory. Plots will be directed to the queue specified by wisdaam_plotter and listings will be directed to the queue specified by wisdaam_printer.

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