MODEL 2500
CONFIG25
MANUAL

DANIEL MEASUREMENT AND CONTROL
HOUSTON, TEXAS

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MODEL 2500
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CONFIG25 REFERENCE MANUAL
(REVISION 5 SERIES)

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SECTION 1

INTRODUCTION

1.0 INTRODUCTION

The Daniel Industries Model 2500 Instrumentation System consists of a Model 2500 Instrumentation Computer, the BASE25 operating system (resident in the EPROM of the Model 2500 microcomputer), and specialized application software that provides for customized configuration of the microcomputer for specific tasks. The specialized application software is developed with the CONFIG25 program.

The CONFIG25 program provides the user of the Model 2500 system with the capability of meeting instrumentation requirements by either customizing configurations previously developed by Daniel or by developing original configurations. CONFIG25 uses the process of menu selection and table completion to guide the user through the process of developing a configuration. These selection and entry methods are easy to work with and are supplemented by continuous prompting that explains exactly what entries are required at each stage of development.

The CONFIG25 program is designed to run on an IBM PC or compatible personal computer.

This manual provides:

- A description of the CONFIG25 program
- The procedure for configuring the Model 2500 for a new application
- The procedure for modifying an existing configuration

NOTE: Revision 5 of CONFIG25 can be used to modify a configuration that was created with a CONFIG25 earlier revision. However when the configuration is loaded using Revision 5, the configuration file structure is modified and the configuration can no longer be loaded with earlier revisions of CONFIG25.

1.1 HARDWARE CONSIDERATIONS

The hardware portion of the Model 2500 Instrumentation System comes in two convenient versions:

1. a one-board system
2. a two-board system

Both systems function identically with the same baseline and software. The number of inputs and outputs required by the user will dictate whether a one- or a two- board system is needed. Refer to Figures 1-1 and 1-2 for a graphic description of the differences. For more detailed specifications refer to Model 2500 Microcomputer Hardware Manual, Daniel Part No. 3-9000-590.

1.2 GENERAL DESCRIPTION

The Model 2500 Series are microprocessor based computers that are most frequently used in the flow measurement and control of liquids and gases. It can be configured for a wide variety of situations with applicable software. The software can be configured to accommodate most applications requiring the ability to read live transmitter inputs (analog and digital) and produce calculated outputs on a timely basis. Model 2500 can be used as a Remote Terminal Unit (RTU) furnishing calculated data on demand to a "Host" computer or a System Control and Data Acquisition (SCADA) system. The Model 2500 Series incorporates the latest in instrumentation design and the most advanced programming techniques. By taking advantage of the latest technology, a single Model 2500 can be configured for applications that in the past required multiple instruments.

In addition, the Model 2500 has a large input/output capacity and a powerful processor. It is compatible with most process flowmeters and transmitters and can be configured to perform a broad range of flow measurement and process applications without compromising the exact needs of the application and without the expense of a custom instrument. The Model 2500 Series can also be configured as a controller for meter prover applications.

SECTION 2

COMPUTER EQUIPMENT REQUIREMENTS AND COPYING THE ORIGINAL CONFIG25 PROGRAM DISK

2.0 GENERAL

This section of the manual explains the minimum requirements for the computer system required for running CONFIG25 and the procedure for making a backup copy of the CONFIG25 program disk.

2.1 COMPUTER REQUIREMENTS

The following computer system and peripheral equipment (or their equivalents) are required to run the CONFIG25 program and to download a configuration developed with CONFIG25 to the Model 2500 microcomputer consists of:

- IBM PC (or compatible personal computer)
- PC DOS, Version 2.0 or later
- 640KB RAM is required
- Monochrome monitor and adapter (or a monochrome or color monitor and graphics adaptor
- Two 5-1/4 inch 360KB disk drives (or one 5-1/4 inch disk drive and a hard disk)
- One RS 232 serial port
- An Epson printer with parallel port (or equivalent)
- A download cable
- A Model 2500 series microcomputer; only after a configuration has been developed using CONFIG25 and is ready to be downloaded and tested

2.2 INSTALLING CONFIG25 SOFTWARE

Config25 software is delivered on a 360KB diskette archived in a compressed format which cannot be directly executed until properly installed. In most cases the installed software on the hard disk will be the working copy and the distribution diskette will serve as a backup.

To install your software on a hard drive or on another diskette, follow these steps:

(1) Insert the distribution diskette in drive A: and type:

A: ↵ <ENTER>

(2) A:\>INSTALL ↵ <ENTER>

(3) Follow the instructions on your screen.

2.3 MEMORY RESIDENT SOFTWARE

A number of utility software packages such as Sidekick and Prokey are frequently loaded by the user and remain resident in the random access memory (RAM) of a PC-compatible computer when the computer is booted. Generally a resident utility package does not interfere with running CONFIG25 unless the package requires an excessive amount of memory or requires serial communications. Excessive memory requirements will prevent loading CONFIG25. A utility with serial communications may cause problems when downloading a configuration to a Model 2500 instrument. If either problem occurs, it can be corrected by removing the resident utility package.

SECTION 3

USER LOG-ON AND SYSTEM ACCESS

3.0 GENERAL

This section of the manual explains how a user logs-on to the CONFIG25 program and how a system administrator controls access to the CONFIG25 program and to CONFIG25 configurations.

3.1 BOOTING THE SYSTEM

To boot the CONFIG25 program, proceed as follows:

(1) Place the working disk of the CONFIG25 program in drive A of a IBM PC (or equivalent).

(2) Since the disk was formatted with the operating system, booting the disk results in the system prompt for date and time.

Enter the date and time as requested by system prompts and when the A> appears, type:

CONFIG25

and press the enter key.

(3) The Daniel Industries logo appears on the monitor screen along with the version level of the program and a copyright notice. The copyright notice is a reminder that the CONFIG25 program is the property of Daniel Industries and may be legally copied only to provide backup and working copies of the original disk.

(4) The initial display also contains a request for a user name, which must be entered to proceed with the program.

3.2 CONFIG25 SYSTEM ACCESS

System access to the CONFIG25 is based on the User Access Screen, which provides for listing authorized users by name and assigning a unique password for each authorized user on the list. Security provided by this system is not highly sophisticated and is not intended to provide high-level protection for configurations developed by the program. If a higher level of protection is required, the built-in CONFIG25 system should be used in conjunction with site security and strict access control.

3.2.1 USER ACCESS SCREEN

The User Access Screen provides for listing up to 49 authorized users plus a SUPERUSER name that provides for gaining access to the screen. The User Access Screen also provides for assigning a unique password for each user on the list if passwords are desired. If assigned, the password must be entered for the user to gain access to the CONFIG25 program. The CONFIG25 program can be aborted from the user access screen by pressing the F10 function key. User Access Screen data are stored in the file CONFIG25.USR. A typical User Access Screen is illustrated and defined in Figure 3-1.

3.2.1.1 User Name. The user name controls access to the CONFIG25 program and identifies users allowed to create and modify a configuration. A user name may be up to 16 characters in length.

3.2.1.2 Password. A password is associated with a user name and is required together with the user name to gain access to a configuration. If no password is assigned, the CONFIG25 program does not require a password and goes immediately to a configuration after the user name is entered. A password may be any alphanumeric string up to 8 characters in length.

3.2.1.3 Authorization. Authorization defines the level of use permitted for a user name. Authorization categories are Edit and View.

Edit: The user may perform all operations on a configuration, including creating, editing, or deleting the configuration.

View: The user may only examine and download a configuration but may not create, merge, copy, edit, or delete a configuration.

```
Active Configuration:

                    User Access Entry

       #     User Name       Password   Authorization

$      1  SUPERUSER          Daniel       Edit
       2  John Smith          shark       Edit
       3  Bill Doe                        Edit
       4  Billy                           Edit
       5  Betty                Boop       Edit
       6  Felix                 Cat       View
       7
       8
       9
      10
      11
      12
      13
      14

     Press the space bar to move to the next data entry.
        Press ENTER to  select a channel for editing.          0%

-1-     -2-   Delete  Insert  Clear   PrntScr   -7-   PrntPg    -9-   Exit
```

Figure 3-1. Typical User Access Screen

3.2.2 SUPERUSER NAME

The Superuser name, which is listed as the first entry on the User Access Screen, provides only for access to the User Access Screen for the purpose of entering and changing authorized user names and their associated passwords. The superuser password does not provide access to the CONFIG25 program for the purposes of creating, deleting, or editing a configuration. The password assigned to the superuser name when the program disk is shipped from the factory is **Daniel** and this is the only password that will permit access to the system the first time CONFIG25 is run.

3.2.3 ACCESSING THE USER ACCESS SCREEN

To provide initial access to the User Access Screen, proceed as follows:

(1) Type SUPERUSER in the space provided for User Name on the log-on display. When entering a user name, the name may be typed using either upper- or lower-case letters. CONFIG25 ignores case when comparing the entry with the list of authorized user names. When entering a password, however, the word must be entered exactly, using upper- and lower-case letters and spaces if appropriate.

(2) When the prompt "password?" appears, enter the superuser password exactly, using spaces and upper- and lower- case letters as appropriate. The factory-installed password for the user name is "Daniel" and must be typed exactly as it appears here (in upper- and lower-case letters and without quotation marks). Note that the password does not appear on the log-on screen as it is typed on the keyboard. This helps to preserve the security of the system by preventing persons nearby from reading the password from the screen.

The User Access Screen will appear on the monitor CRT.

3.2.4 ENTERING USER NAMES AND PASSWORDS

To enter User names and passwords on the User Access Screen, proceed as follows:

(1) Press the ENTER <RETURN> key. A dotted line will appear under **SUPERUSER**, the first entry in the User Name column.

(2) Press the ENTER key again. The dotted line will move to the right beneath "Daniel", the factory-installed password for SUPERUSER, which is the first entry in the Password column. The password for the superuser password may be changed at this time by typing in a new password. The password may be any string of alphanumeric characters (upper- and lower-case) from 1 to 8 characters in length.

The password must be recorded accurately and reentered exactly as it appears on the User Access Screen in order to regain access to the User Access Screen. Save the password in a secure place.

NOTE: During the first execution of an individual CONFIG25 program by the superuser, the superuser password should be changed from the password installed at the factory.

CAUTION: Under no circumstances should "SUPERUSER" be either deleted or altered in the User name column on the User Access Screen. If this occurs, accessing the User Access Screen is not possible.

---

(3) Press the ENTER key. The dotted line moves to the right and underlines the first entry in the Authorization Column. This entry is not applicable to the Superuser name.

(4) Press the ENTER key. A dotted line appears in row number two in the User Name column (the column to the right of the row number). Type in the first user name. The name can be any string of alphanumeric characters (including spaces) from one to 16 characters in length.

(5) Press the ENTER key. The dotted line moves to the right and underlines a blank space under the Password column. Type in the password assigned to the user name just entered. The password may be any string of upper- or lower-case alphanumeric characters (including interior and trailing spaces) from one to eight characters in length. The password must be recorded accurately and reentered exactly (including interior and trailing spaces) as it appears on the User Access Screen in order to access the CONFIG25 program.

NOTE: If the ENTER key is pressed without entering a password for a user name, entering that user name on the log-on screen will permit access to the CONFIG25 program directly without the necessity of entering a password.

(6) Press the ENTER key. The dotted line moves to the right and underlines the word "Edit" in the Authorization column. If the person is authorized to create and edit configurations, press the ENTER key. The authorization entry will remain Edit and the dotted line will drop to the third line of the display. If the person whose name was just entered is not authorized to create or edit a configuration with the CONFIG25 program and has access for viewing only, press the space bar. The word Edit will change to View. Press the ENTER key and the dotted line will move to the third line.

(7) Repeat Steps 4 through 7 to add as many names and passwords as required. A maximum of 49 users are permitted (plus the Superuser name).

Before the ENTER key is pressed to access a user name row (i.e., when the cursor is outside the data field), the location of the cursor can be moved up and down the list of user names using the UP and DOWN arrows. The cursor can be stepped down the list of names by pressing the space bar.

(8) When all the required user names, passwords, and authorizations have been entered or modified, press the F10 key to exit from the User Access Screen.

3.2.5 CHANGING USER NAMES, PASSWORDS, AND AUTHORIZATION

To change User names and passwords on the User Access Screen, proceed as follows:

(1) Using the space bar or down arrow, step down the list to the row in which the user name or password to be changed appears, then press the ENTER key to access the row for editing.

(2) If the name or password needs to be changed, press F5, clear the complete line and type in the new entry.

(3) If the authorization is to be changed, press the ENTER key to move the dotted line under the authorization column and press the space bar to change VIEW to EDIT or vice versa.

3.2.6 DELETING USER NAMES

To delete names from the User Access Screen proceed as follows:

(1) Using the space bar or down arrow, position the cursor in the row containing the name to be deleted, then press the F3 function key. The entire entry is deleted and rows below the deleted entry are renumbered.

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SECTION 4

GENERAL OPERATION

4.0 GENERAL

This section provides general information about the CONFIG25 program, including keyboard operation, date and time downloading, and CONFIG25 file types.

4.1 KEYBOARD

4.1.1 FUNCTION KEYS

The ten function keys labeled F1 through F10 on the computer keyboard are programmed to perform specific functions when the CONFIG25 program is run on the computer. The functions assigned these keys by the CONFIG25 program are:

F1 - Undo	Removes last change
F2 -	Spare
F3 - Delete	Delete the present line of information
F4 - Insert	Insert a blank line
F5 - Clear	Clear the present line of information
F6 - PrntScr	Print the current display screen
F7 - SaveCFG	Save current version of configuration to disk
F8 - PrntPg	Print current table
F9 - Proceed	Proceed to the next level of data entry
F10 - Exit	Exit from display or action to previous display or action.

Not all function keys are active at all times. The keys that are currently active are indicated on line 25 of the display.

Additional functions are available by pressing the ALT key simultaneously with a function key. These functions are:

ALT F1 - Color reset
ALT F2 - Screen reset
ALT F3 - Not used
ALT F4 - Not used
ALT F5 - Change background color of menu area of display
ALT F6 - Change text color of menu area of display
ALT F7 - Change background color of prompt area of display
ALT F8 - Change text color of prompt area of display
ALT F9 - Change background color of frame/border area of display
ALF F10 - Change text color of frame area of display

4.1.2 OTHER KEYS

Other keys on the keyboard allow the user to position the cursor or to edit data depending on the current display and data entry field. These keys are divided into three categories by the type of action they initiate:

1. menu and display positioning
2. short field and numeric entry
3. long field edit and entry

4.1.2.1 Menu and Display Positioning Keys. The actions of keys that move the cursor and change the position of a display are described in the following table.

Key	**Action**
Up Arrow	Moves the cursor up one selection on a menu or up one line on a data entry display.
Down Arrow	Moves the cursor down one selection on a menu or down one line on a data entry display.
Space	Moves the cursor down one selection on a menu or down one line on a data entry display.
NOTE: Action described for the following keys do not affect menu screens; they are for other displays only.	
Home	Moves the cursor and the display to the first line of a data entry display.
End	Moves the display to the last 10 lines of a data entry display and the cursor to the last line of data.
Pg Up	Moves the cursor up 10 lines on a data entry display.
Pg Down	Moves the cursor down 10 lines on a data entry display.

4.1.2.2 Short Field and Numeric Entry. A short field is any data entry field of eight or fewer characters such as names and engineering units. Data within these fields can be deleted, but other changes require retyping the data. The actions of keys that affect short fields and numeric entries are described in the following table.

Key	Action
Backspace	Deletes the character to left of the cursor.
Home	Moves the cursor to the first entry on a data entry line.

4.1.2.3 Long Field Edit and Entry. A long field is one that is longer than eight characters, such as calculation statements and various title fields. In these fields the cursor can be positioned within the field for editing and entering data. The actions of keys that affect long fields are described in the following table.

Key	Action
Home, Ctrl A	Moves the cursor to start of a field.
Left Arrow, Ctrl S	Moves the cursor 1 character to the left in a field.
Right Arrow, Ctrl D	Moves the cursor 1 character to the right in a field.
End, Ctrl F	Moves the cursor to the end of the data in a calculation statement.
Backspace	Deletes the character to the left of the cursor.
Ctrl G, Del	Deletes the character at the cursor.
Ctrl Y	Deletes the data from the cursor to the end of a field.

4.2 CONFIG25 FILE TYPES

Entering and editing CONFIG25 configurations will create files either on the working disk containing the CONFIG25 program or on additional data storage disks. The CONFIG25 program generates a file name extension (the three letters following the "." in the file name) to indicate the type of information contained in the newly created file. The extensions used by CONFIG25 are defined in the following table.

Extension	Definition
.CFG	A file containing a configuration. A file with the extension .CFG should not be erased unless the configuration is no longer needed.
.BAK	A backup file containing the previous version of an edited configuration file (.CFG file). A .BAK file provides the basis for recovering from an accidental erasure or other problem with the .CFG file for which the .BAK file is a backup.
.BTA	A file containing an analyzed configuration in a format that is ready to be downloaded to a Model 2500 microcomputer.
.LST	A file containing documentation that describes a configuration in a format that can be listed on a printer. Listing a .LST file on a printer provides a hardcopy record of the configuration.
.MOD	A file containing a cross-reference file of MODBUS variables used in a configuration. The file contains MODBUS register numbers, variable names, and subfields.

4.3 DATE AND TIME DOWNLOADING

The CONFIG25 program automatically sets the time and date in the Model 2500 when the instrument is downloaded with a new configuration. The time and date used are those set in the computer running the CONFIG25 program. CONFIG25 takes the current time and date from the computer, builds a string in the format required by MODBUS and downloads the date and time message at the end of the download sequence. The message: "Downloading date and time ......" appears while the date and time are being downloaded.

Refer to the User Reference Manual, Daniel Part No. 3-9000-591, for methods of downloading application program software.

SECTION 5

MENUS AND ENTRY TABLES

5.0 GENERAL

This section describes and explains each of the CONFIG25 menu and entry table screens. The descriptions include an explanation for each menu selection and for each column of the table entry screens.

5.1 OUTLINE OF MENUS AND ENTRY TABLES

The sequence of menus and entry table screens for CONFIG25 are provided below in outline form. Each indentation of the outline indicates a sub-menu or display.

The screens in the outline below that are enclosed in brackets ([.....]) are accessed from data entry or definition displays by pressing function key F9 (proceed) when the message display on the bottom line of the screen indicates that F9 is active. Accessing these screens requires an entry on the screen from which the entry screen is accessed. For example, to access the Data Table Row and Column Definition screen, the title of a specific data table must be listed on the Data Table Definition screen. When a data table title has been entered, pressing the F9 key will access the Data Table Row and Column Definition screen.

General Menu

- Define configuration for 2500 instrument
    - Define hardware inputs and outputs of 2500
        - Analog inputs
        - Analog outputs
        - Pulse inputs
        - Status inputs
        - Control outputs
    - Define 2500 operator entry and alarm messages
        - Define operator entries
            - Define numeric operator entries
            - Define selection list operator entries
                - [Selection list operator option definitions]
        - Define alarm limits
            - Define alarms for numeric variables
            - Define alarms for boolean variables

Define limited access variables
Define configuration for 2500 instrument (Continued)
Define appearance of 2500 reports
Report Definition
[Line report definitions]
[Table report definitions]
Define data tables and storage for 2500
Define data tables
[Data table definition]
[Data table row and column definition]
[Data table value entry]
Data Storage or archiving
[Data storage data definition]
Define advanced capabilities for 2500
Define MODBUS slave communications
Boolean variable communications definition
Short integer communications definition
Long integer communications definition
Floating point communications definition
Report communications definition
Archive communications definitions
Create MODBUS cross-reference file
Define MODBUS master and gas chromatography communications
MODBUS Remote Unit Definition
[MODBUS Remote Variable Definition]
Define head meter tube switching
Head Meter Tube Switching Definitions
[Head Meter Switching Tube Definition]
Override system definition defaults
Define periodic update variables (future capability)
Define analog output components (future capability)

Define configuration for 2500 instrument (Continued)
- Define 2500 calculations
  - Calculation Sheet Title Entry
    - [Calculation entries]
      - [Calculation syntax check]

Analyze or transfer configuration for 2500
- Analyze and prepare configuration for transfer
- Transfer configuration to 2500 via comm port 1
- Transfer configuration to 2500 via comm port 2
- Modify download parameters

Define configuration for 2500 instrument (Continued)
- Examine analysis errors

Transfer an Alpha configuration to an Alpha 2500

Create listing file of 2500 Configuration
- Put documentation in ".lst" file
- Print documentation on printer
- Print wirelist on printer

File management (Copy, rename, delete, merge.....)
- Start a new configuration
- Rename an existing configuration
- Copy an existing configuration to a new configuration
- Delete an existing configuration
- Merge existing configuration to current configuration

Exit to DOS

5.2 CONFIG25 MENU SCREEN DESCRIPTIONS

The format for CONFIG25 menu and entry table screens is illustrated by the General Menu screen shown in Figure 5-1.

- The application name of the active configuration is displayed on the top line of the screen after the text reading "Active Configuration". For example, the configuration illustrated in Figure 5-1 is application "App-Name".

- System prompts for the actions available to, or required of the operator for the screen displayed are shown on the third-from-last and next-to-last lines on the screen.

- The percent of computer memory used by the active configuration is shown at the right-hand side of the next-to-last line of the screen. Thirty-eight percent of the computer memory is used by the configuration shown in Figure 5-1.

- Active function keys are indicated on the last line of the screen by replacing the key number with an abbreviation of the function available. For example in Figure 5-1, key F6 (PrntScr) is active for printing the screen, key F7 (SaveCFG) is active for saving the present configuration to disk, and key F10 (Exit) is active for exiting from the CONFIG25 program. The other function keys (1, 2, 3, 4, 5, 8, and 9) are not active on this screen.

5.2.1 GENERAL MENU SCREEN

The General Menu Screen provides the highest level of CONFIG25 menu selection. General Menu selections are defined in the table following Figure 5-1.

```
                Active Configuration:             App-Name

                              General Menu

               Define configuration for 2500 instrument

               Analyze or transfer configuration for 2500

               Create listing file of 2500 configuration

               File management (Copy, rename, delete, merge...)

               Exit to DOS




           Press the space bar to move to the next menu entry.
                   Press ENTER to make your selection.              38%
 -1-     -2-     -3-     -4-     -5-    PrntScr SaveCFG   -8-     -9-   Exit
```

Figure 5-1. General Menu Screen

General Menu Screen Definitions

Selection	Definition
Define..., etc.	Definitions of: - Hardware inputs and outputs - Operator entry and alarm messages - The appearance of reports - Data tables and data storage - Communications and tube switching - Model 2500 calculations - Add new or existing configurations
Analyze.., etc.	(1) The internal analysis performed by CONFIG25, which results in the compilation of a build file (.BTA) that is ready to be downloaded to the 2500 (2) The commands to download to the Model 2500 through either communications port 1 or communications port 2 (3) Modifying or adding parameters (4) Examination of analysis errors
Create..., etc.	(1) The command to put the configuration documentation in a list file (.lst) so the document can be printed by a DOS print command without the CONFIG25 program (2) The command to print the documentation on the printer directly from the CONFIG25 program. Executing this command does not require putting the document in a list file (.lst). (3) The command to print the wirelist on the printer directly from the CONFIG25 program
File.., etc.	(1) The command to create a new configuration (2) The command for renaming an existing configuration (3) The command to copy an existing configuration to a new configuration (4) The command to delete an existing configuration (5) The command to merge two configurations
Exit..., etc.	The command to end a work session with CONFIG25 and to return to the operating system. Pressing F10 also ends the session and returns to the computer to the operating system.

5.2.1.1 Adding or Changing a Configuration

When Define Configuration for 2500 Instrument screen is entered, a new application may be added or an existing configuration may be selected. Four screens with prompts enable a new or changed application to be added. Refer to the screen series Figure 5-2 (Screens 1 through 4).

```
                  Active Configuration:
                   Configuration Files on C:\CONFIG25\5.00\
      APP-NAME







 Enter config file name or new path ______________________________________

                  Enter an 8 character configuration file name.
                                                                      0%
 -1-     -2-     -3-     -4-     -5-    PrntScr   -7-     -8-     -9-   Exit
```

Figure 5-2. Adding a Configuration (Screen 1)

```
                  Active Configuration:
                   Configuration Files on C:\CONFIG25\5.00\
      APP-NAME







 Enter config file name or new path                            *-new name
                       Do you wish to create file *-NEW NAME ?

                    This configuration file does not exist.
                           Please enter a Y or an N.                  0%
 -1-     -2-     -3-     -4-     -5-    PrntScr   -7-     -8-     -9-   Exit
```

Figure 5-2. Adding a Configuration (Screen 2)

```
                Active Configuration:
                 Configuration Files on C:\CONFIG25\5.00\
     APP-NAME






 Enter config file name or new path                              NEW-NAME
                            Enter type of configuration:    _____________

                Valid types of configurations :  2521 / 2522.          0%
 -1-     -2-     -3-     -4-     -5-    PrntScr   SaveCFG -8-     -9-   Exit
```

Figure 5-2. Adding a Configuration (Screen 3)

```
                Active Configuration:
                 Configuration Files on C:\CONFIG25\5.00\
     APP-NAME






 Enter config file name or new path                              NEW-NAME
                            Enter type of configuration:    _________2522

                Valid types of configurations : 2521 / 2522.           0%
Undo     -2-     -3-     -4-     -5-    PrntScr  SaveCFG  -8-     -9-   Exit
```

Figure 5-2. Adding a Configuration (Screen 4)

5.2.2 CONFIGURATION DEFINITION MENU SCREEN

The Configuration Definition Menu Screen is accessed from the General Menu Screen and provides for defining:

1. hardware inputs and outputs
2. operator entry and alarm messages
3. the appearance of 2500 reports
4. data tables and archives
5. communications and data storage
6. 2500 calculations

Each of the Configuration Definition Menu selections is defined in the table below. The Configuration Definition Screen is illustrated in Figure 5-3.

```
            Active Configuration:             App-Name

                 Configuration Definition Menu

           Define hardware inputs and outputs of 2500

           Define 2500 operator entry and alarm messages

           Define appearance of 2500 reports

           Define data tables and storage for 2500

           Define advanced capabilities for 2500

           Define 2500 calculations



        Press the space bar to move to the next menu entry.
                Press ENTER to make your selection.                38%

 -1-     -2-     -3-     -4-     -5-    PrntScr SaveCFG   -8-     -9-    Exit
```

Figure 5-3. Configuration Definition Menu Screen

Configuration Definition Menu Screen Definitions

Selection	Definition
...hardware...	Definitions of: - Analog inputs and outputs - Pulse inputs - Status inputs - Control Outputs
...entry.. ..alarm...	Definitions of: (1) Operator entries: - Numeric - Selection list (2) Alarm limits: - Numeric variables - Boolean variables (3) Limited access variables
...appearance...	Definitions of 2500 Series printout reports.
...tables and storage.....	Definitions of: (1) Data tables (2) Data storage or archiving
...communications...	Definitions of: (1) MODBUS slave communications: - Boolean variable communications - Short integer communications - Long integer communications - Floating point communications - Report communications - Archive communications - Create MODBUS cross-reference file (2) MODBUS master and Gas Chromatography communications - MODBUS Remote unit communications (3) Head meter tube switching - Tube switching data (4) Override system definition defaults
...calculations...	Definitions of calculation sheets

5.2.3 HARDWARE DEFINITION MENU SCREEN

The Hardware Definition Screen is accessed from the Configuration Definition Menu Screen and provides for defining:

1. analog inputs
2. analog outputs
3. pulse inputs
4. status inputs
5. control outputs

Each of the Hardware Definition Menu Screen selections is defined in the following table. The Hardware Definition Screen is illustrated in Figure 5-4.

```
                    Active Configuration:            App-Name

                              Hardware Definition Menu
                                     Analog inputs
                                     Analog outputs
                                     Pulse inputs
                                     Status inputs
                                     Control outputs

           Press the space bar to move to the next menu entry.
                   Press ENTER to make your selection.                38%

 -1-    -2-    -3-    -4-    -5-   PrntScr SaveCFG   -8-    -9-   Exit
```

Figure 5-4. Hardware Definition Menu Screen

Hardware Definition Menu Screen Definitions

Selection	Definition
Analog inputs	Definitions of the variable names, units, scaling factors, and default values of analog input channels.
Analog outputs	Definitions of the variable names, units, scaling factors, and default values of analog output channels.
Pulse inputs	Definitions of the variable names, units and purposes of pulse input channels.
Status inputs	Definitions of the variable names, units, and default value of status input channels.
Control outputs	Definitions of variable names, units, default values, and purposes of control output channels.

5.2.4 ANALOG INPUT SCREEN

The Analog Input Screen is accessed from the Hardware Definition Screen and provides for defining analog input transducers. Each of the analog transducer inputs is defined in the following table. A typical Analog Input Screen is illustrated in Figure 5-5.

```
                    Active Configuration:             App Name

                       Hardware Definition - Analog Input
                                        2500 Startup Values
Chan   Name     Units   Zero Scale   Full Scale   M/V   Fixed Val   Period

  1  DENSITY    G/CC            .4          .65   Var          .5      0.0
  2      TT1    DEGF           0.0        150.0   Var        60.0      0.0
  3      TT2    DEGF           0.0        150.0   Var        60.0      0.0
  4   DENTMP    DEGF           0.0        150.0   Var        60.0      0.0
  5      PT1    PSIG             0        600.0   Var       500.0      0.0
  6      PT2    PSIG             0        600.0   Var       500.0      0.0
  7   DENPRS    PSIG             0        600.0   Var       500.0      0.0
  8
  9
 10
 11
 12
 13
 14

            Press the space bar to move to the next data entry.
               Press ENTER to  select a channel for editing.           38%

 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg   -9-   Exit
```

Figure 5-5. Typical Analog Input Screen

Analog Input Screen Definitions

Column	Definition
Chan	The transducer input channel. A one-board 2500 unit can have a maximum of 6 input channels; a two-board unit can have a maximum of 18 input channels.
Name	The name of the input channel. The name of the input can have a maximum length of eight characters. The value returned by the name is the floating-point scaled value of the input.
Units	The engineering units of the input. The units are entered as a four-character abbreviation that will appear in printout reports and on the front panel display when the input is reported.
Zero Scale	The floating-point value that is the input of the transducer when the output is 4 mA or 1 volt DC.
Full Scale	The floating-point value that is the input of the transducer when the output is 20 mA or 5 volts DC.
M/V	M selects MANUAL OVERRIDE, which specifies a fixed startup value for the input in all calculations that include the input channel value. V selects LIVE MODE, which specifies using at startup the actual analog value being transmitted by the transducer in all calculations that include the input channel value.
Fixed Val	A floating point value that is used in calculations when M is selected in column M/V.
Period	Period is defined as the seconds required to update the input. If left blank or 0.0 is entered, then input is scanned once per calculation cycle. This value should be entered to the nearest 0.5 seconds.

5.2.5 ANALOG OUTPUT SCREEN

The Analog Output Screen is accessed from the Hardware Definition Screen and provides for defining analog output channels. Each of the analog output channels is defined in the following table. A typical Analog Output Screen is illustrated in Figure 5-6.

```
                  Active Configuration:            App Name

                    Hardware Definition - Analog Output
                                    2500 Startup Values
Chan   Name     Units   Zero Scale   Full Scale   M/V   Fixed Val   Period

  1    DENOUT   G/CC            .4          .65   Var          .6      0.0
  2  NETRATEO   BB/H           0.0     100000.0   Var    100000.0      0.0
  3   TEMPOUT   DEGF           0.0        150.0   Var       150.0      0.0
  4

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          38%
 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-6. Typical Analog Output Screen

Analog Output Screen Definitions

Column	Definition
Chan	The transducer output channel. A one-board 2500 unit can have a maximum of 2 output channels; a two-board unit can have a maximum of 4 output channels.
Name	The name of the output channel. The name of the output can have a maximum length of eight characters. The value returned by the name is the floating-point scaled value of the output.
Units	The engineering units of the output. The units are entered as a four-character abbreviation that will appear in printout reports and on the front panel display when the output is reported.
Zero Scale	The floating-point value that is the output of the transducer when the input is 4 mA or 1 volt DC.
Full Scale	The floating-point value that is the output of the transducer when the input is 20 mA or 5 volts DC.
M/V	M selects MANUAL OVERRIDE, which specifies a fixed startup value for the channel output. V selects VARIABLE MODE, which specifies using the calculated value for the channel output.
Fixed Val	A floating point value that is the channel output when M is selected in column M/V.
Period	Period is defined as the seconds required to update the output. If left blank or set to 0.0 update rate will be once per calculation cycle. The value should be entered to the nearest 0.5 seconds.

5.2.6 PULSE INPUT SCREEN

The Pulse Input Screen is accessed from the Hardware Definition Screen and provides for defining pulse inputs and frequency densitometer inputs. Pulse input and frequency densitometer input definitions are defined in the following table. A typical Pulse Input Screen is shown in Figure 5-7.

```
                 Active Configuration:             App Name

                          Pulse Input Definition

                   #    Name      Units

                   1    METERA    PULS
                   2    METERB    PULS
                   3       DT1    MSEC
                   4    METERC    PULS
                   5    METERD    PULS
                   6
                   7
                   8

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          38%

 -1-     -2-    Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-    Exit
```

Figure 5-7. Typical Pulse Input Screen

Pulse Input Screen Definitions

Column	Definition
#	The pulse-input or frequency densitometer input number. A one-board Model 2500 unit can have a maximum of 2 pulse inputs and 1 frequency densitometer input. Channel 3 on the one-board unit is reserved for a frequency densitometer input only. A two-board Model 2500 unit can have a maximum of 6 pulse inputs and 2 frequency densitometer inputs. Channels 3 (board No. 1) and 7 (board No. 2) are reserved for the frequency densitometer inputs only. Channel 1 on both the one-board and two-board units can be used for meter proving.
Name	The name of the pulse input. The name of the input can have a maximum length of eight characters. The value returned by the name is the current value of the counter assigned to this pulse input.
Units	The engineering units of the pulse input. The units are entered as a four-character abbreviation that appears in printout reports and on the front panel display when the pulse input is displayed.

5.2.7 STATUS INPUT SCREEN

The Status Input Screen is accessed from the Hardware Definition Screen and provides for defining status input channels. Status input channel definitions are defined in the following table. A typical Status Input Screen is shown in Figure 5-8.

```
                 Active Configuration:             App Name

                    Hardware Definition - Status Input

              Chan   Name    Units       M/V    Value

                1   PROPANE     -        Var     Off
                2    BUTANE     -        Var     Off
                3    ETHANE     -        Var     Off
                4      MIX1     -        Var     Off
                5      MIX2     -        Var     Off
                6      MIX3     -        Var     Off
                7    BATCH1     -        Var     Off
                8    BATCH2     -        Var     Off
                9    BATCH3     -        Var     Off
               10  PROVECMD     -        Var     Off
               11
               12
               13
               14

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.            38%
 -1-     -2-    Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-    Exit
```

Figure 5-8. Typical Status Input Screen

Status Input Screen Definitions

Channel	**Definition**
Chan	The transducer input channel. A one-board 2500 unit can have a maximum of 6 status input channels; a two-board unit can have a maximum of 24 status input channels.
Name	The name of the status input channel. The name of the input can have a maximum length of eight characters. The boolean value returned by the name indicates the current state of the input.
Units	The engineering units of the status input. The units are entered as a four-character abbreviation that will appear in printout reports and on the front panel display when the input is reported.
M/V	M selects MANUAL OVERRIDE, which specifies a fixed startup value for the status input in all calculations that include the input value. V selects LIVE MODE, which specifies using at startup the line status input value in all calculations that include the input.
Value	The fixed value used in calculations when M is selected in column M/V. Two selections are possible: ON: The channel is on or set. OFF: The channel is off or reset.

5.2.8 CONTROL OUTPUT SCREEN

The Control Output Screen is accessed from the Hardware Definition Screen and defines control output signals. Each column of the Control output screen is defined in the following table. A typical Control Output Screen is shown in Figure 5-9.

```
                  Active Configuration:            App Name

                     Hardware Definition - Control Output

     Chan   Name   Units      Pulsed  Period (40ms)       M/V  Fixed Val

        1  SAMPLER             Yes               1         Var     Off
        2
        3
        4
        5
        6
        7
        8
        9
       10
       11
       12
       13
       14

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.             38%

 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-9. Typical Control Output Screen

Control Output Screen Definitions

Column	Definition
Chan	The control output channel. A one-board 2500 unit can have a maximum of 6 control output channels; a two-board unit can have a maximum of 24 control outputs.
Name	The name of the control output. The name of the output can have a maximum length of eight characters. The control identified by the name receives and outputs a signal consisting of a boolean value or a number of pulses.
Units	Engineering units of the output, which are entered as four-character abbreviations that appear in printout reports and on the front panel when the output is displayed
Pulsed	Defines whether or not the output is pulsed or static: YES indicates a pulsed output No indicates a static output
Period	The cycle period of a pulsed control output in multiples of 40 msec. Period is not entered when the control output is static. NOTE: The duty cycle is 50/50.
M/V	M selects MANUAL OVERRIDE, which specifies a fixed startup value for the control output in all calculations. V selects VARIABLE MODE, which specifies using the calculated value for the channel output.
Fixed Val	The fixed value used in calculations when M is selected in column M/V. Two selections are possible: ON: The channel is on or set. OFF: The channel is off or reset.

5.2.9 OPERATOR ENTRY AND ALARM MESSAGE MENU SCREEN

The Operator Entry and Alarm Message Menu Screen is accessed from the Configuration Definition Menu and provides for defining operator entries, alarm messages, and limited access variables. The Operator Entry and Alarm Message Menu Screens are defined in the table below. The Operator Entry and Alarm Message Menu Screen is shown in Figure 5-10.

```
                  Active Configuration:             App Name

                   Operator Entry and Alarm Message Menu

                        Define operator entries

                        Define alarm limits

                        Define limited access variables


           Press the space bar to move to the next menu entry.
                   Press ENTER to make your selection.              38%

 -1-     -2-     -3-     -4-     -5-    PrntScr SaveCFG   -8-     -9-   Exit
```

Figure 5-10. Operator Entry and Alarm Message Menu Screen

Operator Entry and Alarm Message Menu Screen Definitions

Selection	**Definition**
Operator entry	Definitions of the numeric operator entries and selection list operator entries
Alarm limits	Definitions of alarms for numeric variables and alarms for boolean variables
Limited ... etc.	Definitions of the limited access variables

5.2.10 OPERATOR ENTRY MENU SCREEN

The Operator Entry Menu Screen is accessed from the Operator Entry and Alarm Message Screen and provides for defining numeric operator entries and selection list operator entries. The Operator Entry Menu screen selections are defined in the following table. The Operator Entry Menu Screen is shown in Figure 5-11.

```
                  Active Configuration:            App Name
                          Operator Entry Menu
                   Define numeric operator entries
                   Define selection list operator entries

           Press the space bar to move to the next menu entry.
                   Press ENTER to make your selection.            38%
 -1-     -2-     -3-     -4-     -5-    PrntScr SaveCFG   -8-     -9-   Exit
```

Figure 5-11. Operator Entry Menu Screen

Operator Entry Menu Screen Definitions

Selection	**Definition**
...numeric...	Definitions of the names, units, and default values of numeric operator entries
...selection...	Definitions of names, units, and startup selection of selection list operator entries

5.2.11 NUMERIC OPERATOR ENTRY DEFINITION SCREEN

The Numeric Operator Entry Definition Screen is accessed from the Operator Entry Menu Screen and provides for defining numeric operator entries with floating point values only. Each column of the numeric operator entry screen is defined in the following table. A typical Numeric Operator Entry Definition Screen is shown in Figure 5-12.

```
                 Active Configuration:            App Name

                    Numeric Operator Entry Definition

                 Entry  Name      Units       Default

                   1    GALBBL     G/B           42.0
                   2   CONVGCC                .999012
                   3    LBSGAL                8.33718
                   4      MCFA                    1.0
                   5      MCFB                    1.0
                   6      MCFC                    1.0
                   7      MCFD                    1.0
                   8   DEVRUN1       %            1.0
                   9   DEVRUN2       %            1.0
                  10  SAMPLERK                 1000.0
                  11       PEQ    PSIG          200.0
                  12      MKFA    P/BL         1000.0
                  13      MKFB    P/BL         1000.0
                  14      MKFC    P/BL         1000.0

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          38%

 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-12. Typical Numeric Operator Entry Definition Screen

Numeric Operator Entry Definition Screen Definitions

Column	**Definition**
Entry	The numeric operator entry number.
Name	The name of the numeric entry. The name of the output can have a maximum length of eight characters. The entry identified by the name is the value entered by the operator at the front panel of the instrument.
Units	The engineering units of the entry. The units are entered as a four-character abbreviation that will appear in printout reports and on the front panel display when the entry is reported.
Default	The value of a floating point entry if another value is not entered after downloading the configuration.

5.2.12 SELECTION LIST OPERATOR ENTRY DEFINITION SCREEN

The Selection List Operator Entry Definition Screen is accessed from the Operator Entry Menu Screen and is used to define selection list operator entries. Selection list operator entries allow an operator to customize a Model 2500 configuration by choosing from a list of options. For instance, in an AGA-3 application, the operator can specify whether a tap is located upstream or downstream from an orifice plate. A list of possible options is accessed when the Selection List Operator Entry Definition Screen is displayed by pressing the F9 (proceed) function key. Each column of the selection list operator entry screen is defined in the following table. A typical Selection List Operator Entry Definition Screen is shown in Figure 5-13.

```
                  Active Configuration:            App Name

                  Selection List Operator Entry Definition

              Entry #    Name    Units   Startup Selection

                    1  STARTCUR                 1
                    2   DENTYPE                 2
                    3   REPORTS                 1

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          38%

 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg  Proceed Exit
```

Figure 5-13. Typical Selection List Operator Entry Definition Screen

Selection List Operator Entry Definition Screen Definitions

Column	Definition
Entry #	The selection list option number.
Name	The name of the selection. The selection name can have a maximum length of eight characters. The selection identified by the name is the value entered by the operator at the front panel of the instrument.
Units	The engineering units of the entry. The units are entered as a four-character abbreviation that will appear in printout reports and on the front panel display when the selection is reported.
Startup selection	A numerical value that indicates the option number to be used if no change is made after downloading the configuration. If no entry is made, the value defaults to 1.

5.2.13 SELECTION LIST OPERATOR ENTRY OPTION DEFINITION SCREEN

The Selection List Operator Entry Option Definition Screen is accessed by pressing the F9 (Proceed) function key from the Selection List Operator Entry Definition Screen and provides for defining the selection list operator options. Selection list operator entries allow an operator to customize a 2500 configuration by choosing from a list of options. For instance, in an AGA-3 application, the operator can specify whether a tap is located upstream or downstream from an orifice plate. Each column of the selection list operator entry option screen is defined in the following table. A typical Selection List Operator Entry Option Definition Screen is shown in Figure 5-14.

```
                  Active Configuration:             App-Name

              Selection List Operator Entry Option Definition
                           Variable Name: STARTCUR
                     Option #  Option

                            1   OPERATE
                            2     START

            Press the space bar to move to the next data entry.
               Press ENTER to  select a channel for editing.          38%
 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-14. Typical Selection List Operator Entry Option Definition Screen

Selection List Operator Entry Option Definition Screen Definitions

Column	Definition
Option #	The number of the option.
Option	The name of the option. The option name can have a maximum length of eight characters.

5.2.14 ALARM DEFINITION MENU SCREEN

The Alarm Definition Menu Screen is accessed from the Operator Entry and Alarm Message Menu Screen and provides for defining numeric variable alarms and boolean variable alarms. Each of the Alarm Definition Menu screen selections is defined in the following table. Figure 5-15 illustrates the Alarm Definition Menu Screen.

```
               Active Configuration:             App-Name

                              Alarm Definition Menu

                         Define alarms for numeric variables

                         Define alarms for boolean variables









            Press the space bar to move to the next menu entry.
                    Press ENTER to make your selection.                38%

  -1-     -2-     -3-     -4-     -5-    PrntScr SaveCFG   -8-     -9-   Exit
```

Figure 5-15. Alarm Definition Menu Screen

Alarm Definition Menu Screen Definitions

Selection	Definition
...numeric...	Definitions of the variable alarm names, LoLo limits, Lo limits, Hi limits, HiHi limits, and the rate of change per second (ROC/sec) limits
...boolean...	Definitions of the variable alarm names and the alarm states

5.2.15 NUMERIC VARIABLE ALARM DEFINITION SCREEN

The Numeric Variable Alarm Definition Screen is accessed from the Alarm Definition Menu Screen and provides for defining numeric variable alarm entries. Each column of the numeric variable alarm entry screen is defined in the following table. A typical Numeric Variable Alarm Definition Screen is shown in Figure 5-16.

```
                 Active Configuration:              App-Name

                    Numeric Variable Alarm Definition

 A#  Name      LoLo Limit   Lo Limit    Hi Limit   HiHi Limit    ROC/Sec

  1       PT1                   -12.0      612.0
  2       TT1                    -3.0      153.0
  3       PT2                   -12.0      612.0
  4       TT2                    -3.0      153.0
  5    DENTMP                    -3.0      153.0
  6    DENPRS                   -12.0      612.0
  7       DEN                    .387       .663
  8   ACCGFR1                       0   100000.0
  9   CHKGFR1                       0   100000.0
 10   ACCGFR2                       0   100000.0
 11   CHKGFR2                       0   100000.0

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.           38%

 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-16. Typical Numeric Variable Alarm Definition Screen

Numeric Variable Alarm Definition Screen

Column	Definition
A#	The numeric variable alarm entry number.
Name	The name of the numeric variable alarm entry. The name can have a maximum length of eight characters and is defined as either a input/output (I/O) channel or the result of a calculation.
LoLo limit	A value that specifies the low-low limit alarm for the numeric variable. The alarm is set when the value of the numeric variable is less than the limit and reset when the value of the numeric variable is greater than the limit.
Lo limit	A value that specifies the low limit alarm for the numeric variable. The alarm is set when the value of the numeric variable is less than the limit and reset when the value of the numeric variable is greater than the limit.
Hi limit	A value that specifies the high limit alarm for the numeric variable. The alarm is set when the value of the numeric variable is greater than the limit and reset when the value of the numeric variable is less than the limit.
HiHi limit	A value that specifies the high-high alarm limit for the numeric variable. The alarm is set when the value of the numeric variable is greater than the limit and reset when the value of the numeric variable is less than the limit.
ROC/sec	Rate of change per second (ROC/sec). A value that specifies the maximum amount a variable can increase or decrease in one second. The alarm is set when the value of the numeric variable is changing at a rate greater than this limit.
NOTE:	The ROC alarm only monitors the live value of a variable. The ROC alarm cannot be applied to operator numeric entry variables.

5.2.16 BOOLEAN VARIABLE ALARM DEFINITION SCREEN

The Boolean Variable Alarm Definition Screen is accessed from the Alarm Definition Menu Screen and provides for defining boolean variable alarm entries. Each column of the boolean variable alarm entry screen is defined in the following table. A typical Boolean Variable Alarm Definition Screen is illustrated in Figure 5-17.

```
                  Active Configuration:          App Name
                     Boolean Variable Alarm Definition
                      Alarm #  Name     State

                            1      DEV1  On
                            2      DEV2  On

          Press the space bar to move to the next data entry.
             Press ENTER to  select a channel for editing.          38%
 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-17. Typical Boolean Variable Alarm Definition Screen

Boolean Variable Alarm Definition Screen Definitions

Column	**Definition**
Alarm #	The boolean variable alarm entry number.
Name	The name of the boolean variable alarm entry. The name can have a maximum length of eight characters and is defined as either an input/output (I/O) channel or the result of a calculation.
State	The alarm state of the boolean variable. Two states are possible: ON: The alarm is set when the variable is on. OFF: The alarm is set when the variable is off.

5.2.17 LIMITED ACCESS VARIABLE DEFINITION SCREEN

The Limited Access Variable Definition Screen provides for defining variables in a CONFIG25 configuration that cannot be changed through the front panel of the 2500 unless the restricted password is active.
See Figure 5-18.

```
                 Active Configuration:             App-Name

                    Limited Access Variable Definition

                           #  Variable Name

                           1    GALBBL
                           2   CONVGCC
                           3    LBSGAL

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          38%

 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-18. Typical Limited Access Variable Definition Screen

Limited Access Variable Definition Screen Definitions

Column	**Definition**
#	The number of the entry.
Variable Name	The name of the variable to be limited to restricted password usage.

5.2.18 REPORT DEFINITION SCREEN

The Report Definition Screen is accessed from the Configuration Definition Menu Screen (Define appearance of 2500 reports) and provides for defining 2500 report printouts. Each column of the Report Definition Screen is defined in the following table. A typical Report Definition Screen is shown in Figure 5-19.

```
                 Active Configuration:            App Name

                            Report Definition

            Report #    Name           Title        Type

                   1   ENTRIES    OPERATOR ENTRIES    Line
                   2     DAILY    DAILY REPORT       Table









           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.            38%

  -1-     -2-    Delete  Insert  Clear   PrntScr SaveCFG PrntPg  Proceed Exit
```

Figure 5-19. Typical Report Definition Screen

Report Definition Screen Definitions

Column	Definition
Report #	The 2500 report number.
Name	The name of the report. The name can have a maximum length of /eight characters and is entered on a calculation sheet to initiate the report when a specific event occurs (e.g., a specific time of day, a boolean variable, a value change, and the completion of a specific series of calculations).
Title	A 16-character string that identifies the report. The string is printed at the top of the report.
Type	The means for selecting the type of report. Only two types are available: a line report and a table report. The report type is selected by pressing the space bar, which alternates the screen display between the two choices.

5.2.19 LINE REPORT DEFINITION SCREEN

The Line Report Definition Screen provides for defining individual lines in a line report. The screen is accessed from the Report Definition Screen (if "Line" appears in the "Type" column of the Report Definition Screen) by pressing the F9 (Proceed) function key when the screen cursor is on the same line as the line report title. A typical Line Report Definition Screen is shown in Figure 5-20.

```
                 Active Configuration:            App Name

                          Line Report Definition
                 Title: OPERATOR ENTRIES    Name: ENTRIES
                        Line #   Name

                             1    GALBBL
                             2   CONVGCC
                             3    LBSGAL
                             4      MCFA

                             8     K1EXP
                             9     K2MAN
                            10     K2EXP
                            11    Kt2MAN
                            12    Kt2EXP
                            13    Kt1MAN
                            14    Kt2EXP
                            15    Kp2MAN
                            16    Kp2EXP
                            17    Kp1MAN
                            18    Kp1EXP
                            19   DENTYPE
                            20  STARTCUR

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          39%

 -1-     -2-    Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-20. Typical Line Report Definition Screen

Line Report Definition Screen Definitions

Column	Definition
Line #	A sequential line in the report. Leaving a line blank will result in a blank line in the report. Blank lines permit grouping data for the appearance and readability of the report. Blank lines after the last entry on the report will be ignored by the 2500.
Name	The name that appears on a line of the report. The name can have a maximum length of eight characters and may be either a string used on the report as a title or it may be a variable name defined elsewhere in the CONFIG25 configuration process. In the latter case, the eight characters must be identical to the previously defined variable name.

5.2.20 TABLE REPORT DEFINITION SCREEN

The Table Report Definition Screen provides for defining individual lines in a table report. Archive data can also be printed from the Table Report Definition Screen using the CONFIG25 PRINT command.

5.2.20.1 Defining Individual Lines on the Table Report Definition Screen. Individual lines of a table report are defined on the Table Report Definition Screen. The screen is accessed from the Report Definition Screen (if "table" appears in the "Type" column of the Report Definition Screen) by pressing the F9 (Proceed) function key when the screen cursor is on the same line as the table report title.

An 80-character horizontal line of a table report is divided into four columns. Each column can contain alpha-numerical data (with or without units) but must start with an alphabetical character. An alphabetical string is any eight-character group of letters that is not otherwise identified as a name on a hardware (I/O) definition sheet or on a calculation sheet. Data is automatically right-justified in each column unless otherwise specified.

The columns of the table report definition screen are defined in the following table. A typical Table Report Definition Screen is shown in Figure 5-21 (Sheet 1).

```
               Active Configuration:            App Name

                                 Table Report Definition
                            Title: DAILY REPORT    Name: DAILY
 #     Data    Flags        Data   Flags       Data   Flags       Data   Flags

  1    CORTEZ            PIPELINE             DAILY            REPORT
  2  --------            --------          --------          --------
  3    SHIPNO               BATNO          BATPRODN          --------
  4  --------               BATNO          BATPRODN          --------
  5    STYEAR             STMONTH             STDAY
  6    STHOUR   LU       STMINUTE    LU
  7     SMASS   LU         SGROSS    LU        SNET   LU
  8  --------             CURRNET    LU      TOTALS          --------
  9  MASSRCVD   LU       GROSRCVD    LU     NETRCVD   LU      BAVGDEN

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.            39%
  -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-21. Typical Table Report Definition Screen (Sheet 1)

Table Report Definition Screen Definitions

Column	Definition
Line #	A sequential line in the table report. Leaving a line blank results in a blank line in the report, which groups data in a report for appearance and readability. Blank lines after the last entry on the report are ignored by the 2500.
Data	The name assigned to the data to be printed in the report. The name may have a maximum length of eight characters and may be either a string used on the report as a title or it may be a variable name defined elsewhere in the CONFIG25 configuration process. In the latter case, the eight characters must be identical to the previously defined variable name.
Flags	(1) Left-justifies boolean and selection variable data by entering the letter "L". (2) Suppresses printing the variable name by entering the letter "N". (3) Defines engineering units to be printed by entering the letter "U".

5.2.20.2 Printing Archive Data from the Table Report Definition Screen. Archive data can be printed from the Table Report Definition Screen using the CONFIG25 PRINT command. The first column of the Table Report Definition screen contains the name of the archive area, e.g., FILE1 in Figure 5-21 (Sheet 2). The second column contains the first record to print (FIRST in Figure 5-21, Sheet 2). The third data column contains the name of a variable that is the number of records to print (FILE1LEN in Figure 5-21, Sheet 2). If printing the number of records specified by the variable in column three exhausts the archive area, the PRINT command automatically wraps around to record No.1.

```
                  Active Configuration:             App-Name

                             Table Report Definition
                      Title: HISTORY REPORT    Name: HISTORY
 #     Data    Flags       Data    Flags       Data    Flags       Data    Flags

  1   HISTORY
  2     FILE1                FIRST          FILE1LEN
  3     FILE2                FIRST          FILE2LEN
  4     FILE3                FIRST          FILE3LEN




            Press the space bar to move to the next data entry.
               Press ENTER to  select a channel for editing.              39%
 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-21. Typical Table Report Definition Screen Used to Print Archive Data (Sheet 2)

5.2.21 DATA TABLES AND STORAGE MENU SCREEN

The Data Tables and Storage Menu Screen is accessed from the Configuration Definition Menu and provides for defining data tables and data storage and archiving. A typical Data Tables and Storage Menu Screen is shown in Figure 5-22.

```
                 Active Configuration:            App-Name

                       Data Tables and Storage Menu

                       Define data tables

                       Define data storage or archiving



           Press the space bar to move to the next menu entry.
                   Press ENTER to make your selection.               39%

 -1-     -2-     -3-     -4-     -5-    Prntscr SaveCFG   -8-     -9-    Exit
```

Figure 5-22. Typical Data Table and Storage Menu Screen

5.2.22 DATA TABLE DEFINITION SCREEN

The Data Table Definition Screen is accessed from the Data Tables and Storage Menu Screen and provides for defining data tables.

Each table may have as many as five columns of data. Tables may be independent or linked together to form larger tables. If values between table points are required in calculation statements, the values are linearly interpolated for the calculations. Values that fall outside the table are clipped to the nearest limit of the table.

Each column of the data table definition screen is defined in the following table. A typical Data Table Definition Screen is shown in Figure 5-23.

```
                    Active Configuration:             App Name

                              Data Table Definition

                      Table #   Name      Units

                            1    ASTM24
                            2   API1101

            Press the space bar to move to the next data entry.
               Press ENTER to  select a channel for editing.            39%
  -1-     -2-    Delete  Insert  Clear   Prntscr SaveCFG PrntPg  Proceed Exit
```

Figure 5-23. Typical Data Table Definition Screen

Data Table Definition Screen Definitions

Column	Definition
Table #	The number that identifies an individual data table.
Name	The name of the data table. The name identifies data in calculation statements. It can have as many as eight characters.
Units	The engineering units (if any) of the data presented in the table. The units are entered as 4-character abbreviations and (if appropriate) appear in printout reports and on the front panel display when the value is reported.

5.2.23 DATA TABLE ROW AND COLUMN DEFINITION SCREEN

The Data Table Row and Column Definition Screen is accessed from the Data Table Definition Menu by pressing the F9 (Proceed) function key. The Data Table Row and Column Definition Screen provides for row and column headings and index values for tabular data. Row and column indices must be spaced linearly. For example, if the rows in a table represent temperature and the column pressure, the temperature values assigned to each row must be incremented by the same number of degrees. Similarly equal spacing is required for the pressure values assigned to each column. The columns of the Table Row and Column Definition Screen are defined in the following table. A typical Data Table Row and Column Definition Screen is shown in Figure 5-24.

```
                 Active Configuration:            App-Name

                   Data Table Row and Column Definition
                            Table Name: ASTM24
  #  Row Name  1st Value    Row Incr    Col Name  1st Value    Col Incr

  1         T         20           6          SG         .5        .005










           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.            39%

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg  Proceed Exit
```

Figure 5-24. Typical Data Table Row and Column Definition Screen

Data Table Row and Column Definition Screen

Column	Definition
#	A sequential line in the data table.
Row Name	The name assigned as the row heading index. The name may have a maximum length of eight characters.
1st Value	The starting value for the row index.
Row Incr	The incremental value for the row index.
Col Name	The name assigned as the column heading index. The name may have a maximum of eight characters.
1st Value	The starting value for the column index.
Col Incr	The incremental value for the column index.

5.2.24 DATA TABLE VALUE ENTRY SCREEN

The Data Table Value Entry Screen is accessed from the Data Table Row and Column Definition Screen by pressing the F9 (Proceed) function key. The Data Table Value Entry Screen provides for defining data points in a data table.

The line number (#) column indicates row numbers in the table. A maximum of five columns of data points can be entered in each row.

A typical Data Table Value Entry Screen is illustrated in Figure 5-25.

```
                 Active Configuration:              App-Name

                           Data Table Value Entry
 Table Name: ASTM24                           SG
  #          T       0.500      0.505      0.510      0.515      0.520

  1          20      1.064      1.063      1.061      1.059      1.058
  2          26      1.055      1.054      1.052      1.051      1.049
  3          32      1.046      1.045      1.043      1.042      1.041

  8          62       .997       .997       .997       .997       .997
  9          68       .986       .986       .987       .987       .987
 10          74       .976       .976       .977       .978       .978
 11          80       .965       .966       .967       .968       .969
 12          86       .954       .955       .956       .957       .959
 13          92       .942       .944       .946       .947       .949
 14          98       .931       .933       .935       .937       .939
 15         104       .919       .922       .925       .927       .929
 16         110       .907       .910       .913       .915       .918
 17         116       .895       .898       .902       .904       .907
 18         122       .883       .886       .890       .893       .896
 19         128       .869       .873       .877       .881       .884

            Press the space bar to move to the next data entry.
               Press ENTER to  select a channel for editing.         39%

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg   -9-    Exit
```

Figure 5-25. Typical Data Table Value Entry Screen

5.2.25 DATA STORAGE (ARCHIVING) DEFINITION SCREEN

The Data Storage (Archiving) Definition Screen is accessed from the Data Tables and Storage Menu and provides for defining individual data storage archives. A typical Data Storage (Archiving) Definition Screen is illustrated in Figure 5-26.

```
                Active Configuration:            App Name

                  Data Storage (Archiving) Definition

                         Name        Size

                        1      FILE1      26
                        2      FILE2      26
                        3      FILE3      26
                        4      FILE4      26
                        5      FILE5      26
                        6      FILE6      26
                        7      FILE7      26

                       45    DAYLOG7      24
                       46    GHAWSUM       1
                       47    GHAVERG       1
                       48    GHFLWTM       1
                       49   GHDAWSUM       1
                       50   GHDAVERG       1
                       51   GHDFLWTM       1
                       52     PIDDEF       1
                       53   CURROPER      23
                       54   PREVOPER      23
                       55        DOY      12
                       56         QQ      24
                       57         ZZ       1

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          48%
 -1-     -2-    Delete  Insert  Clear   PrntScr SaveCFG PrntPg  Proceed Exit
```

Figure 5-26. Typical Data Storage (Archiving) Definition Screen

Data Storage (Archiving) Definition Screen Definitions

Column	Definition
Name	The name of the data archive. The name can have a maximum of 8 characters.
Size	The size is defined as the number of records in the archive area. The maximum value for this entry is 999.

5.2.26 DATA STORAGE DATA DEFINITION SCREEN

The Data Storage Data Definition Screen is accessed from the Data Storage (Archiving) Definition Screen by pressing the F9 (Proceed) function key and provides for defining the name and data type of each individual archive location listed on the Data Storage (Archiving) Definition Screen. Each column of the Data Storage Data Definition screen is defined in the following table. A typical Data Storage Data Definition Screen is shown in Figure 5-27.

```
                Active Configuration:            App-Name

                      Data Storage Data Definition
                        Archive Data Name: XDUCER
                       Name             Data Type

                   1         T      Floating
                   2         P      Floating




            Press the space bar to move to the next data entry.
               Press ENTER to  select a channel for editing.         39%
 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-27. Typical Data Storage Definition Screen

Data Storage Definition Screen Definitions

Column	**Definition**
Name	The name of the data archive. The name can have a maximum of 8 characters.
Data type	The nature of the data stored, e.g., floating point integer. The data type is selected by pressing the space bar until the desired type of data is displayed on the screen.

5.2.27 ADVANCED CAPABILITIES MENU SCREEN

The Advanced Capabilities Menu Screen is accessed from the Configuration Definition Screen and provides for

1. Defining MODBUS slave communications
2. Defining MODBUS master and gas chromatography communications
3. Defining head meter tube switching
4. Overriding system definition defaults
5. Defining Periodic Update Variables
6. Defining Periodic Analog Output components

Each of the menu selections is described in the following table. The Advanced Capabilities Menu Screen is illustrated in Figure 5-28.

```
                 Active Configuration:             App-Name

                        Advanced Capabilities Menu

          Define MODBUS slave communications

          Define MODBUS master and Gas Chromatography Communications

          Define head meter tube switching

          Override system definition defaults

          Define Periodic Update Variables

          Define Periodic Analog Output Components


           Press the space bar to move to the next menu entry.
                   Press ENTER to make your selection.              39%
 -1-     -2-     -3-     -4-     -5-    Prntscr SaveCFG   -8-     -9-    Exit
```

Figure 5-28. Advanced Capabilities Menu Screen

Advanced Capabilities Menu Screen Definitions

Selection	**Definitions**
...MODBUS slave..	Boolean variable communications Short integer communications Long integer communications Floating point communications Report communications Archive communications definition Create MODBUS cross-reference file
...master...	Modbus remote units
...Head meter..	Head meter tube switching variables
Override.....	System variable default values
...update variables...	Variable values updated at periodic intervals
...Analog Output components..	Outputs calculated from analog and pulse inputs, operator entries, and calculated factors

5.2.28 COMMUNICATIONS DEFINITION SCREEN

The Communications Definition Screen is accessed from the Advanced Capabilities Definition Screen (MODBUS slave communications) and provides for defining the types of data transferred between the 2500 instrument and a host computer.

Definitions include the following data types:

1. boolean variable data
2. short integer data
3. long integer data
4. floating point data
5. report data
6. archive data

The screen also has a selection for creating a MODBUS cross-reference file.

The 2500 instrument data transmission protocol is either the ASCII version of MODBUS or the RTU version of MODBUS designed by Gould Modicon. The short integer format is intended for communicating with programmable controllers that limit integer length to three digits. The long integer format is recommended for other communications protocols.

NOTE: CONFIG25 applications that include MODBUS remote transmission unit (RTU) master/slave communications should be programmed to recover from fault conditions. This is accomplished by writing the CONFIG25 program so that a master unit continues to try to establish communications with a slave unit if an attempt is initially unsuccessful or when communications are lost after having been once established.

Each of the communications definition menu selections is defined in the table below. The Communications Definition Screen is shown in Figure 5-29.

```
                    Active Configuration:            App-Name
                          Communications Definition
                     Boolean variable communications definition
                     Short integer communications definition
                     Long integer communications definition
                     Floating point communications definition
                     Report communications definition
                     Archive communications definition
                     Create MODBUS cross reference file

          Press the space bar to move to the next menu entry.
                  Press ENTER to make your selection.              39%
 -1-     -2-     -3-     -4-     -5-    Prntscr SaveCFG   -8-     -9-    Exit
```

Figure 5-29. Communications Definition Screen

Communications Definition Screen Definitions

Selection	Definition
...boolean...	Definitions of boolean variable names and subfields
...short...	Definitions of short integer names and subfields. The short integer format is intended for communications with programmable controllers that limit integer length to three digits.
...long...	Definitions of long integer names and subfields. The long integer format is intended for communications with programmable controllers that do not limit integer length.
...floating...	Definitions of floating point variables and subfields
...report...	Definitions of report communications names
...Archive....	Definitions of archive files for communications.
...MODBUS...	Creates a cross-reference file for MODBUS variables

5.2.29 BOOLEAN VARIABLE COMMUNICATIONS DEFINITION SCREEN

The Boolean Variable Communications Definition Screen is accessed from the Communications Definition Screen (MODBUS slave communications definitions) and provides for defining boolean variable communications. Each column of the boolean variable communications definition screen is defined in the following table. A typical Boolean Variable Communications Definition Screen is illustrated in Figure 5-30.

```
                   Active Configuration:             App-Name

              Boolean Variable Communications Definition
         Note: The protocol adds 1000 to these index numbers
                       Index # Name    SubField

                          1  BATCOMP1
                          2  BATCOMP2
                          3  BATCHOMP
                          4  REPORTFG
                          5  PROPVEND
                          6  PRVERROR
                          7   MFERROR
                          8  SHIPCOMP
                          9  MISMATCH
                         10  MATCHFLG
                         11  BAT1PROP
                         12  BAT1PROP    Man/Var
                         13  BAT1PROP    Man/Var

         Press the space bar to move to the next data entry.
            Press ENTER to  select a channel for editing.          40%
 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-30. Typical Boolean Variable Communications Definition Screen

Boolean Variable Communications Definition Screen Definitions

Column	Definition
Index #	The index number of the boolean variable.
Name	The name of the boolean variable. The name can have a maximum of 8 characters.
Subfield	The boolean variable data parameter, e.g., for an input: Man/Var, Blank, Fixed. The parameter is selected by pressing the space bar until the desired parameter is displayed on the screen.

5.2.30 SHORT INTEGER COMMUNICATIONS DEFINITION SCREEN

The Short Integer Communications Definition Screen is accessed from the Communications Definitions Menu Screen (MODBUS slave communications Definitions) and provides for defining short integer communications. The short integer format is intended for communicating with programmable controllers that limit integer length to three digits. The long integer format is recommended for other communications. Each column of the short integer variable communications definition screen is defined in the following table. A typical Short Integer Communications Definition Screen is illustrated in Figure 5-31.

```
              Active Configuration:            App-Name

        Short Integer Variable Communications Definition
      Note: The protocol adds 3000 to these index numbers
                 Index # Name    SubField

                   1  CNTLTUBE
                   2    STATE1
                   3    STATE2
                   4    STATE3
                   5    STATE4
                   6     COMM1
                   7     COMM2

      Press the space bar to move to the next data entry.
         Press ENTER to  select a channel for editing.          40%

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-31. Typical Short Integer Communications Definition Screen

Short Integer Communications Definition Screen Definitions

Column	**Definition**
Index #	The index number of the short integer variable.
Name	The name of the short integer variable. The name can have a maximum of 8 characters.
Subfield	The short integer variable data parameter for an input: blank, live, fixed, zero, full-scale, low, low-low, high, high-high, or rate. The parameter is selected by pressing the space bar repeatedly until the desired parameter is displayed on the screen.

5.2.31 LONG INTEGER VARIABLE COMMUNICATIONS SCREEN

The Long Integer Variable Communications Screen is accessed from the Communications Definition Screen (MODBUS Slave Communications) and provides for defining long integer communications. The long integer format is intended for communications with computers that do not limit integer length. For communications with programmable controllers that limit integer length to three digits, use the short integer format. Each column of the Long Integer Variable Communications Definition Screen is defined in the following table. A typical Long Integer Variable Communications Screen is illustrated in Figure 5-32.

```
            Active Configuration:            App-Name

          Long Integer Variable Communications Definition
        Note: The protocol adds 5000 to these index numbers
                  Index # Name    SubField

                         1    BATNO1
                         2  BATPROD1
                         3    SYEAR1
                         4   SMONTH1
                         5     SDAY1
                         6    SHOUR1
                         7  SMINUTE1
                         8  SGROSS1H
                         9  SGROSS1L
                        10   SMASS1H
                        11   SMASS1L
                        12    SNET1H
                        13    SNET1L
                        14    SYEAR1

        Press the space bar to move to the next data entry.
           Press ENTER to  select a channel for editing.          41%
 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-32. Typical Long Integer Variable Communications Definition Screen

Long Integer Variable Communications Definition Screen Definitions

Column	**Definition**
Index #	The index number of the long integer variable.
Name	The name of the long integer variable. The name can have a maximum of 8 characters.
Subfield	The long integer variable data parameter, for an input: blank, live, fixed, zero, full-scale, low, low-low, high, high-high, or rate. The parameter is selected by pressing the space bar until the desired parameter is displayed on the screen.

5.2.32 FLOATING POINT VARIABLE COMMUNICATIONS DEFINITION SCREEN

The Floating Point Variable Communications Definition Screen is accessed from the Communications Definition Screen (MODBUS Slave Communications) and provides for defining floating point communications. Each column of the floating point variable communications definition screen is defined in the following table. A typical Floating Point Variable Communications Definition Screen is illustrated in Figure 5.33.

```
                 Active Configuration:             App-Name

            Floating Point Variable Communications Definition
           Note: The protocol adds 7000 to these index numbers
                      Index # Name    SubField

                           1   FQ288NH
                           2   FQ288NL
                           3   PROVNHI
                           4   PROVNLO
                           5  PROVH1LO
                           6  PROVH1HI
                           7  PROVT1HI
                           8  PROVT1LO
                           9  PROVT2HI
                          10  PROVT2LO
                          11   PROVERR
                          12  PROVMTRF
                          13   PRVSMON
                          14   PRVSDAY

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          41%
 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-33. Typical Floating Point Variable Communications Definition Screen

Floating Point Variable Communications
Definition Screen Definitions

Column	**Definition**
Index #	The index number of the floating point variable.
Name	The name of the floating point variable. The name can have a maximum of 8 characters.
Subfield	The floating point variable data parameter for an input: blank, live, fixed, zero, full-scale, low, low-low, high, high-high, or rate. The parameter is selected by pressing the space bar until the desired parameter is displayed on the screen.

5.2.33 REPORT COMMUNICATIONS DEFINITION SCREEN

The Report Communications Definition Screen is accessed from the Communications Definition Screen (MODBUS Slave Communications) and provides for defining report communications. Each column of the report communications definition screen is defined in the following table. A typical Report Communications Definition Screen is illustrated in Figure 5-34.

```
              Active Configuration:             App-Name

                  Report Communications Definition
          Note: The protocol adds 500 to these index numbers
                          Index # Name

                             1   ENTRIES
                             2     DAILY

         Press the space bar to move to the next data entry.
            Press ENTER to  select a channel for editing.          41%

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-34. Typical Report Communications Definition Screen

Report Communications Definition Screen Definitions

Column	**Definition**
Index #	The index number of the report.
Name	The name of the report. The name can have a maximum of 8 characters.

5.2.34 ARCHIVE DEFINITION SCREEN

The Archive Definition Screen is accessed from the Communications Definition Screen (MODBUS Slave Communications) and provides for defining the archives to be used by the MODBUS Slave communications. If an archive is defined in this screen, a host computer may retrieve any record in the archive area. Retrieved records may be started on any row and column. If an archive is not defined in the screen, an attempt to retrieve a record in the archive CONFIG25 produces an error message. Because the data in an archive may be any combination of floating point, boolean, integer, or selection variable data, the host computer must be programmed to interpret the data in the appropriate format and in the proper sequence.

```
                  Active Configuration:             App-Name

                        MODBUS Slave Archive Definition
                 Note: The protocol adds 700 to these index numbers
                              Index # Archive Name

                                    1   STATIC1
                                    2   STATIC2
                                    3   STATIC3

               Press the space bar to move to the next data entry.
                  Press ENTER to  select a channel for editing.          41%

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-    Exit
```

Figure 5-35. Typical Archive Definition Screen

5.2.35 CREATE MODBUS CROSS-REFERENCE FILE

The Create MODBUS Cross-Reference file is accessed from the Communications Definition Screen and provides for creating a cross-reference file of all the variable names, MODBUS registers, and subfields in a MODBUS Slave Definition screen. The file created is used to associate variable names with the data acquired from the Model 2500. The file name of a MODBUS cross-reference file consists of the application number of the configuration with the file extension .MOD. For example, the MODBUS cross-reference file for application No.D513001A is D513001A.MOD. A typical MODBUS cross-reference file is illustrated in Figure 5-36.

Each record in a MODBUS cross-reference file contains the information for one MODBUS register number. The record format is:

RRRR, VVVVVVVV, SSSSSSS <Cr><lf>

Where:

RRRR is the MODBUS register number.
VVVVVVVV is the variable name.
SSSSSSSS is the subfield.

The subfield entry may be any one of the following:

Work	The current working value used in calculations. This value may be either LIVE or FIXED, depending on the state of the manual/variable flag.
Live	The current LIVE value of the input or output.
Fixed	The value used when manual override is in effect.
Zero	The zero scale value.
Full	The full scale value.
LoLo	The low-low alarm limit.
Lo	The low alarm limit.
Hi	The high alarm limit.
HiHi	The high-high alarm limit.
Rate	The rate-of-change alarm limit.
Man/Var	The status of the manual override flag (boolean only).

The left-hand column in the illustration is the MODBUS Register number. The center column is the variable name. The right-hand column is the subfield.

501,	REPORT1,	Work
701,	MONTHLY,	Work
1001,	VALVE1,	Work
1002,	VALVE1,	Man/Var
3001,	LINE1,	Work
3002,	LINE1,	Fixed
5001,	VOLUME,	Work
5002,	VOLUME,	Hi
7001,	PRES,	Work
7002,	TEMP,	Fixed

Figure 5-36. Typical MODBUS Cross-Reference File

5.2.36 MODBUS REMOTE UNIT DEFINITION

The MODBUS Remote Unit Definition menu is accessed from the Define MODBUS master and Gas Chromatography Communications selection on the Advanced Capabilities Menu. The MODBUS Remote Unit Definition menu provides for defining MODBUS remote units. Each column of the MODBUS Remote Unit Definition Screen is defined in the following table. A typical Communications Definition Screen is illustrated in Figure 5-37.

```
                 Active Configuration:            App-Name

                      MODBUS Remote Unit Definition

            #  Name          Comm Addr    State      Control

            1   AOSMITH      COMMADDR      COMMSTS   COMMCNTL
            2










            Press the space bar to move to the next data entry.
               Press ENTER to  select a channel for editing.            41%
 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg  Proceed Exit
```

Figure 5-37. Typical MODBUS Remote Unit Definition Screen

MODBUS Remote Unit Definition Screen Definitions

Column	Definition
#	The number of the remote unit. A maximum of two units can be defined.
Name	The name that identifies the remote unit
Comm Addr	An integer variable for the communications address of the slave unit. If a Comm Addr is not defined elsewhere in the configuration, CONFIG25 defines an operator entry variable with a default value of zero. When the communications address is zero, communications with that remote unit is disabled.
State	An integer variable that contains the current MODBUS function code transmitted and received for the remote unit. State provides a means of monitoring the activity between the master and remote units and for monitoring error conditions. The value shown in the State variable is a combination of the function code performed and the error code returned by the slave. The function code is multiplied by 10 and added to the error code to obtain the State variable. The following tables show the function and error codes. (X's represent the other portion of the State variable.) **Value Function Code** 1X Read boolean or manual/live status 3X Read numeric value 5X Write boolean or manual/live status 6X Write numeric value 15X Write multiple boolean or manual/live status 16X Write multiple numeric value -- X0 No errors X1 Illegal function X2 Illegal data address X3 Illegal data value X4 Failure in associated device X5 Acknowledge X6 Busy, rejected message If a State variable is not defined elsewhere in the configuration, CONFIG25 defines the variable.
Control	A selection variable having three options: IDLE, ACTIVE, and FAULT. Idle indicates that no communications are in progress. ACTIVE indicates that communications are in progress. FAULT indicates a failure to communicate with the slave unit. If a Control variable is not defined elsewhere in the configuration, CONFIG25 defines the variable.

NOTE:	The control selection variable cannot be changed directly from the front panel. If an application requires the ability to change the control variable, this may be done by entering a dummy variable in the operator entry definitions screen and changing the control variable through a calculation screen entry that makes the control variable equal to the dummy variable.

5.2.37 MODBUS REMOTE VARIABLE DEFINITION SCREEN

A MODBUS Remote Variable Definition Screen is accessed from the MODBUS Remote Unit Definition Screen. The screen provides for defining variable to be transmitted and/or received between the master and remote units. Each column of the MODBUS Remote Variable Definition Screen is defined in the following table. A typical Report Communications Definition Screen is illustrated in
Figure 5-38.

```
                 Active Configuration:             App-Name

                    MODBUS Remote Variable Definition
                            Unit Name: AOSMITH
                #  Name       Units     Register      Xmit/Rec

                2   PRVSTSR    ----       5001        Receive
                3    PRVT1R    ----       5002        Receive
                4    PRVT2R    ----       5003        Receive
                5     PRVNR    ----       5004        Receive
                6    PRVN1R    ----       5005        Receive

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          41%
 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg   -9-    Exit
```

Figure 5-38. Typical MODBUS Remote Variable Definition Screen

MODBUS Remote Variable Definition Screen

Column	Definition
#	The number of the variable name.
CAUTION: Do not skip any numbers when completing this screen. Leaving undefined numbers will produce unpredictable results.	
Name	The name of a variable in the master 2500. If the variable is not defined elsewhere in the configuration, it is created during analysis of this screen. The data type assigned is determined by the register number. If the variable is defined elsewhere, CONFIG25 verifies that the defined data type matches the register data type and generates an error if the data type is not correct. The data type associated with the register numbers are: Register / Data Type 1001-2999 Boolean variables 3001-4999 Short integers/selection 5001-6999 Long integers/selection 7001-9999 Floating point
Units	The engineering units of the variable. This column is optional, especially if a variable is defined elsewhere in the configuration.
Register	A MODBUS register number that identifies the value. This register number must also be defined in the slave unit.
Xmit/Rec	An option that allows the user to specify whether a variable is received from the slave or transmitted to the slave.

5.2.38 HEAD METER TUBE SWITCHING SCREEN

The Head Meter Tube Switching screen is accessed from the Advanced Capabilities Menu screen. The screen provides for defining tube switching criteria. Only one entry is allowed on this screen. Each column of the screen is defined in the following table. A typical Head Meter Tube Switching screen is illustrated in Figure 5-39.

```
                 Active Configuration:            App-Name

                    Head Meter Tube Switching Definition

      #  Time Delay (sec)   Verify DP   Verify Level     Control #

      1      DLY           VERIFYON       VERPER       CNTLTUBE










           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          42%

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg  Proceed Exit
```

Figure 5-39. Typical Head Meter Tube Switching Definition Screen

Head Meter Tube Switching Definition Screen Definitions

Column	Definition
#	The entry number.
Time Delay (sec)	An integer variable name that specifies a delay time to allow a valve to change position and for the position change to affect the differential pressure across the tube set before changing the position of the next valve in the set. The default value for this variable is 120 seconds.
Verify DP	A boolean variable name that enables or disables automatic verification of a valve position change using DP level after the change is ordered by the 2500. When the variable is OFF, verification is not performed.
Verify Level	A floating point variable that specifies the cutoff value for differential pressure across a tube set to be used in verifying a valve position change. The default value of this variable is 2.
Control #	A variable that displays the number of the tube assigned as the current control tube.

5.2.39 HEAD METER SWITCHING TUBE DEFINITION SCREEN

The Head Meter Switching Tube Definition Screen is accessed from the Head Meter Tube Switching Definition screen by pressing the F9 (Proceed) function key. The Head Meter Switching Tube Definition screen provides for defining the variables described in the following table. A typical Head Meter Switching Tube Definition screen is illustrated in Figure 5-40.

```
                   Active Configuration:            App-Name

                     Head Meter Switching Tube Definition
                    Switching Points    -----------  Tube  -----------
 #   DP Name        Low        High      State      Open       Close

  1      VDPI        TUBE1LO    TUBE1HI    STATE1      OPEN1     CLOSE1
  2      TDPI        TUBE2LO    TUBE2HI    STATE2      OPEN2     CLOSE2
  3      UDPI        TUBE3LO    TUBE3HI    STATE3      OPEN3     CLOSE3
  4      VDPR        TUBE4LO    TUBE4HI    STATE4      OPEN4     CLOSE4
  5      TDPR        TUBE5LO    TUBE4HI    STATE5      OPEN5     CLOSE5
  6      UDPR        TUBE6LO    TUBE6HI    STATE6      OPEN6     CLOSE6
  7       FDP        TUBE7LO    TUBE7HI    STATE7      OPEN7     CLOSE7

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          42%

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg    -9-   Exit
```

Figure 5-40. Typical Head Meter Switching Tube Definition Screen

Head Meter Switching Tube Definition Screen Definitions

Column	Definition
#	The number of the entry
DP Name	The variable with a value equal to the current differential pressure across the tube -Switching Points-
Low	The low differential pressure (expressed in engineering units) across a tube at which the valve controlling the tube is to be closed. The default value for this variable is 2.
High	The high differential pressure (expressed in engineering units) across a tube at which the valve controlling the next tube is to be opened. The default value for this variable is 98.
-Tube-	
State	(For each tube in the set) The operational status of the tube being displayed (i.e., enabled, disabled, fault). The default status of this variable is enabled.
NOTE: The tube state cannot be changed directly from the front panel. If an application requires the ability to change the tube state, this can be done by entering a dummy variable in the operator entry definitions screen and changing the tube state through a calculation screen entry that makes the tube state equal to the dummy variable.	
Open	A boolean variable set to open the valve. After the time delay period, the variable is reset.
Close	A boolean variable set to close the valve. After the time delay period, the variable is reset.

5.2.40 SYSTEM VARIABLE OVERRIDE DEFINITION

The System Variable Override Definition Screen is accessed from the Advanced Capabilities Menu. The screen provides for changing default values of system variables. The system variables included and definitions of the variables are illustrated in Figure 5-41.

```
                    Active Configuration:            App Name

                       System Variable Override Definition

      Name         Units        Default     Description

   1  UNITID                          0     Unit Identification
   2  COMMID                          1     Communications Identification
   3  LOGGER                   Alrm&Opr     Logging
   4  BAUD1                        1200     BaudRate1
   5  BAUD2                        2400     BaudRate2

  10  PARITY1                      None     Parity - Port 1
  11  PARITY2                      None     Parity - Port 2
  12  PARITY3                      None     Parity - Port 3
  13  STOPBIT1                        1     Stop Bits - Port 1
  14  STOPBIT2                        1     Stop Bits - Port 2
  15  STOPBIT3                        2     Stop Bits - Port 3
  16  PRTCLSLV                   ModRTU     Slave Protocol
  17  PRTCLMAS                   ModRTU     Master Protocol
  18  RPTGAP                   FormFeed     Report Gap
  19  COMMWAIT      1OMS             20     Comm Wait
  20  EVENTLOG                      100     Number of MB Event Log Entries
  21  TYPEVNTS                   Old_1B     MB Event Length 10 or 22
  22  MODITOFF                       No     Allow Int/Sein Vars in FP Regs

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.           45%

 -1-     -2-     -3-     -4-     -5-    PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 5-41 - System Variable Override Definition Screen

System Variable Override Definitions

Column	Definition
Name	The name of the system variable
Units	Variable units (if applicable)
Default	The system default value to be downloaded to the 2500.
Description	The definition of the variable name.

5.2.41 PERIODIC UPDATE VARIABLE DEFINITION

The Periodic Update Variables screen is accessed from the Advanced Capabilities Menu and allows variables to be updated at fixed periodic intervals independent of calculation time. Periodic Update Variable Definition Entries have one of the following formats:

Name = [Comp1 Opcode Comp2]

Name = SQRT [Comp1 Opcode Comp2]

Each of the menu selections are described in the following menu. The Periodic Update Variables menu screen is illustrated in Figure 5-42.

```
                    Active Configuration:              App-Name

                   Periodic Update Variable Definition

      Name      Units     Comp1 Name  Comp2 Name  Opcode   Sqrt      Period

 1   PUVPRES              SP1_TRAN     PUVBIAS      +      Off        0.5
 2    PUVEXT              DP1_TRAN     PUVPRES      *      On         0.5
 3   PUVRATE                    CP      PUVEXT      *      Off        0.5
 4
 5
 6
 7
 8
 9
 10
 11
 12
 13
 14

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.           48%

 -1-     -2-   Delete  Insert  Clear  PrntScr SaveCFG PrntPg   -9-  Exit
```

Figure 5-42. Typical Periodic Update Variables Screen

Periodic Update Variables Definitions

Column	**Definition**
Name	Calculated result of the entry line.
Units	Corresponds to the units (PSIA,etc.) of the name.
Comp1 Name	Refers to the first component of the expression (Comp1 Opcode Comp2).
Comp2 Name	Refers to the component following the Opcode.
Opcode	Mathematical operation performed on Comp1 and Comp2 (+, -, *, /).
Sqrt	Switch which performs the square root function on the operation as required.
Period	Cyclical time period in seconds when the calculation is performed

5.2.42 PERIODIC UPDATE ANALOG OUTPUT COMPONENTS DEFINITION

The Periodic Update Analog Output Components Definition screen is accessed from the Advanced Capabilities Menu screen. The Periodic Update Analog Output Components Definition screen allows the user to specify up to eight component variables for each of the analog outputs. Each of the menu selections is described in the following table. The Periodic Update Analog Output Components Definition screen is illustrated in Figure 5-43.

```
                      Active Configuration:          App-Name

          Periodic Update Analog Output Components Definition

Chan ------------- Variable Names of Analog Output Components --------------

 1  SP2_TRAN
 2
 3   PUVRATE
 4

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.            48%

-1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg   -9-  Exit
```

Figure 5-43. Typical Periodic Update Analog Output Components Definition Screen

Periodic Update Analog Output Components Definitions

Column	**Definition**
Chan	Analog output channel defined for periodic update.
Names	As defined on the Hardware Definition - Analog Output screen--allows up to eight variables, the sum of which is output to the corresponding analog channel on a cyclical basis.

5.2.43 CALCULATION SHEET TITLE ENTRY SCREEN

The Calculation Sheet Title Entry screen is accessed from the Configuration Definition screen and provides for listing the title and type of individual calculation sheets. Each column of the calculation sheet title entry definition screen is defined in the following table. A typical Calculation Sheet Title Entry Screen is illustrated in Figure 5-44.

```
                 Active Configuration:            App-Name

                     Calculation Sheet Title Entry

                   Sheet #    Sheet Title     Calc Type

                         1  DESCRIPTION        Startup
                         2  COLD #1            Startup
                         3  COLD #2            Startup
                         4  COLD #3            Startup
                         5  COLD #4            Startup
                         6  COLD #5            Startup
                         7  OPERATOR #1       Operator
                         8  OPERATOR #2       Operator
                         9  REPORTS             Normal
                        10  LOAD INPUT DATA     Normal
                        11  CALCULATE DENS      Normal
                        12  CALCULATE GROSS     Normal
                        13  DEVIATION %         Normal
                        14  SPECIFIC GRAVITY    Normal

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.          42%

 -1-     -2-    Delete  Insert  Clear   Prntscr SaveCFG PrntPg  Proceed Exit
```

Figure 5-44. Typical Calculation Sheet Title Entry Sheet

Calculations Sheet Title Entry Sheet

Column	Definition
Sheet#	The identifying number of an individual calculation sheet. The 2500 instrument can have as many as 99 individual calculation sheets and each sheet can have as many as 50 lines of calculations and textual description of the calculation.
Name	The name (title) of an individual calculation sheet. The name can have a maximum of 16 characters.
Calc Type	The type of calculation. Three types of calculations are available: startup, operator, and normal. Calculation type is selected by pressing the space bar to cycle through the three choices, then pressing the enter key when the desired choice is displayed on the screen. Startup calculations are executed only once- at startup. They are calculations required when a 2500 instrument is first downloaded (upon cold start). All Startup calculations are executed before any operator or normal calculations regardless of the order the calculation sheets themselves occur on the Calculation Sheet Title Entry screen. Operator calculations provide rapid computations when complex computations are required as a result of operator changes to data values. Operator calculations are performed immediately after all startup calculations the first time a 2500 instrument is downloaded and any time an operator makes a front panel entry. All operator calculations are performed before any normal calculations regardless of the order the calculation sheets occur on the Calculation Sheet Title Entry screen. Normal calculations are those performed in all instances where startup and operator calculations are not required. Normal calculations are performed immediately after all operator calculations the first time a 2500 instrument is downloaded and then continuously as long as the 2500 is in operation. The normal calculations are performed in the order listed on the Calculation Sheet Title Entry screen.

5.2.44 CALCULATION ENTRY SCREEN

A Calculation Entry screen is accessed from the Calculation Sheet Title Entry screen by pressing the F9 (Proceed) function key. The Calculation Entry screen provides for entering individual calculation statements and a textual description of the calculation. The Calculation Entry Screen has space for 50 lines of calculation statements and textual description of the calculation. Each line can have a maximum width of 65 characters.

TEXTUAL DESCRIPTION: Lines of textual description must begin with a left-hand curved bracket ({) in order to be interpreted as text rather than a calculation statement.

CALCULATION SYNTAX CHECK: The CONFIG25 provides a syntax check on the current calculation entry sheet when the F9 (Proceed) key is pressed.

A typical Calculation Entry screen is illustrated in Figure 5-45.

```
                  Active Configuration:              App-Name

                                Calculation Entry
                   Title: CALCULATE GROSS     Type: Normal
 L#  Calculation Statements                                              Units

  1
  2
  3  METER = 1
  4
  5  GET ( COUNTS,METER,CURRENT,MCF,MKF )
  6  GET ( GROSS,METER,PREVIOUS,GINCR,GFR,GFRAC )

 24  GFR   = GINCR * 3600.0 / CYCLETIM
 25
 26  GINCR = GINCR + GFRAC
 27  GFRAC = GINCR - TRUNC ( GINCR )
 28
 29
 30  PUT ( GROSSINC,METER,INCR )
 31  PUT ( GROSS,METER,FREEZE,GINCR,GFR,GFRAC )
 32
 33
 34  METER = METER + 1
 35  IF (METER > NMETERS) GOTO NEXT
 36  GOTO 5
 37

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.            42%

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg  Proceed Exit
```

Figure 5-45. Typical Calculation Entry Screen

5.2.45 CONFIGURATION ANALYSIS AND TRANSFER MENU SCREEN

The Configuration Analysis and Transfer Menu screen is accessed from the General Menu and provides for:

- Analysis of a CONFIG25 configuration and preparation of the configuration for transfer (downloading) to the Model 2500
- Transfer of the configuration to the Model 2500 via either comm port 1 or comm port 2
- Modification of download parameters
- Examination of any errors resulting from the CONFIG25 analysis of the configuration

Each of the Configuration Definition Menu selections is defined in the following table. The Configuration Analysis and Transfer Menu screen is illustrated in Figure 5-46.

```
                 Active Configuration:              App-Name
                Configuration Analysis and Transfer Menu
                 Analyze and prepare configuration for transfer
                 Transfer configuration to 2500 via comm port 1
                 Transfer configuration to 2500 via comm port 2
                 Modify download parameters
                 Examine analysis errors

            Press the space bar to move to the next menu entry.
                   Press ENTER to make your selection.               42%
  -1-     -2-     -3-     -4-     -5-    Prntscr SaveCFG   -8-     -9-   Exit
```

Figure 5-46. Typical Configuration Analysis and Transfer Menu Screen

Configuration Analysis and Transfer Menu Screen Definitions

Selection	**Definition**
...analysis...	The internal analysis performed by CONFIG25, which results in the compilation of a build file (.BTA) that is ready to be downloaded to the Model 2500. The user is prompted before the analysis begins, at which time the analysis may be aborted.
...comm port 1...	The command to download to the Model 2500 through communications port 1 of the IBM PC or compatible computer
...comm port 2...	The command to download to the Model 2500 through communications port 2 of the IBM PC or compatible computer
Modify...parameters	Provides for modifying download baud rate and communications identification (ID)
Examine.....	A listing of analysis errors (if any)

5.2.46 DOWNLOAD VARIABLES DEFINITION SCREEN

The Download Variables Definition Screen is accessed from the Configuration Analysis and Transfer Menu Screen and provides for modifying download parameters. The screen is illustrated in Figure 5-47.

```
                Active Configuration:              App-Name
                     Download Variables Definition
                #   Baud Rate   Communications Id.
                   1  2400               1

           Press the space bar to move to the next data entry.
              Press ENTER to  select a channel for editing.            42%
 -1-     -2-     -3-     -4-     -5-    Prntscr SaveCFG   -8-     -9-   Exit
```

Figure 5-47. Download Variables Definition Screen

Download Variables Definition Screen Definitions

Selection	Definition
Baud Rate	Provides for changing the baud rate.
Communications ID	Provides for changing the communications ID

5.2.47 THE CONFIGURATION DOCUMENTATION MENU SCREEN

The Configuration Documentation Menu screen is accessed from the General Menu and provides for:

- Generating a list file (.lst)
- Printing the documentation on a printer
- Printing the wirelist on a printer

Each of the Configuration Documentation Menu selections is defined in the following table. The Configuration Documentation Menu is illustrated in Figure 5-48.

```
                Active Configuration:            App-Name
                    Configuration Documentation Menu
                      Put documentation in ".lst" file
                      Print documentation on printer
                      Print wirelist on printer



           Press the space bar to move to the next menu entry.
                   Press ENTER to make your selection.              42%
 -1-     -2-     -3-     -4-     -5-    Prntscr SaveCFG  -8-     -9-    Exit
```

Figure 5-48. Configuration Documentation Menu Screen

Configuration Documentation Menu Screen Definitions

Selection	Definition
.... .lst	The command to generate a list file (.lst) so the documentation can be printed with computer DOS software
Print.....	The command to print the documentation on a printer using the CONFIG25 program software. Pressing any key while printing a configuration triggers an abort printing option. A complete page must finish printing before the user is prompted for the print abort.
...wirelist...	The command to print the wirelist on a printer using the CONFIG25 program software.

5.2.48 CONFIGURATION FILE ACTIONS SCREEN

The Configuration File Actions screen is accessed from the General Menu and provides for:

- Creating a new configuration
- Renaming an existing configuration
- Copying an existing configuration
- Deleting an existing configuration
- Merging existing configuration to current configuration

Each of the Configuration File Actions screen selections is defined in the following table. The Configuration File Actions screen is illustrated in Figure 5-49.

```
                  Active Configuration:             App-Name

                           Configuration File Actions

               Start a new configuration

               Rename an existing configuration

               Copy an existing configuration to a new configuration

               Delete an existing configuration

               Merge existing configuration to current configuration

            Press the space bar to move to the next menu entry.
                    Press ENTER to make your selection.            42%
 -1-     -2-     -3-     -4-     -5-    Prntscr SaveCFG   -8-     -9-   Exit
```

Figure 5-49. Configuration File Action Screen

Configuration File Action Screen Definitions

Selection	Definition
Start.....	The command to create a new configuration. The menu screen that appears with this selection is self-explanatory.
Rename.....	The command to rename an existing configuration. The menu screen that appears with this selection is self-explanatory.
Copy.....	The command to copy an existing configuration. The command accepts a file name for both input and output files. A disk drive must be specified in the file names. For example, to copy Application No.C511046A from drive C: to drive A:, enter: input file name: D511046A (If the currently logged drive is drive C:) or input file name: C:D511046A (If the currently logged drive is not drive C:) output file name: A:D511046A
Delete.....	The command to delete an existing configuration. The menu screen that appears with this selection is self-explanatory.
Merge.....	The command to merge an existing configuration to the current configuration. The menu screen that appears with this selection is self-explanatory.

SECTION 6

CALCULATIONS

6.0 GENERAL

This section includes the following:

- The types of calculations that can be configured by CONFIG25 to be performed by the Model 2500 Series
- The basic operating system rules of the Model 2500 Series
- Mathematical and logical functions used in writing calculation statements

6.1 CALCULATION TYPES

The Model 2500 Series performs three types of calculations when configured by CONFIG25 and equations must be written for the appropriate calculation type. The types of calculations performed in the CONFIG25 configuration are:

Calculation Type	**Definition**
STARTUP	Calculations specified as STARTUP calculations on the Calculation Sheet Title Entry screen. Startup calculations are used for initializing variable data and are executed only once at startup. They are required after a Model 2500 is first downloaded (upon cold start). All Startup calculations are executed before any normal or operator calculations regardless of the order the calculations sheets themselves occur on the Calculation Sheet Title Entry screen.
OPERATOR	Calculations specified as Operator calculations on the Calculation Sheet Title Entry screen. Operator calculations provide rapid computations when complex computations are required as a result of operator entry changes to data values. Operator calculations are performed immediately after all startup calculations the first time a Model 2500 instrument is downloaded and any time an operator makes a front panel entry. All operator calculations are performed before any normal calculations regardless of the order the calculation sheets occur on the Calculation Sheet Title Entry screen.
NORMAL	Calculations specified as Normal calculations on the Calculation Sheet Title Entry screen. Normal calculations are performed immediately after all operator calculations the first time a Model 2500 instrument is downloaded and after all operator calculations at each power-up. Normal calculations are performed in the order listed on the Calculation Sheet Entry screen.

6.2 BASIC MODEL 2500 SERIES OPERATING SYSTEM RULES

The following are the basic rules followed by the Model 2500 Series operating system.

6.2.1 IDENTIFIERS

An identifier is a variable name that consists of a letter followed by any combination of letters, digits, underscores and $. Identifiers are limited to eight characters. This definition applies to all variables in a CONFIG25 application.

6.2.2 NUMERIC EXPRESSIONS

A numeric expression can consist of a single numeric constant or variable, or it can be made up of a combination of several constants and variables linked by mathematical operators to produce a single numeric value.

6.2.3 NUMERIC OPERATORS

Numeric operators perform mathematical or logical operations on numeric values. They are defined as numeric operators because they produce a number value. CONFIG25 numeric operators are divided into the four following categories:

- Arithmetic
- Relational
- Logical
- Functions

6.2.4 ARITHMETIC OPERATORS

Arithmetic operators perform the operations listed as follows. In an equation, the operations are performed in the order listed.

Operator	**Operation**	**Sample Expression**
^	Exponentiation	X^Y
-	Negation	-X
*,/	Multiplication, Division	X*Y X/Y
MOD	Modulo Arithmetic	X MOD Y
+,-	Addition, Subtraction	X+Y X-Y

Modulo arithmetic is denoted by the operator with the expression MOD. MOD gives the integer value that is the remainder of an integer division.

For example:

A = 7 MOD 4

The value of A is 3.

This result occurs because 7/4 is 1, with a remainder of 3.

6.2.5 RELATIONAL OPERATORS

Relational operators compare two values. The result of the comparison is either true or false and is usually used in Model 2500 Series applications to make a decision regarding program flow. The comparisons available are listed as follows.

Operator	Comparison Made	Sample Expression
=	Equality	X=Y
<>	Inequality	X<>Y
<	Less than	X<Y
>	Greater than	X>Y
<=	Less than or equal to	X<=Y
>=	Greater than or equal to	X>=Y

When arithmetic and relational operators are combined in one expression, the arithmetic is always performed first. For example, the expression:

X+Y < (T-1)/Z

will be true if the value of X plus Y is less than the value of T-1 divided by Z.

6.2.6 LOGICAL OPERATORS

Logical operators perform logical (or Boolean) operations on numeric values. Whereas relational operators are usually used to make decisions regarding program flow, logical operators usually connect two or more relations and return a true or false value to be used in a decision.

A logical operator takes a combination of true-false values and returns a true or false result. Logical operators are:

NOT (logical complement)
AND (conjunction)
OR (disjunction)
XOR (exclusive or)

Each operator returns results as indicated in the following tables. (T indicates a true, or non-zero value. F indicates a false, or zero value.) The operators are shown listed in order of precedence.

NOT

X	NOT X
T	F
F	T

AND

X	Y	X AND Y
T	T	T
T	F	F
F	T	F
F	F	F

OR

X	Y	X OR Y
T	T	T
T	F	T
F	T	T
F	F	F

XOR

X	Y	X XOR Y
T	T	F
T	F	T
F	T	T
F	F	F

The following are examples of logical operators in decisions.

```
IF HE>60 AND SHE<20 GOTO 10
```

In this expression, the result will be true if the value of the variable HE is more than 60 and also the value of SHE is less than 20.

```
IF I>10 OR K<0 GOTO 5
```

The result will be true if I is greater than 10, or K is less than 0, or both.

```
IF NOT (P=-1) GOTO 10
```

In this expression, the program will branch to line 10 if P is not equal to -1. Note that NOT (P=-1) does not produce the same result as NOT P.

```
FLAG = NOT FLAG
```

In this example, a value is switched back and forth from true to false.

6.2.7 NUMERIC FUNCTIONS

A function is used like a variable in an expression to perform a predetermined operation on one or more operands. CONFIG25 has a number of built-in functions that reside in the system, such as SQRT (square root) and SIN (sine).

6.2.8 ORDER OF EXECUTION

Operations in an equations are executed in the following order:

- Numeric functions
- Arithmetic operations, executed in the following order:

  Exponentiation (^)
  Negation (unary -)
  Multiplication, division (*,/)
  Modulo Arithmetic (MOD)
  Addition, subtraction (+,-)

Relational operations

Logical operations, executed in the following order:

  NOT
  AND
  OR
  XOR

Operations of the same level of precedence are performed from left to right in an expression, except that operations within parentheses are performed first. Inside parentheses, the normal order of precedence is followed.

6.3 CONFIG25 EXPRESSIONS AND ALGEBRAIC COUNTERPARTS

The following are examples of common algebraic expressions and the CONFIG25 counterparts.

Algebraic Expression	CONFIG25 Expression
$X+2Y$	X+Y*2
$X-\frac{Y}{Z}$	X-Y/Z
$\frac{XY}{Z}$	X*Y/Z
$\frac{X+Y}{Z}$	(X+Y)/Z
$(X^2)^Y$	(X^2)^Y
$X^{(Y^Z)}$	X^(Y^Z)
$X(-Y)$	X*(-Y)

NOTE: Two consecutive operators must be separated by parentheses as shown in the example X*(-Y).

6.4 CONFIG25 MATHEMATICAL AND LOGICAL FUNCTIONS

A number of function operators are available in CONFIG25 to facilitate entering calculation statements. Discussions of CONFIG25 functions follow in alphabetical order.

ABS FUNCTION

PURPOSE	To return the absolute value.
FORMAT	V = ABS (X)
REMARKS	If the value of X is an integer the value of ABS is an integer. If the value of X is real, the value of ABS is real.
EXAMPLE	X = ABS (-1.7) The value of X is 1.7 X = ABS (-2) The value of X is 2

ADJ4to20 COMMAND

PURPOSE	To adjust the 4 to 20mA outputs of smart transmitter channel.
FORMAT	ADJ4to20(Chan) Where: Chan is an integer from 1 through 12 that indicates the interface channel.
EXAMPLE	ADJ4to20(2) The smart transmitter interface channel is No. 2.

ADJRANGE COMMAND

PURPOSE	To change the range of a smart transmitter channel
FORMAT	ADJRANGE(Chan, LowRange, UpRange) Where: Chan is an integer from 1 through 12 that indicates the interface channel. LowRange is the floating point value of the new low range value. UpRange is the floating point value of the new upper range value.
EXAMPLE	ADJRANGE(2,0.0,200.0)

AGAR STATEMENT

PURPOSE	To provide coefficients of calibration for the Agar frequency densitometer to the density function.
FORMAT	AGAR (CALTEMP, KO, TO, DO, TEMPCOEFF, CALSPANLB, CALSPANS)
REMARKS	The factors are obtained from the manufacturer's calibration certificate. Care must be taken in naming the variables in this statement to ensure that the statement will fit on one line of a calculation sheet. This statement is intended for use with the DENSITY function.
APPLICATION	Variable names are defined for numeric operator entry. Data values are entered from the calibration certificate. Engineering units for the coefficients must be consistent. The following are the normally expected units for common coefficients: <u>Coefficient</u> — <u>Expected Units</u> CALTEMP — degrees celsius (°C) KO — - TO — Microseconds (µsec) DO — pound-mass per cubic foot (lbm/ft^3) TEMPCOEFF — grams per cubic centimeter per °F (gm/cc/°F) CALSPANLB — lbm/ft^3 CALSPANS — msec

ALARMLOG COMMAND

PURPOSE	To print the alarms that are present in the current alarm list:
FORMAT	ALARMLOG
EXAMPLE	ALARMLOG

ALARMNUM FUNCTION

PURPOSE	To recall the number of alarms in a system for use in reports, auto-dial reports, etc.
FORMAT	v = ALARMNUM
REMARKS	v is initialized to zero upon startup, incremented by one each time a new alarm is set, and decreased by one each time an alarm is reset.
EXAMPLE	x = ALARMNUM The value of x is the number of current alarms in the system.

ARCTAN FUNCTION

PURPOSE	To return the arctangent of x, when x is expressed in radians.
FORMAT	v = ARCTAN (X)
COMMENTS	The expression X may be any numeric type. To convert from degrees to radians, multiply by 3.14.../180.
EXAMPLE	X = ARCTAN (3) The value of X is 1.249046.

BARTON STATEMENT

PURPOSE	To provide coefficients of calibration for the Barton frequency densitometer.
FORMAT	BARTON (CALTEMP, A, B, TEMPCOEFF, PRSCOEFF, AVGDENSITY)
REMARKS	The factors are obtained from the manufacturer's calibration certificate. Care must be taken in naming the variables in this statement to ensure that the statement will fit on one line of a calculation sheet. This statement is intended for use with the DENSITY function.
APPLICATION	Variable names are defined for numeric operator entry. Data values from the calibration certificate are entered. Units should be consistent. <u>Coefficient</u> — <u>Expected Units</u> CALTEMP — ^{o}F A — - B — gm/cc TEMPCOEFF — gm/cc/^{o}F PRS COEFF — gm/cc per pounds per square inch (gm/cc/psi) AVGDENSITY — gm/cc

BESTDP FUNCTION

PURPOSE	To return the best differential pressure (DP) from a set of DP inputs.
FORMAT	V = BESTDP (DP1, DP2 [,DP3...])
REMARKS	The inputs to BESTDP must be the analog input channels intended for the differential pressure (DP) transducers. BESTDP returns the DP from the transducer where DP is closest to but does not exceed the full-scale value. The BESTDP function uses only the live value of the analog input. If the "DP in use" is below the zero scale value, the next DP in line will be used.
EXAMPLE	X = BESTDP (DP1, DP2, DP3) If the full-scale values for DP1, DP2 and DP3 are 50, 100, and 150, respectively, BESTDP will return DP1 values between 0 and 50. If the value of DP1 should exceed 50 (its full scale value) then the value from DP2 will be used.

CALIBRATE COMMAND

PURPOSE	To calibrate a smart transmitter channel
FORMAT	CALIBRATE(Chan, Lowhigh, Input) Where: Chan is an integer from 1 through 12 that indicates the interface channel. LowHigh is either the integer 1 or 2 where: 1 sends the command to calibrate the low input 2 sends the command to calibrate the high input (If the integer is neither 1 nor 2, the CALIBRATE command is ignored. Input is the floating point value of the input to the transmitter, e.g., PSI, Deg, H2O.
EXAMPLE	CALIBRATE(2, 2, 100.0)

CLIP FUNCTION

PURPOSE	To return a value clipped to be within a specified range.
FORMAT	V = CLIP (X, LOW, HIGH)
REMARKS	The value of V will be X when the condition LOW $\leq$ X $\leq$ HIGH occurs. Otherwise when X < LOW, V will be LOW, or when X > HIGH then V will be HIGH.
EXAMPLE	X = 1.0 X = Clip (X, 1.5, 2.5) The value of X will be 1.5 X = 2.0 X = Clip (X, 1.5, 2.5) The value of X will be 2.0 X = 3.0 X = Clip (X, 1.5, 2.5) The value of X will be 2.5

COS FUNCTION

PURPOSE	To return the cosine of the value of x.
FORMAT	Y = COS(X)
COMMENTS	X must be in radians. COS is the trigonometric cosine function. To convert from degrees to radians: Radians = $\frac{\text{degrees * 180}}{3.1416}$
EXAMPLE	X = COS (.4) The value of X is .921061

CURALRM FUNCTION

PURPOSE	To return the current alarm condition of a variable.
FORMAT	I = CURALRM (VNAME)
REMARKS	VNAME is the name of the variable and must have been defined before calling this function on the variable. The value of I returned is derived from a 16-bit integer that has the alarm state bit-mapped into the value. The I value returned is interpreted by subtracting from it the largest number from the table below that will leave a positive remainder. The subtrahend and remainder correspond to the current alarm conditions of the variable. Value — Current Alarm Status 1024 — LoLo alarm 2048 — Lo alarm 4096 — Hi alarm 8192 — HiHi alarm 16384 — Rate alarm
EXAMPLE	I = CURALRM (PRES) For example, if the value of I returned is 12288, then the largest number from the table that can be subtracted from 12288 and leave a positive remainder is 8192 (12288 - 8192 = 4096). Referring to the table, the subtrahend (8192) corresponds to the HiHi alarm and the remainder (4096) corresponds to the Hi alarm. Therefore, an I of 12288 returned for the function CURALRM (PRES) indicates the variable PRES is in Hi and HiHi alarm.

CURREC FUNCTION

PURPOSE	To obtain the current record number for an archive area being used in the sequential mode.
FORMAT	V = CURREC (ANAME)
REMARKS	ANAME is the name of an archive area. The value returned is an integer.
EXAMPLE	After the GET commands (see GET) GET (ARC, 1, V1, V2, V3) R1 = CURREC (ARC) GET (ARC, -1, V1, V2, V3) R2 = CURREC (ARC) GET (ARC, -1, V1, V2, V3) R3 = CURREC (ARC) are executed, the values of R1, R2 and R3 are R1 = 1 R2 = 2 R3 = 3

DATESTAMP FUNCTION

PURPOSE	To return the current day, month, and year.
FORMAT	I = DATESTAMP
REMARKS	The value of I returned is a six-digit integer with the form MMDDYY in which MM is the month (1 - 12) without preceding initial zeros, DD is the day of the month, and YY is the year minus 1980.
EXAMPLE	I = DATESTAMP For example, if the value of I returned is 41407, the date is April 14, 1987.

DAY FUNCTION

PURPOSE	To return the day of the month.
FORMAT	V = DAY
REMARKS	The value of V is an integer
EXAMPLE	K = DAY On May 30, 1985 the value of K is 30.

DIALSTATE FUNCTION

PURPOSE	To monitor the activity of the auto-dial modem following a DIALUP command. The function returns a status value indicating the progress made toward completing the telephone call, or the problems encountered if the call cannot be completed.
FORMAT	v = DIALSTATE (PORT) Where PORT indicates the 2500 communications port to use.
REMARKS	The values returned by DIALSTATE are defined in the table below. Value Definition 0 Idle 1 DIALUP in progress 2 HANGUP in progress 3 Call answered 4 No answer 5 Dial error 6 Wrong serial port specified
EXAMPLE	x = DIALSTATE (2) returns X = 1: Where the value returned for x indicates (by referring to the definitions shown for the values in the table above) that DIALUP is in progress in port No.2

DIALUP FUNCTION

PURPOSE	To initiate dialing a telephone number by the auto-dial modem.
FORMAT	DIALUP(Port, ModemType, PhoneNo [,PhoneNo]) Port is the parameter indicating the communications (serial) port to use. ModemType is a selection or integer variable indicating the type of modem in use ("1" indicates a Hayes modem and "2" a UDS modem). PhoneNo is the number Model 2500 is to dial. In cases where two telephone numbers separated by a pause are desired (for example, dialing "9" for an outside line), Model 2500 will pause after the first number if the second number is entered as a negative number. The length of the pause is determined by the defaults set within the modem selected. The telephone number can be either a string of numbers (no symbols such as parentheses or brackets are allowed) or an integer variable.
EXAMPLE	DIALUP(1,1,9,-2221234) Where the example dials a 9, pauses for a dial tone, then dials the second telephone number, 222-1234. and DIALUP(1,1,1,800,2221234) Where the example dials a long distance number. In this example there is no pause between dialing the numbers. **NOTES:** 1. The telephone numbers in the DIALUP command may be written together without commas if the combined number does not exceed 4294967295. Therefore, the example above, DIALUP(1,1,1,800,2221234), can be written as DIALUP(1,1,1800,2221234) but not as DIALUP(1,1,18002221234) because 18002221234 exceeds the maximum number, 4294967295. 2. Leading zeros are ignored, therefore the number can not be expressed as 18,002221234 because the 2500 microprocessor interprets this number as 182221234.

DENSITY FUNCTION

PURPOSE	To calculate density for Agar, Barton, and Solartron frequency densitometers.
FORMAT	x = DENSITY (FREQ, TEMP, PRS, DCF)
EXAMPLE	The corrected density is calculated in gm/cc. FREQ is the pulse input frequency in Hertz. TEMP is the temperature in °F. PRS is static pressure in pounds per square inch, gauge (psig). DCF is a densitometer correction factor. Prior to executing the DENSITY function one of the densitometer definition statements (AGAR, BARTON, SOLARTRON) must have been executed. SOLARTRON (CALTEMP, K0, K1, K2, K18, K19, K20a, K20b, K21A, K21B) DEN = DENSITY (FREQ, TEMP, PRS, DCF) The variable DEN has the value of density in units of gm/cc.

ETHYLENE FUNCTION

PURPOSE	To calculate the density of vapor phase ethylene based on the temperature and pressure of the fluid.
FORMAT	C = Ethylene(Temp, Prs) Where: C is the density of vapor phase ethylene. Temp is the temperature of ethylene in °F. Prs is the pressure of ethylene in PSIA.
REMARKS	The Ethylene function is based on the API 2565 standard and the FORTRAN subroutines ETHYLE, RUBIN, and TAINT supplied by API. The density calculated by ETHYLENE is within ±.0001 of the results calculated by the API subroutines. The range for temperature is 20.0 to 167.0 °F. The range for pressure is 200.0 to 2100.0 PSIA. Input values outside these limits are clipped to the limits and the density at the clipped values is returned. The ETHYLSTAT function (q.v.) flags the clipping of temperature or pressure values if it occurs.
EXAMPLE	C = Ethylene(100, 500)

ETHYLSTAT FUNCTION

PURPOSE	To return a status code based on the last calculation performed by the ETHYLENE function. The ETHYLSTAT status codes are: Code Definition 0 Calculation good 1 (Not used) 2 Temperature outside limits 3 Pressure outside limits 4 (Not used) 5 BWR calculation did not converge in 25 iterations

EXP FUNCTION

PURPOSE	To return e to the power of X.
FORMAT	V = EXP(X)
COMMENTS	X must be less than 88.02969 If EXP overflows, machine infinity with the appropriate sign is supplied as the result, and execution continues.
EXAMPLE	X = EXP(4) The value of X is 54.59815

FIX FUNCTION

PURPOSE	To truncate a floating point value to an integer.
FORMAT	v = FIX(x)
COMMENTS	FIX does not round off numbers, it simply eliminates the decimal point and all digits to the right of the decimal point.
EXAMPLES	x = FIX (58.75) The value of x is 58 x = FIX (-3.5) The value of x is -3

FIXED FUNCTION

PURPOSE	To return the fixed value for a variable.
FORMAT	V = FIXED(X)
COMMENTS	A fixed value should be defined for x, otherwise 0.0 is returned.
EXAMPLES	V = FIXED (ANALIN1) The value of X is the FIXED value of ANALIN1.

FLOAT FUNCTION

PURPOSE	To return a floating point value from an integer number.
FORMAT	v = FLOAT(x)
COMMENTS	The FLOAT function ensures that an integer value is converted to a real value. In most cases this is done automatically.
EXAMPLES	X = FLOAT(1) The value of X is 1.0

FULLSCALE FUNCTION

PURPOSE	To return the full-scale value for a variable.
FORMAT	V = FULLSCALE(X)
REMARKS	A full scale value must be defined for X, otherwise 0.0 is returned.
EXAMPLES	X = FULLSCALE (AnalIn1) The value of X is the full scale value of AnalIn1.

GET COMMAND

PURPOSE	To retrieve data from a 2500 archive area.
FORMAT	GET (ANAME, REC, VAR1 [, VAR2....VARN])
REMARKS	ANAME is the name of an archive area defined in the configuration process. REC is the record number from which data is to be retrieved. VAR1 through VARN are the names of variables to receive the retrieved data. The variables must be of the same data type as those defined in the archive definition. Unexpected results will occur if the types differ. If the record number exceeds the number of records defined in the archive definition, the last record in the archive will be retrieved. The GET command can also automatically step sequentially through the records by using a record number of -1. When the last record of the area is retrieved, the next sequential GET retrieves record 1. Also see PUT and CURREC.

EXAMPLE

The archive ARC contains:

REC #	VAR1	VAR2	VAR3
1	1	2	3
2	4	5	6
3	7	8	9

After the GET command

GET (ARC, 2, V1, V2, V3)

the values for V1, V2, and V3 are

V1 = 4
V2 = 5
V3 =6

After the command

GET (ARC, -1, V1, V2, V3)

the results are

V1 = 7
V2 = 8
V3 = 9

Repeating the command results in

V1 = 1
V2 = 2
V3 = 3

The record number in the last two examples was stepped from the value of 2 set in the first example to 3, and finally to 1. This last step automatically wrapped around to the start when the end of the storage area was reached.

GOTO STATEMENT

PURPOSE	To branch out of the normal execution sequence to a specified line number, to the next sheet, or to the start of all calculations.
FORMAT	GOTO LINE NUMBER GOTO Next GOTO Start
REMARKS	LINE NUMBER can specify any line on the current sheet.
EXAMPLES	GOTO 10 (The execution sequence goes to line 10.) GOTO 1 (The execution sequence goes to line 1.)

GRICMP FUNCTION

PURPOSE	To define chromatographic input values for AGA-8, 1985 calculations. **NOTES:** 1. This command must be called before the GRIPROC command is executed in order to perform an AGA-8 calculation. 2. AGA-8 calculations require a two-board version of the Model 2500 equipped with an optional EPROM with the AGA-8 procedures installed. If the Model 2500 does not have the capability to perform AGA-8, the functions GRICMP and GRIPROC are ignored.
FORMAT	GRICMP(a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t)
REMARKS	The variables a through t of the GRICMP function represent different components of a gas and are defined in the table below. The GRICMP function must include all twenty variables although some may have a value of zero (0). The calculation line is limited to 65 characters and this should be kept in mind when naming variables so that the maximum line length is not exceeded. Also, the sum of the values of all twenty variables must equal one (1). a = nitrogen mole fraction b = CO2 mole fraction c = H2S mole fraction d = Water mole fraction e = Helium mole fraction f = Methane mole fraction g = Ethane mole fraction h = Propane mole fraction i = nButane mole fraction j = iButane mole fraction k = nPentane mole fraction l = iPentane mole fraction m = nHextane mole fraction n = nHeptane mole fraction o = nOctane mole fraction p = nNonane mole fraction q = nDecane mole fraction r = Oxygen mole fraction s = CO mole fraction t = Hydrogen mole fraction
EXAMPLE	GRICMP(a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t) Where the values for variables a through t are supplied for AGA-8 calculations either by operator entry or gas chromatograph.

GRIPROC FUNCTION

PURPOSE	To perform AGA-8 calculations. **NOTES:** 1. The GRICMP command must be called before the GRIPROC command is executed in order to perform an AGA-8 calculation. 2. AGA-8 calculations require a two-board version of the Model 2500 equipped with an optional EPROM with the AGA-8 procedures installed. If the Model 2500 does not have the capability to perform AGA-8, the functions GRICMP and GRIPROC are ignored.
FORMAT	GRIPROC(GRIData,LineTemp,LinePres,BaseTemp,BasePres) Where: GRIData is the name of an archive area. LineTemp is the line temperature in degrees Rankine (ºR). LinePres is the line pressure in pounds per square inch absolute (PSIA). BaseTemp is the base temperature in ºR. BasePres is the base pressure in PSIA.

REMARKS

The results of the GRIPROC calculation are returned in the GRIData archive. The GRIData archive consists of one record. The table below illustrates the contents of a typical GRIData archive.

Variable Name	Value Type	Variable Definition
ZLine	Floating	Line compressibility factor
ZRef	floating	Reference compressibility factor
Fpv	Floating	Fpv factor
Density	Floating	Mass density in kilograms per cubic meter (kg/m^3)
SpecVol	Floating	Specific volume in cubic meters per kilogram (m^3/kg)
MolarMss	Floating	Molar mass in pounds
MolarDen	Floating	Molar density in kilogram-moles per cubic meter ($kg\text{-}mole/m^3$)
MolarVol	Floating	Molar volume in cubic meters per kilogram-mole ($m^3/kg\text{-}mole$)
Error	Integer	Error flag*

* Error flags are defined in the table on the following page:

Value	Error Definition
0	No error
1	Root too small
3	Root not found

HANGUP FUNCTION

PURPOSE	To send a hang-up command to the auto-dial modem.
FORMAT	HANGUP (PORT), in which PORT indicates the communications (serial) port to use.
REMARKS	Executing HANGUP sets the DIALSTATE function to Idle.
EXAMPLES	HANGUP (1)

HI FUNCTION

PURPOSE	To return the High Alarm limit for a variable.
FORMAT	V = HI(X)
REMARKS	If no alarm limits are defined for X, 0.0 is returned.
EXAMPLES	X = HI (AnalIn1) The value of X is the HI alarm limit of AnalIn1.

HI HI FUNCTION

PURPOSE	To return the HIHI alarm limit for a variable.
FORMAT	V = HIHI(X)
REMARKS	If no alarm limits are defined for X, 0.0 is returned.
EXAMPLES	X = HIHI (AnalIn1) The value of X is the HIHI alarm limit of AnalIn1.

HOUR FUNCTION

PURPOSE	To return the hour of the current time.
FORMAT	V = HOUR
REMARKS	The value of V is an integer.
EXAMPLES	K = HOUR At 10pm the value of K is 22

IF STATEMENT

PURPOSE	To make a decision regarding program flow based on the results of an expression.
FORMAT	IF "expression" "statement".
REMARKS	The IF "expression" must result in a boolean value (i.e., true or false, on or off). The "statement" may be any valid statement or assignment except another IF statement. When the expression is evaluated as true, the statement is executed. The "expression" may be separated from the other parts of the "statement" by parentheses.

EXAMPLES	IF (X=Y) GOTO NEXT
	
	When X and Y are equal, the remainder of the sheet is skipped and the execution sequence continues on the next sheet.
	
	RESET (K)
	IF J < 10 SET (K)
	
	When J is less than 10, the boolean K is set to on (or true).
	
	IF (K) GOTO 20
	
	When K is set or true (previous example) execution continues on line 20.

IOTIME FUNCTION

PURPOSE	To return the number of milliseconds between the current and previous start of a calculation cycle.
FORMAT	V = IOTIME
REMARKS	The IOTIME function returns an integer value that represents the period from the start of the previous calculation cycle to the start of the present calculation cycle.

LIVE FUNCTION

PURPOSE	To return the current (live) value of a variable regardless of the state of the manual override flag.
FORMAT	v = LIVE(x)
REMARKS	Normally the value of a variable is the live value unless the manual override flag is set, in which case the fixed value is the value of the variable. The LIVE function always returns the live value. X may be numeric or boolean.
EXAMPLES	K = LIVE (AnalInl) The value of K is the live value of AnalIn1.

LN FUNCTION

PURPOSE	To return the natural logarithm of a value.
FORMAT	V = LN(X)
COMMENT	X must be a number greater than zero.
EXAMPLES	X = LN (2) The value of X is .6931472

LO FUNCTION

PURPOSE	To return the LOW alarm limit for a variable.
FORMAT	v = LO(x)
REMARKS	If no alarm limits are defined for X, 0.0 is returned.
EXAMPLES	X = LO (AnlIn1) The value of X is the LO alarm limit of AnalIn1.

LOG FUNCTION

PURPOSE	To return the base 10 logarithm of X.
FORMAT	v = LOG(x)
COMMENT	X must be a number greater than zero.
EXAMPLES	X = LOG(2) The value of X is .30103.

LOLO FUNCTION

PURPOSE	To return the LOLO alarm limit for a variable.
FORMAT	V = LOLO(X)
REMARKS	If no alarm limits are defined for X, 0.0 is returned.
EXAMPLE	X = LOLO (AnalInl) The value of X is the LOLO alarm limit of AnalIn1.

MANUAL FUNCTION

PURPOSE	To return the current status of the manual override flag for a variable.
FORMAT	V = MANUAL(X)
REMARKS	The value returned is boolean.
EXAMPLE	K = MANUAL (AnalInl) The value of K is true or set when the AnalInl variable is in manual override.

MANUALOFF COMMAND

PURPOSE	To reset the manual override flag of a variable from a calculation sheet.
FORMAT	MANUALOFF(VNAME) Where VNAME is the name of the variable.
REMARKS	If the variable VNAME cannot be placed in the manual override mode, this command is ignored.
EXAMPLE	MANUALOFF(PRESSURE) If the variable PRESSURE has a fixed value and can be placed in the manual mode, the working value returned for PRESSURE is the live value.

MANUALON COMMAND

PURPOSE	To set the manual override flag of a variable from a calculation sheet.
FORMAT	MANUALON(VNAME) Where VNAME is the name of the variable.
REMARKS	If the variable VNAME cannot be placed in the manual override mode, this command is ignored.
EXAMPLE	MANUALON(PRESSURE) If the variable PRESSURE has a fixed value and can be placed in the manual mode, the working value returned for PRESSURE is the fixed value.

MAX FUNCTION

PURPOSE	To select the maximum value from a list of values.
FORMAT	R = MAX (R1, I2, [R3,.....])
REMARKS	R, R1, R2, R3, are floating point values. Any number of inputs may be specified. If an integer value is specified, it is automatically converted to a floating point value.
EXAMPLE	R1 = 1.0 I2 = 2 R3 = 3.0 R = MAX (R1, I2, R3) The value of R will be 3.0. The integer value of 2 (assigned the value I2) is converted to 2.0 when MAX is invoked.

MIN FUNCTION

PURPOSE	To select the minimum value from a list of values.
FORMAT	R = MIN (R1, R2, [R3,....])
REMARKS	R, R1, R2, R3 are floating point values. Any number of values may be specified. If an integer is specified, it is automatically converted to a floating point value.
EXAMPLE	R1 = 1.0 R2 = 2.0 I3 = 3 R = MIN (R1, R2, I3) The value of R will be 1.0. The integer value of 3 is converted to 3.0 when MIN is executed.

MINUTE FUNCTION

PURPOSE	To return the minutes of the current hour.
FORMAT	V = MINUTE
REMARKS	The value of v is an integer.
EXAMPLE	K = MINUTE At 10:20, the value of K is 20.

MONTH FUNCTION

PURPOSE	To return the numerical equivalent of the month for the current date.
FORMAT	V = MONTH
REMARKS	The value of V is an integer.
EXAMPLE	K = MONTH On May 30, 1989 the value of K is 5

MSEC FUNCTION

PURPOSE	To return a count of milliseconds from the system clock.
FORMAT	V = MSEC
REMARKS	This function give an absolute count of milliseconds from the system clock. This count is then available for tasks such as measuring intervals or controlling events.
EXAMPLE	K = MSEC V = MSEC - K The value of V is the number of milliseconds required to store K and perform the subtraction.

NUMEVENTS FUNCTION

PURPOSE	To return the number of events in the internal event log queue.
FORMAT	E = NumEvents
REMARKS	E is an integer value.

NX19 FUNCTION

PURPOSE	To calculate supercompressibility factors.
FORMAT	Fpv = NX19 (AbsTemp, FlowPrs, Gravity, MoleCo2, MoleN2)
REMARKS	Fpv is the supercompressibility factor. AbsTemp is the temperature of the gas in degrees Rankin (°R). FlowPrs is the static pressure in psig. Gravity is the specific gravity in SGU. MoleCO2 and MoleN2 are the mole percents of carbon dioxide and nitrogen in the gas. Fpv is calculated in accordance with American Gas Association (AGA) Standard NX-19 - Manual for the Determination of Supercompressibility Factors for Natural Gas.
EXAMPLE	TEMP = 70 N2 = 0.5 CO2 = 1.23 G = 0.605 PRESSURE = 1097 T = TEMP + 460.0 FPV = NX19 (T, PRESSURE, G, CO2, N2) The value of FPV is 1.083

OPCHGLOG FUNCTION

PURPOSE	To command the Model 2500 to log operator entry changes in the operator change list and clear all entries in the operator change list after they are logged.
FORMAT	OPCHGLOG
EXAMPLE	OPCHGLOG

OPCHGNUM FUNCTION

PURPOSE	To return the current number of operator changes on the operator change list.
FORMAT	I = OPCHGNUM
EXAMPLE	I = OPCHGNUM returns I = 3 Were I = 3 indicates that three operator entries have been made since the last time the OPCHGLOG function was called. I is always an integer value.

PRINT COMMAND

PURPOSE	To print reports.
FORMAT	PRINT (reportname) or PRINT (reportname 1, reportname 2, reportname 3, etc.)
REMARKS	"reportname" is the name of a line or a table report. PRINT causes all the reports named in the parameter list to be printed. The PRINT command prints archive data from the Table Report Definition Screen. See 5.2.19. **NOTE:** When the PRINT command is used in a program, the command does not get values to be printed until the end of a calculation cycle regardless of the position of the command in the program. For this reason, the values printed will be the values in memory at the end of the calculation cycle rather than the values in memory at the time the PRINT command appeared in the program.
EXAMPLES	PRINT (STATUS) Prints the report named STATUS. PRINT (STATUS, HOURLY, DAILY) Prints the reports named STATUS, HOURLY, and DAILY.

PROVE COMMAND

PURPOSE	To detect prover switch inputs and meter pulses.
FORMAT	PROVE
REMARKS	Most of the prover switch detection and meter pulse input is performed in hardware. The PROVE command resets this hardware. It should be executed only once per prove cycle. See also PROVECHK and PROVESET.
EXAMPLES	PROVE

PROVECHK COMMAND

PURPOSE	To monitor the state of a prove cycle.
FORMAT	V = PROVECHK
REMARKS	The integer value returned by PROVECHK indicates the progress through a prover cycle. The values returned are: 0 - Power on, no prove started 1 - Prove started; waiting for first detector switch 2 - First detector sensed; waiting for second detector switch 3 - Second detector sensed and prove completed **NOTE:** Depending on the speed of the prover, state 1 and 2 may not actually be seen by the calculations. See also PROVE and PROVESET

PROVESET COMMAND

PURPOSE	To specify the type of prove operation to be performed.
FORMAT	PROVESET (V)
REMARKS	The PROVESET command requires a parameter to establish the type of prove operation to be performed. The parameter for the type of prove operation is specified by selecting one of the following integer values: Parameter No. — Type of Prove Operation 1 Board 1 conventional prover 2 Board 1 short prover 3 Boards 1 and 2 short prover 4 Board 2 conventional prover 5 Board 2 short prover

PUT COMMAND

PURPOSE	To place data in a Model 2500 archive area.
FORMAT	Put (AName, Rec, Var1 [, Var2...., VarN])
REMARKS	AName is the name of an archive area defined by the user. Rec is the record number where data is to be placed. Var1 through VarN are the names of variables containing the data to be placed in the archive area. The data types of the variables must be the same as the type defined for the archive area. Unexpected results will occur if the types differ. If the record number exceeds the number of records defined in the archive area the data will be placed in the last archive record. The PUT command can also automatically step sequentially through the records by using a record number of -1. When the last record of the area is retrieved the next sequential PUT places data in record 1. See also GET and CURREC.
EXAMPLE	The archive ARC is defined as 3 records with 3 integer values. After the following PUT commands, PUT (Arc, 1, 1, 2, 3) PUT (Arc, -1, 4, 5, 6) PUT (Arc, -1, 7, 8, 9) the archive appears as Rec # Var1 Var2 Var3 1 1 2 3 2 4 5 6 3 7 8 9

PWDISABLE COMMAND

PURPOSE	To disable the front panel for operator entry.
FORMAT	PWDISABLE
REMARKS	This command prevents an operator from entering data at the front panel. See also the PWENABLE AND PWKILL commands. As the example below shows, the PWENABLE AND PWDISABLE commands can be used to enable and disable the front panel in conjunction with an external switch connected to a status input.
EXAMPLE	IF (Status1) PWENABLE if (not Status1) PWDISABLE

PWENABLE COMMAND

PURPOSE	To enable the front panel for operator entry.
FORMAT	PWENABLE
REMARKS	This command allows the operator to enter data from the front panel. The time limit for the operator entry is limited to 30 seconds; however the time limit can be extended indefinitely by repeated calls to PWENABLE. See also PWKILL and PWDISABLE. As the example below shows, the PWENABLE and PWDISABLE commands can be used to enable and disable the front panel in conjunction with an external switch connected to a status input.
EXAMPLE	IF (Status1) PWENABLE IF (not Status1) PWDISABLE

PWKILL COMMAND

PURPOSE	To prevent the use of the password to enable operator entry of information at the front panel.
FORMAT	PWKILL
REMARKS	The PWKILL command is used in conjunction with the PWENABLE and PWDISABLE commands to control (from the calculations) the ability of an operator to enter data at the front panel. If PWKILL is executed, it sets the front panel password to a value that cannot be entered from the front panel and the PWENABLE and PWDISABLE commands become the only means of allowing front panel data entry.
EXAMPLE	PWKILL

RATE FUNCTION

PURPOSE	To return the rate alarm limit for a variable.
FORMAT	V = RATE(x)
REMARKS	If no alarm limits are defined for X, 0.0 is returned.
EXAMPLE	X = RATE (AnalIn1) The value of X is the RATE alarm limit of AnalIn1.

RESET STATEMENT

PURPOSE	To reset a boolean variable to false or off.
FORMAT	RESET(X)
REMARKS	X must be a boolean variable.
EXAMPLE	RESET(X) The value of X is false or off.

SECONDS FUNCTION

PURPOSE	To return the number of seconds in the time of day.
FORMAT	I = SECONDS
REMARKS	I must be an integer value.
EXAMPLE	I = SECONDS The value of I is 15 when the time is 10:20:15.

SET STATEMENT

PURPOSE	To set a boolean variable to true or on.
FORMAT	SET(X)
REMARKS	X must be a boolean variable.
EXAMPLE	SET(X) The value of X is true or on.

SIN FUNCTION

PURPOSE	To calculate the trigonometric sine of x, in radians.
FORMAT	v = SIN(X)
REMARKS	To obtain SIN(X) when X is in degrees, use SIN (X*3.14.../180).
EXAMPLE	X = SIN (1.5) The value of X is .9974951

SMRTASSGN COMMAND

PURPOSE	To assign analog inputs to the appropriate smart transmitter interface channel.
FORMAT	SMRTASSGN(AnalogIn,Chan)
REMARKS	Where: AnalogIn is the name of the analog input channel. Chan is an integer from 1 through 12 that indicates the channel number of the smart transmitter interface.
EXAMPLE	If the value of Chan in this command is not in the range 1 through 12, the command is ignored.

SMRTSTAT FUNCTION

PURPOSE	To provide the operating status of a smart transmitter.
FORMAT	Status = SMRTSTAT
REMARKS	The SMRTSTAT function returns one of the selection variable integers defined in the following table.
EXAMPLE	Integer Value — Definition 1 IDLE: no command is active. 2 ACTIVE: a command is in progress. 3 ERROR: no smart transmitter channel is assigned to the analog input used in the last command. 4 ERROR: no response received from the Smart Transmitter Interface Computer (STIC). 5 ERROR: no response received from the smart transmitter. 6 ERROR: an error response received from the smart transmitter. 7 An analog LIVE value is required for adjustment. 8 A power failure or watchdog reset has occurred. 9 ERROR: a 4 to 20mA adjust requires more than 50 increase or decrease steps. The SMRTSTAT function returns the status of the last command sent to a smart transmitter. For example, when a command to the smart transmitter is initiated, the SMRTSTAT functions returns an integer value of 2 indicating that the status is ACTIVE. If an error occurs in executing the command, SMRTSTAT returns one of the ERROR values shown in the table above. When a command is successfully completed, SMRTSTAT returns the integer value 1, indicating that the status is IDLE. New commands to the smart transmitter will be accepted for execution only when the status is IDLE or ERROR. New commands are ignored when the status is ACTIVE or LIVE.

SOLARTRON STATEMENT

PURPOSE	To provide coefficients of calibration for the Solartron or UGC frequency densitometer.
FORMAT	SOLARTRON (CALTEMP, K0, K1, K2, K18, K19, K20a, K20b, K21A, K21B)
REMARKS	CALTEMP is the calibration temperature for the densitometer. The K factors are obtained from the manufacturer's calibration certificate. The variables named for this statement must not cause the statement to exceed one line of a calculations sheet. The SOLARTRON statement is intended to be used with the DENSITY function.
APPLICATION	Variable names are defined for numeric operator entry. Data values are entered from the calibration certificate. Engineering units must be consistent. <u>Coefficient</u> <u>Expected Units</u> CALTEMP °C K0 gm/cc K1 - K2 K18 1/°C K19 gm/cc/°C K20a 1/PSI K20b - K21A gm/cc/PSI K21B -

SPECIAL COMMAND

PURPOSE	To invoke customized functions specifically requested by a user, which are coded in the D800 EPROM on board two of a Model 2500 Series microcomputer.
FORMAT	Special (n) Where: n is an integer value. The parameter n causes the SPECIAL command to request the nth function of a set of functions, allowing for multiple special user functions.
REMARKS	The SPECIAL command is not normally supplied as part of the Model 2500 BASE25 software. The command is included with the Model 2500 only if required by user specifications. When the command is included it requires documentation explaining the custom functions the command implements. No action is taken if n is not a valid function number, if the Model 2500 is not a two-board unit, or if an EPROM with special functions is not installed.
EXAMPLE	SPECIAL (1) Special function 1 is invoked.

SQRT FUNCTION

PURPOSE	Computes the square root of X.
FORMAT	V = SQRT(X)
REMARKS	X must be greater than 0.
EXAMPLE	X = SQRT(4) The value of X will be 2.0

TABLE FUNCTION

PURPOSE	To interpolate or extract a value from a user-defined data table.
FORMAT	V = Table (TNAME, ROW, COL)
REMARKS	TNAME is the name of a user-defined table. ROW and COL are values within the limits of the table. Table uses ROW and COL (column) to perform a linear interpolation to derive a value from the table.
EXAMPLE	The defined table TNAME is: 1 2 3 4 10 20 30 5 40 50 60 6 70 80 90 The statement V = TABLE (TNAME, 4.1, 2.5) results in V equal to 28.

TAN FUNCTION

PURPOSE	Computes the tangent of X, in radians.
FORMAT	V = TAN(X)
COMMENTS	To obtain TAN (X) when X is in degrees, use TAN (X*3.14.../180)
EXAMPLE	Y = TAN(X) When executed, Y will contain the value of the tangent of X radians.

TIME FUNCTION

PURPOSE	To return the number of milliseconds since the last execution of the time function at this position in the calculations.
FORMAT	V = TIME
REMARKS	The Time function is dependent on the position of the function in a calculation, therefore the function is undefined the first time it is encountered in a calculation.
EXAMPLE	1. V = TIME 2. K = K + 1 3. IF (K < 5) GOTO NEXT 4. X = TIME 5. K = 0 Because X is assigned every fifth calculation cycle, the value of X will always be about 5 times the value of V.

TIMESTAMP FUNCTION

PURPOSE	To return the current time of day.
FORMAT	I = TIMESTAMP
REMARKS	I must be an integer value and is a six-digit integer with the form HHMMSS. HH is the hour (24-hour format) without preceding zeros, MM is the minutes, and SS is the seconds.
EXAMPLE	V = TIMESTAMP For example, the value of V returned is 143437 if the time is 14:34:37.

TSET FUNCTION

PURPOSE	To allow timed closure of static control outputs.
FORMAT	ISTAT = TSET (CNTLVAR, TIME,FLAG)
REMARKS	CNTLVAR is the variable name associated with a static control output. TIME represents the time in 20 millisecond ticks for which the control output is to be activated (a value of 5 corresponds to 100 milliseconds). This variable must be an integer. FLAG is an integer variable used to indicate the action to be taken in a previous timed closure is still in process. If FLAG = 0, then the requested control output activation is carried out only if no previous activation of the output is currently in progress. In this case the value of the variable is set to zero to indicate successful initiation of the requested closure. If the control output is already in the midst of a timed closure, then the request is ignored and the number of 20 millisecond ticks remaining in the timed closure is returned in the variable ISTAT. If FLAG is <> to zero, then the amount of time represented by TIME is added to any remaining time in a timed closure in progress. If no closure is in progress, the requested timed closure is initiated as above. The value which is returned in ISTAT is always equal to zero as specified timed closure is always implemented.
EXAMPLE	ISTAT = TSET(GCO, WIDTH, Z) Where: GCO is a variable name for a control output WIDTH is a variable name for the number of 20 milliseconds for output Z is zero if no previous outputs ISTAT WILL RETURN A ZERO

UNACKALRM FUNCTION

PURPOSE	To return the unacknowledged alarm state of a variable.
FORMAT	I = UNACKALRM(VNAME)
REMARKS	VNAME is the name of the variable and must have been defined before calling this function on the variable. The value of I returned is derived from a 16-bit integer that has the alarm state bit-mapped into the value. The I value returned is interpreted by subtracting from it the largest number from the table below that will leave a positive remainder. The subtrahend and remainder correspond to the unacknowledged alarm conditions of the variable.
EXAMPLE	<u>Value</u> <u>Unacknowledged Alarm Status</u> 1024 LoLo alarm 2048 Lo alarm 4096 Hi alarm 8192 HiHi alarm 16384 Rate alarm EXAMPLE: I = UNACKALRM(PRES) For example, if the value of I returned is 12288, then the largest number from the table that can be subtracted from 12288 and leave a positive remainder is 8192 (12288 - 8192 = 4096). Referring to the table, the subtrahend (8192) corresponds to the HiHi alarm and the remainder (4096) corresponds to the Hi alarm. Therefore, an I of 12288 returned for the function UNACKALRM(PRES) indicates an unacknowledged alarm state of Hi and HiHi alarm for the variable PRES.

TRUNC FUNCTION

PURPOSE	To return the whole number value of a floating point value.
FORMAT	V = TRUNC(x)
REMARKS	TRUNC does not round off numbers, the function simply eliminates the fractional part of the value. Negative numbers are returned as the next lower number.
EXAMPLE	X = TRUNC (1.57) The value of X is 1.0. X = TRUNC (-1.25) The value of X is -2.0.

YEAR FUNCTION

PURPOSE	To return the year of the current date.
FORMAT	V = YEAR
REMARKS	The value of V is an integer.
EXAMPLE	K = YEAR On May 30, 1989 the value of K is 1989.

ZEROSCALE FUNCTION

PURPOSE	To return the zero scale value for a variable.
FORMAT	V = ZeroScale(x)
REMARKS	If a zero scale value is not defined for X, 0.0 is returned.
EXAMPLE	X = ZeroScale (AnalIn1) The value of X is the zero scale value of AnalIn1.

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SECTION 7

ERROR ANALYSIS AND SYNTAX CHECK

7.0 GENERAL

CONFIG25 provides a display of any errors made in entering data and calculation statements. A syntax check is also available on individual calculation entry sheets while the calculation sheet is displayed on the screen.

7.1 ERROR ANALYSIS

A configuration is analyzed for errors by executing the first selection on the submenu titled Analyze or transfer configuration for 2500. Configuration errors found during the analysis are automatically displayed on the screen when the analysis is completed. Analysis errors can also be displayed on the screen by selecting the last menu selection (titled Examine analysis errors) on the Analyze or transfer configuration for 2500 submenu.

The format for displaying error messages on the analysis error display screen consists of several standard statements. Each statement contains one or more blanks that are filled in with either the type or the location of an error detected by CONFIG25 during the analysis of the configuration.

7.2 ERROR STATEMENTS

Two types of error statements are displayed on the analysis error display; operator entry errors and calculation statement errors.

7.2.1 OPERATOR ENTRY ERRORS

The following are examples of operator entry errors displayed on the analysis error display. A typical analysis error display is shown in Figure 7-1.

Missing archive data for "Name" .

Where "Name" identifies the archive for which data is missing.

Missing value in table "Name".

Where "Name" identifies the table in which data is missing.

Unknown name definition from "entry screen".

Where "entry screen" identifies the entry screen (e.g., CALC, NUM ENTRY, REPORT COMM, etc.) on which a name has been entered without being defined on a calculation sheet or a hardware definition (I/O) screen.

Duplicate name ("Name") found in both "entry screen" and "entry screen".

Where the same designation, "Name", is used to identify data on two entry screens. The entry screens are identified by "entry screen" in the error message.

```
                    Active Configuration:             App-Name

                                Analysis Error Display

    Error Message

  1  Calculation error on sheet 31 line 28 at 9 expected unknown
  2  Calculation error on sheet 31 line 30 at 10 expected System
  3  Calculation error on sheet 31 line 31 at 3 expected unknown




                                                                          47%
 -1-     -2-     -3-     -4-     -5-    Prntscr SaveCFG   -8-     -9-   Exit
```

Figure 7-1. Typical Analysis Error Display

7.2.2 CALCULATION SHEET ERRORS (SYNTAX CHECK)

The following is an example of a calculation sheet error (syntax check) statement as it appears on the Analysis Error Display screen.

Calculation error on sheet "x" line "y" at "z" expected "expected".

Where "x" is the calculation sheet number, "y" is the line number of the calculation sheet statement, "z" is the character position in the calculation statement, and "expected" identifies the arithmetic operator, relational operator, logical operator, function, or data type expected by CONFIG25 (e.g., +, -; <,>; NOT, AND; SIN, TAN; floating, real, integer, etc).

NOTE: "x", "y", and "z" indicate the sheet, line, and character position where CONFIG25 analysis first detected the error. The actual error may have been made in a previous line.

Calculation sheet error messages are also displayed on individual calculation sheet screens by pressing the F9 (Proceed) key. A question mark (?) appears where an error occurs and an error message appears at the bottom of the screen. A typical calculation sheet error message screen is shown in Figure 7-2. The error messages displayed on calculation sheet screens are similar to the messages appearing on the Analysis Error Display screen except that they do not include the calculation sheet number.

```
                   Active Configuration:            App-Name

                            Calculation Entry
                  Title: INPUT STATUS       Type: Normal
 L#  Calculation Statements                                     Units

 24
 25
 26
 27
 28  TOT25 = ?
 29  TOT28 = 100
 30  TOT65 = X +
 31  25 + X = 1
 32
 33
 34
 35
 36
 37

               Expected unknown but EOLINE was received.
                   Please press ENTER to continue...

 -1-     -2-   Delete  Insert  Clear   Prntscr SaveCFG PrntPg  Proceed Exit
```

Figure 7-2. Typical Calculation Sheet Error Screen

SECTION 8

SUPPORT FOR ROSEMOUNT SMART TRANSMITTERS

8.0 SUPPORT FOR ROSEMOUNT TRANSMITTERS

The application may make whatever use of the data in the archive the customer requires.

The definition of the units code is:

0 - undefined
1 - in. H2O @ 68 deg. F
2 - in. Mercury @ 0 deg. C
3 - ft. H2O @ 68 deg. F
4 - mm H2O @ 68 deg. F
5 - mm Mercury @ 0 deg. C
6 - psi

The status code is bit encoded according to:

bit

0 - transmitter out of range
1 - transmitter not ready
2 - no response from transmitter last poll
3 - unused
4 - unused
5 - unused
6 - unused
7 - transmitter reports hardware failure

The Baseline initializes all status conditions to not ready. This status means that no valid data has been read from the transmitter since the Model 2500 was powered on.

If the status byte is 0, the transmitter is operating properly and the value is the most recently reported value.

If the status byte is other than 0, the last good value received from the transmitter is the reported value.

8.1 SUPPORT FOR DATA ACQUISITION

8.1.1 ROSEMOUNT SMART TRANSMITTERS (BASE 25 REV. 5.09)

Support for acquiring data from Rosemount transmitters has been added to the MODBUS Master. Upon initialization of the MODBUS Master communications, a check is made for the existence of an archive called "ROSEDATA". If this archive exists, data will be acquired from Rosemount Smart Transmitters. If this archive is not defined by the configuration, the MODBUS Master will function in its normal manner. If the configuration has defined this archive, Base25 will poll each transmitter set to active status. This status is part of the archive data defined in the configuration. The actual structure of the archive must be:

VALUE	floating point value of variable
UNITS	1 byte binary code of engineering units in use
STATUS	bit encoded error status of transmitter
RESP CODE	integer representing the two byte response code returned by the transmitter
PRELENGTH	preamble length, the number of preamble characters (ASCII OFFH) required by the transmitter at this address (5-250).
ACTIVE	flag indicating whether to poll this particular transmitter
UNIV REV	universal revision level of the transmitter (5 or greater implies use of the expanded protocol). This information is read from the transmitter via the Read Unique Identifier command.
DEVICE ID	read via the Read Unique ID command
MFR ID	read via the Read Unique ID command
MFR DEVICE TYPE	read via the Read Unique ID command

The operator must set the ACTIVE flag for the appropriate entries in the archive. All other information in the archive should be initialized to zero. The BASE25 program will obtain all additional information from the transmitter and update the archive.

The VALUE is a standard IEEE floating point number and the other fields are long integers, although only the low order byte of the long integers is used by Base25. The length of the archive is equal to 16, the maximum number of transmitters on the loop plus one. The record number of a record corresponds to that transmitter's address plus one (e.g. record 3 contains information for transmitter address 2). If address 0 is set to active, the baseline code assumes that this is the only transmitter present (so does the Rosemount transmitter).

The definition and initialization of the archive is the responsibility of the configuration. Once the archive is defined and initialized by the application, the baseline will continuously poll those transmitters whose ACTIVE status field is non-zero. The data in the archive will be undefined until the first successful poll if not initialized by the application. The polling of the Rosemounts is coordinated with the calculation cycle only to the extent that the transmitters will be polled a maximum of one time per calculation cycle.

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SECTION 9

PLC OPTION

9.0 GENERAL

The EMUL PLC function allows Modbus registers to be polled by a true Modicon host processor. To use this feature the variable EMUL_PLC must be defined in the Selection List Operator Entry Definition Screen. The variable must be in capital letters. Only two options should be defined. Names assigned to the options can be selected by the Application Programmer. The first option is selected if regular Modbus registers are used. The second option is selected to enable the PLC emulation type Modbus registers.

It is necessary to decide the type of Modbus that will be used when defining the Modbus registers. When the PLC emulation is used the boolean registers and short integer registers are the only Modbus registers that can be addressed through Modbus communications. When the regular Modbus is enabled, all of the Modbus registers can be addressed.

When the PLC emulation option is selected, the boolean registers which were defined at locations 1001 through 2999 can be addressed using function codes "1, 5, and 15" at addresses zero through 1999. The short integers which were defined at locations 3001 through 4999 can be addressed using function codes "3, 6, and 16" at addresses zero through 1999. Long integers and floating point Modbus registers are not supported when using the PLC emulation option. Refer to Figure 9-1 (Sheets 1 and 2).

```
                Active Configuration:             App-Name

                Selection List Operator Entry Definition

            Entry #    Name    Units   Startup Selection

                  1  EMUL_PLC                  2
                  2   TAPTYPE                  2
                  3    TAPLOC                  2
                  4     PLATE                  1
                  5  PRESSURE                  1
                  6  CLEARTOT                  1
                  7  INTERVAL                  1
                  8  SCFSCALE    MCFH          4
                  9  PRINTREQ                  9

          Press the space bar to move to the next data entry.
             Press ENTER to  select a channel for editing.           45%

 -1-     -2-    -3-     -4-     -5-    PrntScr -7-     -8-     -9-     Exit
```

Figure 9-1. Typical Selection List Operator Entry Definition Screen (Sheet 1)

```
Active Configuration:            App-Name

        Selection List Operator Entry Option Definition
                     Variable Name: EMUL_PLC
              Option #  Option

                     1   REGULAR
                     2       PLC
                     3
                     4
                     5
                     6

                    11
                    12
                    13
                    14

       Press the space bar to move to the next data entry.
          Press ENTER to  select a channel for editing.          45%

 -1-     -2-   Delete  Insert  Clear   PrntScr SaveCFG PrntPg    -9-   Exit
```

Figure 9-1. Typical Selection List Operator Entry Definition Screen (Sheet 2)

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SECTION 10

EXAMPLE CONFIGURATIONS

10.0 EXAMPLE CONFIGURATIONS

This section includes an example configuration for the Model 2500 Series instrument. The Model 2500 application illustrated by the configuration is 51305310.

The example configuration demonstrates the archive capability of CONFIG25 configurations and the functions of both the numeric and list types of operator entries. Line-type reports are also defined.

The calculation sheets demonstrate how textual comments are used to document individual calculations and the use of functions calculations.

NOTES:

1. The units column on the calculation sheets illustrated shows "-" for several variables. This enables the calculated value to be displayed on the front panel of the Model 2500 Series.

2. If the units column is left blank the first time a variable name appears on a calculation sheet, the variable cannot be manually overridden by the operator. In most applications, it is undesirable for totalizer values to be manually overridden. For this reason, in the examples shown in this section, the units column has been left blank where variable names for totalizers first appear on start-up sheets.

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```
2500 Instrument Configuration Report  v500           51305310   2502 Page 1
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Hardware Definition - Analog Input

Chan	Name	Units	Zero Scale	Full Scale	M/V	Fixed Val	Period
			---------- 2500 Startup Values ---------				
1	PRESIN	PSIG	0.0	1000.0	Var	250.0	
2	M1PT	PSIG	0.0	1000.0	Var	250.0	
3	M1TT	DEGF	20.0	120.0	Var	50.0	
4	M2PT	PSIG	0.0	1000.0	Var	250.0	
5	M2TT	DEGF	20.0	120.0	Var	50.0	
6	PRESOUT	PSIG	0.0	1000.0	Var	250.0	
7	REG1POS	%	0.0	100.0	Var	0.0	
8	PIC1FDBK	PSIG	0.0	800.0	Var	400.0	
9	REG2POS	%	0.0	100.0	Var	0.0	
10	PIC2FDBK	PSIG	0.0	800.0	Var	400.0	
11							
12							
13							
14							
15							
16							
17							
18							

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 2
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

                     Hardware Definition - Analog Output
                             ----------  2500 Startup Values  ---------
 Chan   Name     Units   Zero Scale   Full Scale   M/V   Fixed Val   Period
_____________________________________________________________________________
   1      SFR   MCFH          0.0       10000.0   Var        0.0
   2      AFR   MCFH          0.0       10000.0   Var        0.0
   3
   4
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 3
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Pulse Input Definition

#	Name	Units
1	METER1	PULS
2	METER2	PULS
3		
4		
5		
6		
7		
8		

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 4
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Hardware Definition - Status Input

Chan	Name	Units	M/V	Value
1				
2				
3				
4				
5				
6				
7	M1OPEN		Var	Off
8	M1CLOSE		Var	Off
9	M2OPEN		Var	Off
10	M2CLOSE		Var	Off
11				
12	REG1OPEN		Var	Off
13	REG1CLS		Var	Off
14	REG2OPEN		Var	Off
15	REG2CLS		Var	Off
16	MON1OPEN		Var	Off
17	MON1CLS		Var	Off
18	MON2OPEN		Var	Off
19	MON2CLS		Var	On
20	GAS1LOW		Var	Off
21	GAS2LOW		Var	Off
22	BADUPS		Var	Off
23	OPENGATE		Var	Off
24	ENTRROOM		Var	Off

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 5
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Hardware Definition - Control Output

Chan	Name	Units	Pulsed	Period (40ms)	M/V	Fixed Val
1	M1THERM	DT	Yes	3	Var	Off
2	M2THERM	DT	Yes	3	Var	Off
3						
4						
5						
6						
7	M1OPNCMD		No		Var	Off
8	M1CLSCMD		No		Var	Off
9	M2OPNCMD		No		Var	Off
10	M2CLSCMD		No		Var	Off
11						
12	PIC1RAIS		Yes	1	Var	Off
13	PIC1LWR		Yes	1	Var	Off
14	PIC2RAIS		Yes	1	Var	Off
15	PIC2LWR		Yes	1	Var	Off
16						
17						
18						
19						
20						
21						
22						
23						
24						

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 6
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Numeric Variable Alarm Definition

A#	Name	LoLo Limit	Lo Limit	Hi Limit	HiHi Limit	ROC/Sec
1	BTU		1000.0	1060.0		
2	GRAVITY		0.5	0.75		
3	CO2		0.01	5.0		
4	N2		0.01	10.0		
5	M1PT	-20.0			1020.0	
6	M2PT	-20.0			1020.0	
7	M1TT	18.0			122.0	
8	M2TT	18.0			122.0	
9	PRESIN	-20.0			1020.0	
10	PRESOUT	-20.0			1020.0	
11	REG1POS	-2.0			102.0	
12	PIC1FDBK	-16.0			816.0	
13	REG2POS	-2.0			102.0	
14	PIC2FDBK	-16.0			816.0	

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 7
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Boolean Variable Alarm Definition

Alarm #	Name	State
1	SHTDOWN	On
2	BADUPS	On
3	MON1OPN	On
4	MON2OPN	On
5	GAS1LO	On
6	GAS2LO	On
7	GATEOPEN	On
8	ROOMENTR	On
9	WDT	On
10	TMOVER	On

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 8
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Numeric Operator Entry Definition

Entry	Name	Units	Default
1	PRESBASE	PSIG	14.73
2	TEMPBASE	DEGF	60.0
3	SCFSCALE		1000.0
4	BTUSCALE		1000000.0
5	SUBN2	%	1.40
6	SUBCO2	%	.72
7	GRV1BASE		0.595
8	SUBBTU	BTU	1032.0
9	DAYBEGIN	HOUR	7.0
10	BAROPRES	PSIA	14.4
11	GCDELAY	MIN	6.0
12	TDELAY1	SEC	60.0
13	TDELAY2	SEC	60.0
14	TDELAY3	SEC	60.0
15	TDELAY4	SEC	60.0
16	TDELAY5	SEC	60.0
17	TDELAY6	SEC	60.0
18	FREQ1	HZ	900.0
19	FREQ2	HZ	900.0
20	FREQ3	HZ	100.0
21	FREQ4	HZ	100.0
22	FREQ5	HZ	1000.0
23	FREQ6	HZ	1000.0
24	MF1	P/CF	100.0
25	MF2	P/CF	100.0

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 9
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Selection List Operator Entry Definition

Entry #	Name	Units	Startup Selection
1	VOL		1
2	PRINTAL		1
3	SELECT		4
4	INTERVAL		1
5	GCTYPE		1
6	STREAMID		1
7	SWMODE		2
8	EMUL_PLC		1
9	TESTTURB		1
10	CONTROL		1
11	METER_1		1
12	METER_2		1

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 10
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                             Variable Name: VOL
                     Option #  Option
-----------------------------------------------------------------------------
                            1 TOTALIZE
                            2    CLEAR
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 11
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                           Variable Name: PRINTAL
                     Option #  Option
-----------------------------------------------------------------------------
                            1      YES
                            2       NO
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 12
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                            Variable Name: SELECT
                     Option #  Option
-----------------------------------------------------------------------------
                            1  CURRENT
                            2  ENTRIES
                            3  PROCESS
                            4     NONE
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 13
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                           Variable Name: INTERVAL
                     Option #  Option
-----------------------------------------------------------------------------
                            1     HOUR
                            2    HOUR2
                            3    HOUR3
                            4    HOUR4
                            5    HOUR6
                            6   HOUR12
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 14
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                            Variable Name: GCTYPE
                     Option #  Option
----------------------------------------------------------------------------
                            1   DANIEL
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 15
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                           Variable Name: STREAMID
                     Option #  Option
-----------------------------------------------------------------------------
                            1  STREAM1
                            2  STREAM2
                            3  STREAM3
                            4  STREAM4
                            5  STREAM5
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 16
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                            Variable Name: SWMODE
                     Option #  Option
-----------------------------------------------------------------------------
                            1     AUTO
                            2   MANUAL
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 17
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                           Variable Name: EMUL_PLC
                     Option #  Option
-----------------------------------------------------------------------------
                            1  REGULAR
                            2      RTU
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 18
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                           Variable Name: TESTTURB
                     Option #  Option
-----------------------------------------------------------------------------
                            1      OFF
                            2       ON
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 19
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                           Variable Name: CONTROL
                     Option #  Option
-----------------------------------------------------------------------------
                            1    LOCAL
                            2   REMOTE
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 20
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                           Variable Name: METER_1
                     Option #  Option
-----------------------------------------------------------------------------
                            1     IDLE
                            2     OPEN
                            3    CLOSE
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 21
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

               Selection List Operator Entry Option Definition
                           Variable Name: METER_2
                     Option #  Option
-----------------------------------------------------------------------------
                            1     IDLE
                            2     OPEN
                            3    CLOSE
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 22
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Report Definition

Report #	Name	Title	Type
1	CURRENT	RATES & ACCUMUL.	Line
2	ENTRIES	OPERATOR ENTRIES	Line
3	PROCESS	PROCESS VARIABLS	Line

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 23
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

                    Line Report Definition
          Title: RATES & ACCUMUL.     Name: CURRENT
                 Line #   Name
----------------------------------------------------------------------------
                      1  MCFCNT1
                      2 HMCFCNT1
                      3 MCFRATE1
                      4  ACCVOL1
                      5 --------
                      6  MCFCNT2
                      7 HMCFCNT2
                      8 MCFRATE2
                      9  ACCVOL1
                     10 --------
                     11   DTCNT1
                     12  HDTCNT1
                     13   ACCDT1
                     14 --------
                     15   DTCNT2
                     16  HDTCNT2
                     17   ACCDT2
                     18 --------
                     19  MCFCNTS
                     20 HMCFCNTS
                     21  ACCVOLS
                     22 --------
                     23   DTCNTS
                     24  HDTCNTS
                     25   ACCDTS
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 24
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

                         Line Report Definition
               Title: OPERATOR ENTRIES     Name: ENTRIES
                      Line #   Name
-----------------------------------------------------------------------------
                          1 PRESBASE
                          2 TEMPBASE
                          3 SCFSCALE
                          4 BTUSCALE
                          5    SUBN2
                          6   SUBCO2
                          7 GRV1BASE
                          8   SUBBTU
                          9 DAYBEGIN
                         10 BAROPRES
                         11  GCDELAY
                         12  TDELAY1
                         13  TDELAY2
                         14  TDELAY3
                         15  TDELAY4
                         16  TDELAY5
                         17  TDELAY6
                         18    FREQ1
                         19    FREQ2
                         20      MF1
                         21      MF2
                         22 INTERVAL
                         23   SWMODE
                         24 EMUL_PLC
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 25
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

                    Line Report Definition
          Title: PROCESS VARIABLS     Name: PROCESS
                 Line #   Name
```

Line #	Name
1	M1PT
2	M1TT
3	M2PT
4	M2TT

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 26
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54
```

Data Storage (Archiving) Definition

	Name	Size
1	GC	16
2	GCINPUTS	1
3	GCREAD	1
4	GPPREV	6
5	GPCURR	6
6	GPMF	6
7	GPAINCR	6
8	GPAFRAC	6
9	GPATIX	6
10	GPAL	6
11	GPHAL	6
12	GPPRES	6
13	GPTEMP	6
14	GPFPV	6
15	GPSINCR	6
16	GPSFRAC	6
17	GPSTIX	6
18	GPSL	6
19	GPHSL	6
20	GPEINCR	2
21	GPEFRAC	2
22	GPETIX	2
23	GPEL	2
24	GPHEL	6
25	GPFWDIV	6
26	GPFWSUM	6
27	GPFWA	6
28	PMLD	12
29	QRPT	20

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 27
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:54

                         Data Storage Data Definition
                            Archive Data Name: GC
                         Name             Data Type
```

1	ID	Integer
2	MOLEPCT	Floating

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 28
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GCINPUTS
                         Name            Data Type
----------------------------------------------------------------------------
                       1    GRAVX      Floating
                       2     BTUX      Floating
                       3      N2X      Floating
                       4     CO2X      Floating
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 29
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GCREAD
                         Name             Data Type
```

1	GRAVR	Floating
2	BTUR	Floating
3	N2R	Floating
4	CO2R	Floating

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 30
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPPREV
                         Name             Data Type
---------------------------------------------------------------------------
                      1     PREV       Integer
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 31
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPCURR
                         Name             Data Type
-----------------------------------------------------------------------------
                      1     CURR       Integer
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 32
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                           Archive Data Name: GPMF
                         Name             Data Type
_____________________________________________________________________________
                      1       MF       Floating
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 33
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GPAINCR
                         Name             Data Type
---------------------------------------------------------------------------
                      1     INCR      Floating
                      2     RATE      Floating
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 34
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GPAFRAC
                         Name             Data Type
-----------------------------------------------------------------------------
                      1     FRAC       Floating
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 35
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPATIX
                         Name             Data Type
-----------------------------------------------------------------------------
                       1    TICKS       Integer
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 36
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                           Archive Data Name: GPAL
                         Name             Data Type
-----------------------------------------------------------------------------
                       1      RATE       Floating
                       2       TOT        Integer
                       3     NRTOT        Integer
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 37
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPHAL
                         Name              Data Type
------------------------------------------------------------------------------
                      1       TOT       Floating
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 38
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPPRES
                         Name              Data Type
----------------------------------------------------------------------------
                      1     PRES       Floating
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 39
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPTEMP
                         Name              Data Type
______________________________________________________________________________
                      1     TEMP      Floating
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 40
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPFPV
                         Name             Data Type
___________________________________________________________________________
                       1       FPV       Floating
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 41
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GPSINCR
                         Name             Data Type
```

	Name	Data Type
1	INCR	Floating
2	RATE	Floating

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 42
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GPSFRAC
                         Name             Data Type
---------------------------------------------------------------------------
                      1     FRAC      Floating
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPSTIX
                         Name             Data Type
----------------------------------------------------------------------------
                       1    TICKS       Integer
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 44
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                           Archive Data Name: GPSL
                         Name              Data Type
_____________________________________________________________________________
                      1     RATE       Floating
                      2      TOT        Integer
                      3    NRTOT        Integer
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 45
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPHSL
                         Name             Data Type
-----------------------------------------------------------------------------
                      1      TOT        Integer
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 46
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GPEINCR
                         Name             Data Type
-----------------------------------------------------------------------------
                       1      INCR       Floating
                       2      RATE       Floating
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 47
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GPEFRAC
                         Name             Data Type
---------------------------------------------------------------------------
                      1     FRAC      Floating
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 48
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPETIX
                         Name             Data Type
-----------------------------------------------------------------------------
                      1    TICKS       Integer
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 49
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                           Archive Data Name: GPEL
                         Name             Data Type
```

	Name	Data Type
1	RATE	Floating
2	TOT	Integer
3	NRTOT	Integer

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPHEL
                         Name              Data Type
----------------------------------------------------------------------------
                      1       TOT        Integer
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 51
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GPFWDIV
                         Name             Data Type
---------------------------------------------------------------------------
                      1     RATE      Floating
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 52
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                         Archive Data Name: GPFWSUM
                         Name             Data Type
-----------------------------------------------------------------------------
                       1      TEMP       Floating
                       2      PRES       Floating
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 53
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                          Archive Data Name: GPFWA
                         Name             Data Type
----------------------------------------------------------------------------
                       1      TEMP      Floating
                       2      PRES      Floating
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 54
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                           Archive Data Name: PMLD
                         Name              Data Type
-----------------------------------------------------------------------------
                       1    MONTH        Integer
                       2      DAY        Integer
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 55
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                         Data Storage Data Definition
                           Archive Data Name: QRPT
                         Name             Data Type
----------------------------------------------------------------------------
                      1    QUEUE        Integer
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 56
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                  Boolean Variable Communications Definition
            Note: The protocol adds 1000 to these index numbers
                      Index # Name    SubField
```

Index #	Name	SubField
1	SPAREB	
2	SPAREB	
3	SPAREB	
4	SPAREB	
5	SPAREB	
6	M1TT	Man/Var
7	M2TT	Man/Var
8	SPAREB	
9	SPAREB	
10	SPAREB	
11	M1PT	Man/Var
12	M2PT	Man/Var
13	SPAREB	
14	SPAREB	
15	SPAREB	
16	SPAREB	
17	SPAREB	
18	SPAREB	
19	SPAREB	
20	SPAREB	
21	SPAREB	
22	SPAREB	
23	BADUPS	
24	SPAREB	
25	SPAREB	
26	ROOMENTR	
27	SPAREB	
28	SPAREB	
29	SPAREB	
30	SPAREB	
31	SPAREB	
32	SHTDOWN	
33	SPAREB	
34	SPAREB	
35	SPAREB	
36	SPAREB	
37	SPAREB	
38	SPAREB	
39	M1OPEN	
40	M1CLOSE	
41	M2OPEN	
42	M2CLOSE	
43	REG1OPEN	
44	REG1CLS	
45	REG2OPEN	
46	REG2CLS	
47	MON1OPEN	
48	MON1CLS	
49	MON2OPEN	
50	MON2CLS	

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 57
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

                  Boolean Variable Communications Definition
            Note: The protocol adds 1000 to these index numbers
                      Index # Name    SubField
```

Index #	Name	SubField
51	GAS1LOW	
52	GAS2LOW	
53	GATEOPEN	
54	PRESIN	Man/Var
55	PRESOUT	Man/Var
56	REG1POS	Man/Var
57	PIC1FDBK	Man/Var
58	REG2POS	Man/Var
59	PIC2FDBK	Man/Var
60	OPEN1	
61	CLOSE1	
62	OPEN2	
63	CLOSE2	
64	SW_MODE	
65	CHMCF1	
66	CMCF1	
67	CACCVOL1	
68	CHDT1	
69	CDT1	
70	CACCDT1	
71	CHMCF2	
72	CMCF2	
73	CACCVOL2	
74	CHDT2	
75	CDT2	
76	CACCDT2	
77	CHMCFS	
78	CMCFS	
79	CACCVOLS	
80	CHDTS	
81	CDTS	
82	CACCDTS	
83	GCALARM	
84	MBWDT	
85	MBTMOVER	
86	WDT	
87	TMOVER	

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 58
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

               Short Integer Variable Communications Definition
            Note: The protocol adds 3000 to these index numbers
                      Index # Name    SubField
```

Index #	Name	SubField
1	REG0000	
2	REG0001	
3	REG0002	
4	REG0003	
5	REG0004	
6	REG0005	
7	REG0006	
8	REG0007	
9	REG0008	
10	REG0009	
11	REG0010	
12	REG0011	
13	REG0012	
14	REG0013	
15	REG0014	
16	REG0015	
17	REG0016	
18	REG0017	
19	REG0018	
20	REG0019	
21	REG0020	
22	REG0021	
23	REG0022	
24	REG0023	
25	REG0024	
26	REG0025	
27	REG0026	
28	REG0027	
29	REG0028	
30	REG0029	
31	REG0030	
32	REG0031	
33	REG0032	
34	REG0033	
35	REG0034	
36	REG0035	
37	REG0036	
38	REG0037	
39	REG0038	
40	REG0039	
41	REG0040	
42	REG0041	
43	REG0042	
44	REG0043	
45	REG0044	
46	REG0045	
47	REG0046	
48	REG0047	
49	REG0048	
50	REG0049	

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 59
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

               Short Integer Variable Communications Definition
            Note: The protocol adds 3000 to these index numbers
                      Index # Name    SubField
```

Index #	Name	SubField
51	REG0050	
52	PIC1RAIS	
53	PIC1LWR	
54	PIC2RAIS	
55	PIC2LWR	
56	REG0055	
57	REG0056	
58	REG0057	
59	REG0058	
60	REG0059	
61	REG0060	
62	REG0061	
63	REG0062	
64	REG0063	
65	REG0064	
66	REG0065	
67	REG0066	
68	REG0067	
69	REG0068	
70	REG0069	
71	REG0070	
72	REG0071	
73	REG0072	
74	REG0073	
75	REG0074	
76	REG0075	
77	REG0076	
78	REG0077	
79	REG0078	
80	REG0079	
81	REG0080	
82	REG0081	
83	REG0082	
84	REG0083	
85	REG0084	
86	REG0085	
87	REG0086	
88	REG0087	
89	REG0088	
90	REG0089	
91	REG0090	
92	REG0091	
93	REG0092	
94	REG0093	
95	REG0094	
96	REG0095	
97	REG0096	
98	REG0097	
99	REG0098	
100	REG0099	

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 60
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:55

               Short Integer Variable Communications Definition
            Note: The protocol adds 3000 to these index numbers
                      Index # Name    SubField
-----------------------------------------------------------------------------
                         101  REG0100
                         102  REG0101
                         103  REG0102
                         104  REG0103
                         105  REG0104
                         106  REG0105
                         107  REG0106
                         108  REG0107
                         109  REG0108
                         110  REG0109
                         111  REG0110
                         112  REG0111
                         113  REG0112
                         114  REG0113
                         115  REG0114
                         116  REG0115
                         117  REG0116
                         118  REG0117
                         119  REG0118
                         120  REG0119
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56
```

MODBUS Remote Unit Definition

#	Name	Comm Addr	State	Control
1	AE012	GCADR	GCSTATE	GCCNTRL
2				

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56
```

MODBUS Remote Variable Definition
Unit Name: AE012

#	Name	Units	Register	Xmit/Rec
1	GCSTART1		3045	Receive
2	C1		3001	Receive
3	C2		3002	Receive
4	C3		3003	Receive
5	C4		3004	Receive
6	C5		3005	Receive
7	C6		3006	Receive
8	C7		3007	Receive
9	C8		3008	Receive
10	C9		3009	Receive
11	CA		3010	Receive
12	CB		3011	Receive
13	CC		3012	Receive
14	CD		3013	Receive
15	CE		3014	Receive
16	CF		3015	Receive
17	C10		3016	Receive
18	GCSTREAM		3034	Receive
19	GCSTART		3045	Receive
20	ALARM1		3046	Receive
21	ALARM2		3047	Receive
22	CALFLAG		3059	Receive
23	P1		7001	Receive
24	P2		7002	Receive
25	P3		7003	Receive
26	P4		7004	Receive
27	P5		7005	Receive
28	P6		7006	Receive
29	P7		7007	Receive
30	P8		7008	Receive
31	P9		7009	Receive
32	PA		7010	Receive
33	PB		7011	Receive
34	PC		7012	Receive
35	PD		7013	Receive
36	PE		7014	Receive
37	PF		7015	Receive
38	P10		7016	Receive
39	GCBTU		7033	Receive
40	GCGRAV		7035	Receive
41	GCSTART2		3045	Receive

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56
```

System Variable Override Definition

	Name	Units	Default	Description
1	UNITID		0	Unit Identification
2	COMMID		1	Communications Identification
3	LOGGER		No Log	Logging
4	BAUD1		1200	Baud Rate1
5	BAUD2		1200	Baud Rate2
6	BAUD3		1200	Baud Rate3
7	PORTUSE1		Slave	Usage - Port 1
8	PORTUSE2		Master	Usage - Port 2
9	PORTUSE3		Reports	Usage - Port 3
10	PARITY1		None	Parity - Port 1
11	PARITY2		Even	Parity - Port 2
12	PARITY3		Even	Parity - Port 3
13	STOPBIT1		1	Stop Bits - Port 1
14	STOPBIT2		1	Stop Bits - Port 2
15	STOPBIT3		1	Stop Bits - Port 3
16	PRTCLSLV		ModRTU	Slave Protocol
17	PRTCLMAS		ModAscii	Master Protocol
18	RPTGAP		Spaces	Report Gap
19	COMMWAIT	10ms	20	Comm Wait
20	EVENTLOG		20	Number of MB Event Log Entries
21	TYPEVNTS		Old_18	MB Event Length 18 or 22
22	MODITOFP		No	Allow Int/Seln Vars in FP Regs

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56
```

Calculation Sheet Title Entry

Sheet #	Sheet Title	Calc Type
1	DESCRIPTION	Startup
2	STARTUP 1	Startup
3	STARTUP 2	Startup
4	STARTUP 3	Startup
5	STARTUP 4	Startup
6	STARTUP 5	Startup
7	STARTUP 6	Startup
8	STARTUP 7	Startup
9	MODBUS REG	Startup
10	CLEAR STARTUP	Startup
11	OPERATOR ENTRY 1	Operator
12	OPERATOR ENTRY 2	Operator
13	OPERATOR ENTRY 3	Operator
14	EXECUTIVE	Normal
15	CALENDAR	Normal
16	CLEAR	Normal
17	CLEAR 1	Normal
18	CLEAR 2	Normal
19	CLEAR HOURLY	Normal
20	CLEAR DAILY	Normal
21	DANIEL GC EXEC	Normal
22	DANIEL GC SEQ 1	Normal
23	DANIEL GC	Normal
24	SUBSTITUE GC VAL	Normal
25	GAS INPUTS	Normal
26	GAS ACF INCR	Normal
27	GAS ACF TOTAL	Normal
28	GAS NX19 FPV	Normal
29	GAS SCF INCR	Normal
30	GAS SCF TOTAL	Normal
31	GAS ENERGY INCR	Normal
32	GAS ENERGY TOTAL	Normal
33	ACF HOUR TOTALS	Normal
34	ACF DISPLAY	Normal
35	SCF HOUR TOTALS	Normal
36	SCF DISPLAY	Normal
37	DT HOUR TOTALS	Normal
38	DT DISPLAY	Normal
39	FACTORS LINE 1&2	Normal
40	AVERAGES	Normal
41	ALARMS	Normal
42	LOCAL CONTROL	Normal
43	REMOTE CONTROL	Normal
44	AUTO SWITCH 1	Normal
45	AUTO SWITCH 2	Normal
46	ALL CASES 1	Normal
47	ALL CASES 2	Normal
48	MODBUS #1	Normal
49	MODBUS #2	Normal
50	MODBUS #3	Normal

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56
```

Calculation Sheet Title Entry

Sheet #	Sheet Title	Calc Type
51	MODBUS #4	Normal
52	MODBUS #5	Normal
53	EVENT EXECUTIVE	Normal
54	HOURLY	Normal
55	DAILY	Normal
56	INTERVAL PRINT	Normal
57	FINIS	Normal
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
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```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56

                                          Calculation Entry
                        Title: DESCRIPTION        Type: Startup
  L#  Calculation Statements                                          Units
______________________________________________________________________________
    {  51305310


    {  P G & E.  HARPER LAKE METER STATION
    {  2 Parallel runs, separate calculations
    {  separate pressure and temperature.


    {  Fluid Type - Gas
    {  Primary Element - Turbine
    {  Special 2502
    {  2 Tubes
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56

                              Calculation Entry
                   Title: STARTUP 1          Type: Startup
  L#  Calculation Statements                                          Units
___________________________________________________________________________
   1 RESET (WATCHDOG)
   2 RESET (POWRFAIL)
   3 GPTUBES = 2
   4 YES = 1
   5 NO  = 0
   6 DOSTATIC = YES
   7 ORIF = 0.0
   8 PIPE = 0.0
   9 HEAT = 0.0
  10 TYP  = 1
  11 LOC  = 1
  12 GRAVX = 0.0
  13 TEMPX = 0.0
  14 PRESX = 0.0
  15 DPX   = 0.0
  16 DPX1  = 0.0
  17 DPX2  = 0.0
  18 CUTX  = 0.0
  19 CUTX1 = 0.0
  20 CUTX2 = 0.0
  21 BTUX  = 0.0
  22 DUMMY = 0.0
  23
  24 NRTOT = 0
  25 TOT = 0
  26 FR = 0.0
  27 INCR =0.0
  28 FRAC = 0.0
  29
  30 DMY = 0.0
  31 SUMFR = 0.0
  32 SUMT  = 0.0
  33 SUMP  = 0.0
  34 SUMDP = 0.0
  35 GHSCF   = 0
  36 HGHSCF = 0
  37 GHNRSCF = 0
  38 TIMESHUT = 0.0
  39
  40 GHBTU   = 0
  41 CURHOUR = HOUR
  42 PUTDAY = 1
  43 BTUR = 0.0
  44 GRAVR = 0.0
  45 CO2R = 0.0
  46 N2R = 0.0
  47 GRAVITY = GRV1BASE
  48 BTU = SUBBTU
  49
  50
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 68
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56

                              Calculation Entry
                  Title: STARTUP 2           Type: Startup
  L#  Calculation Statements                                          Units
___________________________________________________________________________
   1 MCFCNT1 = 0
   2 MCFCNT2 = 0
   3 MCFCNT3 = 0
   4 MCFCNT4 = 0
   5
   6 ACCVOL1 = 0
   7 ACCVOL2 = 0
   8 ACCVOL3 = 0
   9 ACCVOL4 = 0
  10
  11 MCFCNTS = 0
  12 ACCVOLS = 0
  13 HMCFCNT1 = 0
  14 HMCFCNT2 = 0
  15 HMCFCNT3 = 0
  16 HMCFCNT4 = 0
  17
  18 HMCFCNTS = 0
  19 I1 = 1
  20 I2 = 2
  21 I7 = 7
  22 DMCFCNT1 = 0
  23 DMCFCNT2 = 0
  24 DMCFCNT3 = 0
  25 DMCFCNT4 = 0
  26
  27 MCFRTE1 = 0.0
  28 MCFRTE2 = 0.0
  29 MCFRAT3 = 0.0
  30 MCFRAT4 = 0.0
  31
  32 TOTALIZE = 1
  33 CLEAR = 2
  34 GRAVITY1 = 0.0
  35 BTU1 = 0.0
  36 N2X = 0.0
  37 CO2X = 0.0
  38 CO2 = 0.0
  39 N2 = 0.0
  40 TIMER3 = 0
  41 RESET (SHTDOWN)
  42 RESET (BUSY1)
  43 RESET (BUSY2)
  44 RESET (BUSY3)
  45 RESET (BUSY4)
  46
  47
  48 REG0020 = 0
  49
  50
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 69
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56

                              Calculation Entry
                  Title: STARTUP 3           Type: Startup
  L#  Calculation Statements                                             Units

GCADR = 1
IDLE = 1
ACTIVE = 2
GCTRIES = 0
CX = 0
PX = 0.0
RESET ( GCCOMM )
WAIT1 = NO
SUSPEND1 = 1
PRINTALR = NO
NTERVAL = 0
RESET( RPTFLAG )
RESET ( COLIMIT1 )
RESET ( COLIMIT2 )
RESET ( COLIMIT3 )
RESET ( COLIMIT4 )

RESET ( GCOM )
DMY = 0.0
I = 0
SPARE = 0
SPAREFP = 0.0
SEQUENCE = -1
REG0012 = 0
REG0013 = 0
REG0014 = 0
REG0029 = 0
REG0030 = 0
OEMN     = 1.0E-8
OEMX     = 1.0E8
REG0039 = 0
REG0040 = 0
REG0049 = 0
REG0050 = 0
RESET( LOWDIFF )
RESET( MTR1FAIL )
RESET( MTR2FAIL )
RESET( MTR3FAIL )
RESET( MTR4FAIL )
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 70
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56

                            Calculation Entry
                Title: STARTUP 4           Type: Startup
  L#  Calculation Statements                                          Units

CURHOUR = HOUR

DANIEL = 1

{ RESET (VERFYDP)

TUBENUM = 0

TDEL = 0
RESET(SPAREB)
SPAREL = 0

REMOTE = 1
LOCAL = 2
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 71
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:56

                         Calculation Entry
                Title: STARTUP 5           Type: Startup
  L#  Calculation Statements                                         Units
```

```
{ TUBE SWITCHING INITIALIZATIONS:

RESET(M1OPNCMD)
SET(M1CLSCMD)
RESET(M2OPNCMD)
SET(M2CLSCMD)
RESET(M3OPNCMD)
SET(M3CLSCMD)
RESET(M4OPNCMD)
SET(M4CLSCMD)

ENABLED = 1
DISABLED = 2
FAULTED = 3

SET(STARTUP)

CURCTLTB = 1
STATUS = 0

RESET(OPNSTAT)
RESET(CLSSTAT)
RESET(OPNCMD)
RESET(CLSCMD)

TSTIMER = 0.0

STATE1 = DISABLED
STATE2 = DISABLED
STATE3 = DISABLED
STATE4 = DISABLED


SWCHLO = 0.0
SWCHHI = 0.0
OPENING = 2
CLOSING = 3
TSACTION = IDLE
DP = 0.0
RESET (TSFLAGL)
RESET (TSFLAGH)
RESET (SWITCHHI)
RESET (SWITCHLO)
RESET (WAIT)
SET (DOSTART)
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                             Calculation Entry
                     Title: STARTUP 6    Type: Startup
  L#  Calculation Statements                                          Units
-----------------------------------------------------------------------------
   1
   2
   3
   4
   5 CLEARHH = 1
   6 CLEARDD = 1
   7 RATEX   = 0.0
   8 PREV    = 0
   9 CURR    = 0
  10 MFX     = 0.0
  11 TOTX    = 0
  12 CURRHOUR = HOUR
  13
  14 HDTCNT1  = 0
  15 HDTCNT2  = 0
  16 HDTCNT3  = 0
  17 HDTCNT4  = 0
  18 HDTCNTS  = 0
  19
  20 DTCNT1   = 0
  21 DTCNT2   = 0
  22 DTCNT3   = 0
  23 DTCNT4   = 0
  24 DTCNTS   = 0
  25
  26 ACCDT1   = 0
  27 ACCDT2   = 0
  28 ACCDT3   = 0
  29 ACCDT4   = 0
  30 ACCDTS   = 0
  31
  32 F0       = 0.0         { MUST ALWAYS BE = 0.0)
  33 F1       = 0.0
  34 F2       = 0.0
  35 FWDIV    = 0.0
  36
  37 NUL      = 0
  38 OPN      = 1
  39 CLS      = 2
  40
  41 CS1      = 0
  42 CS2      = 0
  43
  44 SEQ      = 1
  45
  46 RESET (TMOVERS)
  47 RESET (WDT)
  48
  49
  50
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                              Calculation Entry
                      Title: STARTUP 7    Type: Startup
  L#  Calculation Statements                                           Units
-----------------------------------------------------------------------------
     TD1 = 0.0
     TD2 = 0.0
     TD3 = 0.0
     TD4 = 0.0
     TD5 = 0.0
     TD6 = 0.0

     RESET (SW_MODE)
     RESET (WDT)
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                              Calculation Entry
                    Title: MODBUS REG    Type: Startup
  L#  Calculation Statements                                              Units
-------------------------------------------------------------------------------
   1
   2
   3
   4
   5 REG0051 = 0
   6 REG0052 = 0
   7 REG0053 = 0
   8 REG0054 = 0
   9
  10
  11
  12
  13
  14
  15
  16
  17
  18
  19
  20
  21
  22
  23
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  48
  49
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```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 75
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                                          Calculation Entry
                          Title: CLEAR STARTUP    Type: Startup
  L#  Calculation Statements                                                Units
```

```
RESET (CHMCF1)
RESET (CMCF1)
RESET (CACCVOL1)

RESET (CHDT1)
RESET (CDT1)
RESET (CACCDT1)

RESET (CHMCF2)
RESET (CMCF2)
RESET (CACCVOL2)

RESET (CHDT2)
RESET (CDT2)
RESET (CACCDT2)

RESET (CHMCFS)
RESET (CMCFS)
RESET (CACCVOLS)

RESET (CHDTS)
RESET (CDTS)
RESET (CACCDTS)

GOTO NEXT
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                            Calculation Entry
                  Title: OPERATOR ENTRY 1    Type: Operator
  L#  Calculation Statements                                              Units

DOSTATIC = YES

DAYBEGIN = CLIP (DAYBEGIN,0.0,23.0)
DAYBEGIN = TRUNC (DAYBEGIN)
DAYSTART = FIX (DAYBEGIN)

PRESBASE = CLIP ( PRESBASE,14.0,20.0 )

SCFSCALE = 1000.0
SCFSF    = 1000.0
ACFSF    = 1000.0

BTUSCALE = 1000000.0
BTUSF    = 1000000.0

SUBCO2 = CLIP ( SUBCO2,0.0,15.0 )
SUBN2 = CLIP ( SUBN2,0.0,15.0 )

GRAVX = CLIP ( GRV1BASE, 0.1, 1.0 )

GCDELAY = TRUNC (GCDELAY)
GCDELAY = CLIP  (GCDELAY,1.0,15.0)
GCDLY   = GCDELAY * 60.0
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                             Calculation Entry
                     Title: OPERATOR ENTRY 2    Type: Operator
  L#  Calculation Statements                                          Units
```

```
I = INTERVAL
IF (I = 1) J = 1
IF (I = 2) J = 2
IF (I = 3) J = 3
IF (I = 4) J = 4
IF (I = 5) J = 6
IF (I = 6) J = 12

IF ( J = NTERVAL ) GOTO NEXT



NTERVAL = J
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                        Calculation Entry
            Title: OPERATOR ENTRY 3    Type: Operator
  L#  Calculation Statements                                          Units
---------------------------------------------------------------------------
    TEMPBASE = CLIP (TEMPBASE,0.0,100.0)
    PRESBASE = CLIP (PRESBASE,14.0,20.0)

    PUT (GPMF,1,MF1)
    PUT (GPMF,2,MF2)
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                              Calculation Entry
                      Title: EXECUTIVE    Type: Normal
  L#  Calculation Statements                                          Units
```

```
IF (WATCHDOG) RESET (WATCHDOG)
IF (POWRFAIL) RESET (POWRFAIL)

IOCYCLE = FLOAT (IOTIME) / 1000.0
APCYCLE = FLOAT (TIME) / 1000.0

SIMULATE = 500.0 * IOCYCLE

DOSTATIC = NO

IF (TD1 > 0.0) TD1 = TD1 - IOCYCLE
IF (TD2 > 0.0) TD2 = TD2 - IOCYCLE
IF (TD3 > 0.0) TD3 = TD3 - IOCYCLE
IF (TD4 > 0.0) TD4 = TD4 - IOCYCLE
IF (TD5 > 0.0) TD5 = TD5 - IOCYCLE
IF (TD6 > 0.0) TD6 = TD6 - IOCYCLE

GOTO NEXT
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 80
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                              Calculation Entry
                       Title: CALENDAR    Type: Normal
  L#  Calculation Statements                                              Units
_______________________________________________________________________________
   1
   2
   3
   4
   5 CMONTH  = MONTH
   6 CDAY    = DAY
   7 CYEAR   = YEAR
   8 CHOUR   = HOUR
   9 CMINUTE = MINUTE
  10
  11 IF (CMINUTE <> MINUTE) GOTO 5
  12
  13 PDYY = CYEAR
  14 IF (CMONTH = 1) AND (CDAY = 1) PDYY = CYEAR - 1
  15
  16 PUT (PMLD,3,2,28)
  17 LEAP = PDYY MOD 4
  18 IF (LEAP = 0) PUT (PMLD,3,2,29)
  19
  20 PDMM = CMONTH
  21 PDDD = CDAY - 1
  22 IF (PDDD = 0) GET (PMLD,CMONTH,PDMM,PDDD)
  23
  24 PDMMDDYY = PDYY MOD 100
  25 PDMMDDYY = PDMMDDYY + (PDDD * 100)
  26 PDMMDDYY = PDMMDDYY + (PDMM * 10000)
  27
  28 PDMMDD   = (PDMM * 100) + PDDD
  29
  30 PHHH     = CHOUR - 1
  31 IF (CHOUR = 0) PHHH = 23
  32
  33 MMDDYY   = CYEAR MOD 100
  34 MMDDYY   = MMDDYY + (CDAY   * 100)
  35 MMDDYY   = MMDDYY + (CMONTH * 10000)
  36
  37 HHMM     = (CHOUR * 100) + CMINUTE
  38
  39 PHMMDDYY = MMDDYY
  40 IF (CHOUR = 0) PHMMDDYY = PDMMDDYY
  41
  42 PHDD     = CDAY
  43 IF (CHOUR = 0) PHDD = PDDD
  44
  45 GOTO NEXT
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 81
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                              Calculation Entry
                        Title: CLEAR    Type: Normal
  L#  Calculation Statements                                              Units
IF (VOL = 1) GOTO NEXT
VOL     = 1
CLRDD   = 2
CLRHH   = 2
GOTO NEXT
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 82
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                              Calculation Entry
                       Title: CLEAR 1    Type: Normal
  L#  Calculation Statements                                              Units
```

```
TUBE = 1

IF (CHMCF1 )  OR (CHMCFS)     PUT (GPHSL,TUBE,0)

GET (GPSL,TUBE,RATEX,TOT,NRTOT)
IF (CMCF1)    OR (CMCFS)      PUT (GPSL ,TUBE,RATEX,0,NRTOT)

IF (CACCVOL1) OR (CACCVOLS)   PUT (GPSL ,TUBE,RATEX,0,0)

IF (CHDT1)    OR (CHDTS)      PUT (GPHEL,TUBE,0)

GET (GPEL,TUBE,RATEX,TOT,NRTOT)
IF (CDT1)     OR (CDTS)       PUT (GPSL ,TUBE,RATEX,0,NRTOT)

IF (CACCDT1)  OR (CACCDTS)    PUT (GPSL ,TUBE,RATEX,0,0)

RESET (CHMCF1)
RESET (CMCF1)
RESET (CACCVOL1)

RESET (CHDT1)
RESET (CDT1)
RESET (CACCDT1)
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 83
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                              Calculation Entry
                       Title: CLEAR 2    Type: Normal
  L#  Calculation Statements                                             Units
```

```


TUBE = 2

IF (CHMCF2 )  OR (CHMCFS)     PUT (GPHSL,TUBE,0)

GET (GPSL,TUBE,RATEX,TOT,NRTOT)
IF (CMCF2)    OR (CMCFS)      PUT (GPSL ,TUBE,RATEX,0,NRTOT)

IF (CACCVOL2) OR (CACCVOLS)   PUT (GPSL ,TUBE,RATEX,0,0)

IF (CHDT2)    OR (CHDTS)      PUT (GPHEL,TUBE,0)

GET (GPEL,TUBE,RATEX,TOT,NRTOT)
IF (CDT2)     OR (CDTS)       PUT (GPSL ,TUBE,RATEX,0,NRTOT)

IF (CACCDT2)  OR (CACCDTS)    PUT (GPSL ,TUBE,RATEX,0,0)

RESET (CHMCF2)
RESET (CMCF2)
RESET (CACCVOL2)

RESET (CHDT2)
RESET (CDT2)
RESET (CACCDT2)

RESET (CHMCFS)
RESET (CMCFS)
RESET (CACCVOLS)

RESET (CHDTS)
RESET (CDTS)
RESET (CACCDTS)

GOTO NEXT
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 84
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:57

                              Calculation Entry
                    Title: CLEAR HOURLY    Type: Normal
  L#  Calculation Statements                                               Units
______________________________________________________________________________
   1 IF (CLRHH = 1) GOTO NEXT
   2
   3 CLRHH = 1
   4
   5 TUBE = 1
   6
   7
   8
   9
  10 PUT (GPHSL,TUBE,0)
  11 PUT (GPHEL,TUBE,0)
  12 PUT (GPHAL,TUBE,0)
  13
  14 TUBE = TUBE + 1
  15 IF (TUBE <= GPTUBES) GOTO 10
  16 GOTO NEXT
  17
  18
  19
  20
  21
  22
  23
  24
  25
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```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 85
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                              Calculation Entry
                    Title: CLEAR DAILY    Type: Normal
  L#  Calculation Statements                                              Units
______________________________________________________________________________
   1 IF (CLRDD = 1) GOTO NEXT
   2
   3 CLRDD = 1
   4
   5 TUBE = 1
   6
   7 GET (GPEL,TUBE,RATEX,TOT,NRTOT)
   8 PUT (GPEL,TUBE,  0.0,  0,NRTOT)
   9
  10 GET (GPSL,TUBE,RATEX,TOT,NRTOT)
  11 PUT (GPSL,TUBE,  0.0,  0,NRTOT)
  12
  13 GET (GPAL,TUBE,RATEX,TOT,NRTOT)
  14 PUT (GPAL,TUBE,  0.0,  0,NRTOT)
  15
  16 PUT (GPFWDIV,TUBE,F0)
  17 PUT (GPFWSUM,TUBE,F0,F0)
  18 PUT (GPFWA  ,TUBE,F0,F0)
  19
  20 TUBE = TUBE + 1
  21 IF (TUBE <= GPTUBES) GOTO 10
  22 GOTO NEXT
  23
  24
  25
  26
  27
  28
  29
  30
  31
  32
  33
  34
  35
  36
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```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 86
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                              Calculation Entry
                   Title: DANIEL GC EXEC      Type: Normal
  L#  Calculation Statements                                            Units
_____________________________________________________________________________
   1 IF (GCTYPE <> DANIEL) GOTO NEXT
   2
   3
   4
   5 IF (SEQUENCE <> -1) GOTO 15
   6
   7 DLY      = GCDLY
   8
   9
  10 TIMER    = DLY
  11 ASSURE   = 1
  12 SEQUENCE = 0
  13 RESET (ATTACH)
  14
  15 IF (SEQUENCE <> 0) GOTO NEXT
  16
  17 BUSY = NO
  18 IF (BUSY1) BUSY = YES
  19 IF (BUSY2) BUSY = YES
  20 IF (BUSY3) BUSY = YES
  21 IF (BUSY4) BUSY = YES
  22
  23 IF (TIMER > 0.0) TIMER = TIMER - IOCYCLE
  24
  25 IF (TIMER > 0.0) GOTO NEXT
  26
  27 IF (BUSY = YES) AND (DLY > 60.0) DLY = DLY - 60.0
  28 IF (BUSY = YES)                  GOTO 10
  29
  30 SET (ATTACH)
  31
  32 ASSURE = ASSURE + 1
  33 IF (ASSURE <> 3) GOTO NEXT
  34
  35 SEQUENCE = 1
  36
  37
  38
  39
  40 GCTRIES = 1
  41 RESET (GCALARM)
  42
  43
  44
  45 GCCNTRL = ACTIVE
  46 GOTO NEXT
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 87
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                              Calculation Entry
                   Title: DANIEL GC SEQ 1     Type: Normal
  L#  Calculation Statements                                          Units
___________________________________________________________________________
   1 IF (GCTYPE <> DANIEL)  GOTO NEXT
   2 IF (SEQUENCE <> 1)     GOTO NEXT
   3
   4
   5
   6
   7 IF (GCCNTRL = ACTIVE) GOTO NEXT
   8 CNTRL   = GCCNTRL
   9
  10
  11 IF (CNTRL = IDLE) GOTO 20
  12
  13 GCTRIES = GCTRIES + 1
  14 IF (GCTRIES <> 5)      GCCNTRL = ACTIVE
  15 IF (GCTRIES = 5)       SEQUENCE = -1
  16 GOTO NEXT
  17
  18
  19
  20 GCTRIES = 1
  21 RESET (GCALARM)
  22
  23 TEST = ALARM1 MOD 4
  24 IF (TEST <> 0)        SEQUENCE = -1
  25
  26 IF (ALARM1 > 16383)   SEQUENCE = -1
  27 IF (ALARM1 < 0)       SEQUENCE = -1
  28
  29 TEST = ALARM2 MOD 8
  30 IF (TEST > 3)         SEQUENCE = -1
  31
  32 IF (SEQUENCE = -1)     SET (GCALARM)
  33 IF (SEQUENCE = -1)     GOTO NEXT
  34
  35 SEQUENCE = 2
  36
  37 IF (GCSTART1 <> GCSTART2) SEQUENCE = 1
  38 IF (CALFLAG = 0)          SEQUENCE = 1
  39 IF (GCSTREAM <> STREAMID) SEQUENCE = 1
  40
  41 IF (SEQUENCE = 1)         GCCNTRL = ACTIVE
  42
  43 GOTO NEXT
  44
  45
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 88
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                              Calculation Entry
                 Title: DANIEL GC          Type: Normal
  L#  Calculation Statements                                          Units
--------------------------------------------------------------------------------
   1 IF (GCTYPE <> DANIEL) GOTO NEXT
   2 IF (SEQUENCE <> 2)    GOTO NEXT
   3
   4
   5 PUT (GC, 1,C1,P1)
   6 PUT (GC, 2,C2,P2)
   7 PUT (GC, 3,C3,P3)
   8 PUT (GC, 4,C4,P4)
   9 PUT (GC, 5,C5,P5)
  10 PUT (GC, 6,C6,P6)
  11 PUT (GC, 7,C7,P7)
  12 PUT (GC, 8,C8,P8)
  13 PUT (GC, 9,C9,P9)
  14 PUT (GC,10,CA,PA)
  15 PUT (GC,11,CB,PB)
  16 PUT (GC,12,CC,PC)
  17 PUT (GC,13,CD,PD)
  18 PUT (GC,14,CE,PE)
  19 PUT (GC,15,CF,PF)
  20 PUT (GC,16,C10,P10)
  21
  22 I = 1
  23
  24
  25 GET (GC,I,CX,PX )
  26 IF (CX = 14) N2R = PX
  27 IF (CX = 17) CO2R = PX
  28
  29 I = I + 1
  30 IF (I <= 16) GOTO 25
  31
  32
  33 PUT ( GCREAD,1,GCGRAV,GCBTU,N2R,CO2R )
  34
  35 SEQUENCE = -1
  36
  37 GOTO NEXT
  38
  39
  40
  41
  42
  43
  44
  45
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 89
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                                Calculation Entry
                     Title: SUBSTITUE GC VAL    Type: Normal
  L#  Calculation Statements                                               Units
________________________________________________________________________________
   1
   2
   3
   4
   5 GET (GCREAD,1,GRAVX,BTUX,N2X,CO2X)
   6
   7 GRAVITY = GRAVX                                                         -
   8 N2      = N2X                                                           %
   9 CO2     = CO2X                                                          %
  10
  11 LO1 = LO ( GRAVITY )
  12 HI1 = HI ( GRAVITY )
  13 IF (GRAVX < LO1) OR (GRAVX > HI1) SET (GRAVSUB)
  14 IF (GRAVX < LO1) OR (GRAVX > HI1) GRAVX = GRV1BASE
  15
  16 LO1 = LO ( BTU )
  17 HI1 = HI ( BTU )
  18 IF ( BTUX < LO1 ) OR ( BTUX > HI1 ) SET (BTUSUB)
  19 IF ( BTUX < LO1 ) OR ( BTUX > HI1 ) BTUX = SUBBTU
  20
  21 LO1 = LO ( N2 )
  22 HI1 = HI ( N2 )
  23 IF ( N2X < LO1 ) OR ( N2X > HI1 ) SET (N2SUB)
  24 IF ( N2X < LO1 ) OR ( N2X > HI1 ) N2X = SUBN2
  25
  26 LO1 = LO ( CO2 )
  27 HI1 = HI ( CO2 )
  28 IF ( CO2X < LO1 ) OR ( CO2X > HI1 ) SET (CO2SUB)
  29 IF ( CO2X < LO1 ) OR ( CO2X > HI1 ) CO2X = SUBCO2
  30
  31 GRAVX = CLIP ( GRAVX,.55,1.0 )
  32 N2X = CLIP ( N2X,0.0,15.0 )
  33 CO2X = CLIP ( CO2X,0.0,15.0 )
  34
  35 GRAVITYS = GRAVX
  36 N2S      = N2X
  37 CO2S     = CO2X
  38 BTUS     = BTUX
  39
  40 PUT (GCINPUTS,1,GRAVX,BTUX,N2X,CO2X )
  41
  42
  43
  44
  45
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 90
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                            Calculation Entry
                    Title: GAS INPUTS    Type: Normal
  L#  Calculation Statements                                          Units

PUT (GPCURR,1,METER1)
PUT (GPCURR,2,METER2)

PUT (GPTEMP,1,M1TT)
PUT (GPTEMP,2,M2TT)

PUT (GPPRES,1,M1PT)
PUT (GPPRES,2,M2PT)

GOTO NEXT
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 91
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                               Calculation Entry
                     Title: GAS ACF INCR     Type: Normal
  L#  Calculation Statements                                           Units
---------------------------------------------------------------------------------
   1
   2 TUBE = 1
   3
   4
   5 GET (GPPREV,TUBE,PREV)
   6 GET (GPCURR,TUBE,CURR)
   7 GET (GPMF  ,TUBE,MFX)
   8
   9 DELTA = CURR - PREV
  10
  11 INCR  = FLOAT (DELTA)
  12
  13 IF (TESTTURB = 2) INCR = SIMULATE
  14
  15 HZX   = INCR / IOCYCLE
  16
  17 IF (TUBE = 1) HZ1 = HZX                                            HZ
  18 IF (TUBE = 2) HZ2 = HZX                                            HZ
  19
  20 INCR  = INCR / MFX
  21 IF (MFX <= 0.0) INCR = 0.0
  22 RATEX = INCR * 3600.0 / IOCYCLE
  23
  24 PUT (GPAINCR,TUBE,INCR,RATEX)
  25 PUT (GPPREV ,TUBE,CURR)
  26
  27 TUBE = TUBE + 1
  28 IF (TUBE <= GPTUBES) GOTO 5
  29 GOTO NEXT
  30
  31
  32
  33
  34
  35
  36
  37
  38
  39
  40
  41
  42
  43
  44
  45
  46
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  48
  49
  50
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 92
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                                Calculation Entry
                      Title: GAS ACF TOTAL    Type: Normal
  L#  Calculation Statements                                             Units
-----------------------------------------------------------------------------
   1
   2 TUBE = 1
   3
   4
   5 GET (GPAL   ,TUBE,RATEX,TOT,NRTOT)
   6 GET (GPAINCR,TUBE,INCR,RATEX)
   7 GET (GPAFRAC,TUBE,FRAC)
   8
   9 CYCLE  = (INCR / ACFSF) + FRAC
  10 TICKS  = FIX (CYCLE)
  11 FRAC   = CYCLE - TRUNC (CYCLE)
  12 TOT    = (TOT + TICKS) MOD 1E9
  13 RATEX  = RATEX / ACFSF
  14 NRTOT  = (NRTOT + TICKS) MOD 1E9
  15
  16 PUT (GPAFRAC,TUBE,FRAC)
  17 PUT (GPATIX ,TUBE,TICKS)
  18 PUT (GPAL   ,TUBE,RATEX,TOT,NRTOT)
  19
  20 TUBE = TUBE + 1
  21 IF (TUBE <= GPTUBES) GOTO 5
  22 GOTO NEXT
  23
  24
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2500 Instrument Configuration Report  v500            51305310   2502 Page 93
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                              Calculation Entry
                     Title: GAS NX19 FPV    Type: Normal
  L#  Calculation Statements                                                Units
___________________________________________________________________________________
   1
   2
   3 TUBE = 1
   4
   5 GET (GPTEMP  ,TUBE,TEMPX)
   6 GET (GPPRES  ,TUBE,PRESX)
   7 GET (GCINPUTS,1,GRAVX,BTUX,N2X,CO2X)
   8
   9
  10 ABSTEMP  = TEMPX + 460.0
  11
  12 KT       = CO2X + (1.681 * N2X)
  13 FT       = 226.29 / (99.15 + (211.9 * GRAVX) - KT)
  14 ADJT     = (ABSTEMP * FT) - 460.0
  15 KP       = CO2X - (0.392 * N2X)
  16 FP       = 156.47 / (160.8 - (7.22 * GRAVX) + KP)
  17 ADJP     = PRESX * FP
  18
  19 FPVX     = NX19 (ABSTEMP,PRESX,GRAVX,CO2X,N2X)
  20
  21 RESET (FPVXALM)
  22
  23 CHECK    = CLIP (ADJT,0.0,200.0)
  24 IF (CHECK <> ADJT) SET (FPVXALM)
  25
  26 CHECK    = CLIP (ADJP,0.0,5000.0)
  27 IF (CHECK <> ADJP) SET (FPVXALM)
  28
  29 PUT (GPFPV,TUBE,FPVX)
  30
  31 TUBE = TUBE + 1
  32 IF (TUBE <= GPTUBES) GOTO 5
  33 GOTO NEXT
  34
  35
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2500 Instrument Configuration Report  v500           51305310   2502 Page 94
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                             Calculation Entry
                   Title: GAS SCF INCR     Type: Normal
  L#  Calculation Statements                                            Units
-----------------------------------------------------------------------------
   1
   2
   3 TUBE = 1
   4
   5 GET (GPTEMP ,TUBE,TEMPX)
   6 GET (GPPRES ,TUBE,PRESX)
   7 GET (GPFPV  ,TUBE,FPVX)
   8 GET (GPAINCR,TUBE,INCR,RATEX)
   9
  10 PF     = PRESX + BAROPRES
  11 PB     = PRESBASE
  12 TB     = TEMPBASE + 460.0
  13 TF     = TEMPX + 460.0
  14 S      = FPVX * FPVX
  15
  16 INCR  = INCR * (PF / PB) * (TB / TF) * S
  17 IF (PB <= 0.0) OR (TF <= 0.0) INCR = 0.0
  18 IF (PF <= 0.0) OR (TB <= 0.0) INCR = 0.0
  19
  20 RATEX = INCR * 3600.0 / IOCYCLE
  21
  22 PUT (GPSINCR,TUBE,INCR,RATEX)
  23
  24 TUBE = TUBE + 1
  25 IF (TUBE <= GPTUBES) GOTO 5
  26 GOTO NEXT
  27
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2500 Instrument Configuration Report  v500           51305310   2502 Page 95
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                             Calculation Entry
                   Title: GAS SCF TOTAL    Type: Normal
  L#  Calculation Statements                                             Units
-------------------------------------------------------------------------------
   1
   2 TUBE = 1
   3
   4
   5 GET (GPSL   ,TUBE,RATEX,TOT,NRTOT)
   6 GET (GPSINCR,TUBE,INCR,RATEX)
   7 GET (GPSFRAC,TUBE,FRAC)
   8
   9 CYCLE  = (INCR / SCFSF) + FRAC
  10 TICKS  = FIX (CYCLE)
  11 FRAC   = CYCLE - TRUNC (CYCLE)
  12
  13 TOT    = (TOT + TICKS) MOD 1E9
  14 RATEX  = RATEX / SCFSF
  15 NRTOT  = (NRTOT + TICKS) MOD 1E9
  16
  17 PUT (GPSFRAC,TUBE,FRAC)
  18 PUT (GPSTIX ,TUBE,TICKS)
  19 PUT (GPSL   ,TUBE,RATEX,TOT,NRTOT)
  20
  21 TUBE = TUBE + 1
  22 IF (TUBE <= GPTUBES) GOTO 5
  23 GOTO NEXT
  24
  25
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  31
  32
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2500 Instrument Configuration Report  v500           51305310   2502 Page 96
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                                          Calculation Entry
                     Title: GAS ENERGY INCR    Type: Normal
  L#  Calculation Statements                                              Units

   3 TUBE = 1
   5 GET (GPSINCR ,TUBE,INCR,RATEX)
   6 GET (GCINPUTS,1,GRAVX,BTUX,N2X,CO2X)
   8 INCR  = INCR * BTUS
   9 RATEX = INCR * 3600.0 / IOCYCLE
  11 PUT (GPEINCR,TUBE,INCR,RATEX)
  13 TUBE = TUBE + 1
  14 IF (TUBE <= GPTUBES) GOTO 5
  15 GOTO NEXT
```

```
2500 Instrument Configuration Report  v500            51305310   2502 Page 97
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:58

                                    Calculation Entry
                         Title: GAS ENERGY TOTAL    Type: Normal
  L#  Calculation Statements                                             Units
-------------------------------------------------------------------------------
   1
   2 TUBE = 1
   3
   4
   5 GET (GPEL   ,TUBE,RATEX,TOT,NRTOT)
   6 GET (GPEINCR,TUBE,INCR,RATEX)
   7 GET (GPEFRAC,TUBE,FRAC)
   8
   9 CYCLE  = (INCR / BTUSF) + FRAC
  10 TICKS  = FIX (CYCLE)
  11 FRAC   = CYCLE - TRUNC (CYCLE)
  12
  13 TOT    = (TOT + TICKS) MOD 1E9
  14 RATEX  = RATEX / BTUSF
  15 NRTOT  = (NRTOT + TICKS) MOD 1E9
  16
  17 PUT (GPEFRAC,TUBE,FRAC)
  18 PUT (GPETIX ,TUBE,TICKS)
  19 PUT (GPEL   ,TUBE,RATEX,TOT,NRTOT)
  20
  21 IF (TUBE = 1) M1THERM = M1THERM + TICKS
  22 IF (TUBE = 2) M2THERM = M2THERM + TICKS
  23
  24 TUBE = TUBE + 1
  25 IF (TUBE <= GPTUBES) GOTO 5
  26 GOTO NEXT
  27
  28
  29
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```
2500 Instrument Configuration Report  v500           51305310   2502 Page 98
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                                Calculation Entry
                   Title: ACF HOUR TOTALS    Type: Normal
  L#  Calculation Statements                                          Units
-----------------------------------------------------------------------------
   1
   2
   3 TUBE = 1
   4
   5 GET (GPATIX,TUBE,TICKS)
   6
   7 GET (GPHAL,TUBE,TOT)
   8 TOT = (TOT + TICKS) MOD 1E9
   9 PUT (GPHAL,TUBE,TOT)
  10
  11 TUBE = TUBE + 1
  12 IF (TUBE <= GPTUBES) GOTO 5
  13 GOTO NEXT
  14
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2500 Instrument Configuration Report  v500           51305310   2502 Page 99
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                              Calculation Entry
                    Title: ACF DISPLAY     Type: Normal
  L#  Calculation Statements                                          Units
___________________________________________________________________________
   1
   2
   3 TUBE = 1
   4
   5 GET (GPAL ,TUBE,RATEX,TOT,NRTOT)
   6
   7
   8
   9
  10 IF (TUBE <> 1) GOTO 20
  11 ATOT1 = TOT                                                       MCF
  12 AFR1  = RATEX                                                    MCFH
  13
  14
  15
  16
  17
  18
  19
  20 IF (TUBE <> 2) GOTO 30
  21 ATOT2 = TOT                                                       MCF
  22 AFR2  = RATEX                                                    MCFH
  23
  24
  25
  26
  27
  28
  29
  30 TUBE = TUBE + 1
  31 IF (TUBE <= GPTUBES) GOTO 5
  32
  33 ATOT = (ATOT1 + ATOT2) MOD 1E9                                    MCF
  34 AFR  = AFR1  + AFR2                                              MCFH
  35
  36 GOTO NEXT
  37
  38
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```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 100
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                             Calculation Entry
                  Title: SCF HOUR TOTALS    Type: Normal
  L#  Calculation Statements                                           Units
_____________________________________________________________________________
   1
   2
   3 TUBE = 1
   4
   5 GET (GPSTIX,TUBE,TICKS)
   6
   7 GET (GPHSL,TUBE,TOT)
   8 TOT = (TOT + TICKS) MOD 1E9
   9 PUT (GPHSL,TUBE,TOT)
  10
  11 TUBE = TUBE + 1
  12 IF (TUBE <= GPTUBES) GOTO 5
  13 GOTO NEXT
  14
  15
  16
  17
  18
  19
  20
  21
  22
  23
  24
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```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 101
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                           Calculation Entry
                    Title: SCF DISPLAY     Type: Normal
  L#  Calculation Statements                                            Units
_____________________________________________________________________________
   1
   2
   3 TUBE = 1
   4
   5 GET (GPHSL,TUBE,TOTX)
   6 GET (GPSL ,TUBE,RATEX,TOT,NRTOT)
   7
   8
   9
  10 IF (TUBE <> 1) GOTO 20
  11 ACCVOL1  = NRTOT                                                   MCF
  12 HMCFCNT1 = TOTX                                                    MCF
  13 MCFCNT1  = TOT                                                     MCF
  14 SFR1     = RATEX
  15 MCFRATE1 = RATEX                                                  MCFH
  16
  17
  18
  19
  20 IF (TUBE <> 2) GOTO 30
  21 ACCVOL2  = NRTOT                                                   MCF
  22 HMCFCNT2 = TOTX                                                    MCF
  23 MCFCNT2  = TOT                                                     MCF
  24 SFR2     = RATEX
  25 MCFRATE2 = RATEX                                                  MCFH
  26
  27
  28
  29
  30 TUBE = TUBE + 1
  31 IF (TUBE <= GPTUBES) GOTO 5
  32
  33 ACCVOLS  = (ACCVOL1  + ACCVOL2)  MOD 1E9                           MCF
  34 HMCFCNTS = (HMCFCNT1 + HMCFCNT2) MOD 1E9                           MCF
  35 MCFCNTS  = (MCFCNT1  + MCFCNT2)  MOD 1E9                           MCF
  36
  37 SFR  = SFR1  + SFR2                                               MCFH
  38
  39 GOTO NEXT
  40
  41
  42
  43
  44
  45
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 102
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                              Calculation Entry
                    Title: DT HOUR TOTALS    Type: Normal
  L#  Calculation Statements                                            Units
-----------------------------------------------------------------------------
   1
   2
   3 TUBE = 1
   4
   5 GET (GPETIX,TUBE,TICKS)
   6
   7 GET (GPHEL,TUBE,TOT)
   8 TOT = (TOT + TICKS) MOD 1E9
   9 PUT (GPHEL,TUBE,TOT)
  10
  11 TUBE = TUBE + 1
  12 IF (TUBE <= GPTUBES) GOTO 5
  13 GOTO NEXT
  14
  15
  16
  17
  18
  19
  20
  21
  22
  23
  24
  25
  26
  27
  28
  29
  30
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```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 103
 Created: MLT                          12/11/1986  20:31:55
Modifier: --==[ WHR ]==--              10/31/1989  16:55:59

                           Calculation Entry
                  Title: DT DISPLAY     Type: Normal
  L#  Calculation Statements                                              Units
______________________________________________________________________________
   1
   2
   3 TUBE = 1
   4
   5 GET (GPHEL,TUBE,TOTX)
   6 GET (GPEL ,TUBE,RATEX,TOT,NRTOT)
   7
   8
   9
  10 IF (TUBE <> 1) GOTO 20
  11 ACCDT1  = NRTOT                                                        DT
  12 HDTCNT1 = TOTX                                                         DT
  13 DTCNT1  = TOT                                                          DT
  14 EFR1    = RATEX                                                       DTH
  15
  16
  17
  18
  19
  20 IF (TUBE <> 2) GOTO 30
  21 ACCDT2  = NRTOT                                                        DT
  22 HDTCNT2 = TOTX                                                         DT
  23 DTCNT2  = TOT                                                          DT
  24 EFR2    = RATEX                                                       DTH
  25
  26
  27
  28
  29
  30 TUBE = TUBE + 1
  31 IF (TUBE <= GPTUBES) GOTO 5
  32
  33 ACCDTS  = (ACCDT1  + ACCDT2)  MOD 1E9                                  DT
  34 HDTCNTS = (HDTCNT1 + HDTCNT2) MOD 1E9                                  DT
  35 DTCNTS  = (DTCNT1  + DTCNT2)  MOD 1E9                                  DT
  36
  37 EFR  = EFR1 + EFR2                                                    DTH
  38
  39 GOTO NEXT
  40
  41
  42
  43
  44
  45
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 104
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                           Calculation Entry
                Title: FACTORS LINE 1&2    Type: Normal
  L#  Calculation Statements                                          Units
---------------------------------------------------------------------------
 GET (GPFPV,1,FPVX)
 FPV1 = FPVX                                                            -
 GET (GPFPV,2,FPVX)
 FPV2 = FPVX                                                            -
 GOTO NEXT
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                              Calculation Entry
                       Title: AVERAGES    Type: Normal
  L#  Calculation Statements                                              Units

   1
   2
   3 TUBE = 1
   4
   5 GET (GPSINCR,TUBE,INCR,RATEX)
   6
   7 GET (GPTEMP ,TUBE,TEMPX)
   8 GET (GPPRES ,TUBE,PRESX)
   9
  10 GET (GPFWDIV,TUBE,FWDIV)
  11 GET (GPFWSUM,TUBE,F1,F2)
  12
  13 IF (RATEX = 0.0) GOTO 45
  14
  15 WEIGHT = RATEX / 10000.0
  16 FWDIV  = FWDIV + WEIGHT
  17
  18
  19 F1 = F1 + (TEMPX * WEIGHT)
  20 F2 = F2 + (PRESX * WEIGHT)
  21
  22 PUT (GPFWDIV,TUBE,FWDIV)
  23 PUT (GPFWSUM,TUBE,F1,F2)
  24
  25 F1 = F1 / FWDIV
  26 F2 = F2 / FWDIV
  27
  28 PUT (GPFWA,TUBE,F1,F2)
  29
  30 IF (TUBE = 1) FWTEMP1 = F1                                         DEGF
  31 IF (TUBE = 1) FWPRES1 = F2                                         PSIG
  32
  33 IF (TUBE = 2) FWTEMP2 = F1                                         DEGF
  34 IF (TUBE = 2) FWPRES2 = F2                                         PSIG
  35
  36
  37
  38
  39
  40
  41
  42
  43
  44
  45 TUBE = TUBE + 1
  46 IF (TUBE <= GPTUBES) GOTO 5
  47 GOTO NEXT
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 106
 Created: MLT                          12/11/1986  20:31:55
Modifier: --==[ WHR ]==--              10/31/1989  16:55:59

                            Calculation Entry
                      Title: ALARMS    Type: Normal
  L#  Calculation Statements                                          Units
____________________________________________________________________________
IF (NOT MON1OPEN) SET   (MON1OPN)
IF (    MON1OPEN) RESET (MON1OPN)
IF (NOT MON2OPEN) SET   (MON2OPN)
IF (    MON2OPEN) RESET (MON2OPN)
ROOMENTR  = NOT(ENTRROOM)
UPSBAD   = NOT(BADUPS)
GAS1LO    = NOT(GAS1LOW)
GAS2LO    = NOT(GAS2LOW)
GATEOPEN  = NOT(OPENGATE)
GOTO NEXT
```

```
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 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                                Calculation Entry
                      Title: LOCAL CONTROL    Type: Normal
  L#  Calculation Statements                                              Units
```

```
IF (CONTROL <> 1) GOTO NEXT
RESET (OPEN1)
RESET (OPEN2)
RESET (CLOSE1)
RESET (CLOSE2)
M1CMD  = METER_1
M2CMD  = METER_2
METER_1 = 1
METER_2 = 1
IF (SWMODE = 1) GOTO NEXT
IF (M1CMD = 1) AND (M2CMD = 1) GOTO NEXT
IF (M1CMD = 2)  DS1 = OPN
IF (M1CMD = 2)  TD3 = TDELAY3
IF (M1CMD = 3)  DS1 = CLS
IF (M1CMD = 3)  TD4 = TDELAY4
IF (M2CMD = 2)  DS2 = OPN
IF (M2CMD = 2)  TD5 = TDELAY5
IF (M2CMD = 3)  DS2 = CLS
IF (M2CMD = 3)  TD6 = TDELAY6
IF (M1CMD <> 1) OR (M2CMD <> 1) RESET (WDT)
SEQ = 1
GOTO NEXT
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 108
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                              Calculation Entry
                    Title: REMOTE CONTROL    Type: Normal
  L#  Calculation Statements                                                Units
```

```
IF (CONTROL = 1) GOTO NEXT

METER_1 = 1
METER_2 = 1

M1CMD   = 1
M2CMD   = 1

IF (OPEN1)  M1CMD  = 2
IF (CLOSE1) M1CMD  = 3

IF (OPEN2)  M2CMD  = 2
IF (CLOSE2) M2CMD  = 3

RESET (OPEN1)
RESET (OPEN2)
RESET (CLOSE1)
RESET (CLOSE2)

IF (SW_MODE) GOTO NEXT

IF (M1CMD = 1) AND (M2CMD = 1) GOTO NEXT

IF (M1CMD = 2)  DS1 = OPN
IF (M1CMD = 2)  TD3 = TDELAY3

IF (M1CMD = 3)  DS1 = CLS
IF (M1CMD = 3)  TD4 = TDELAY4

IF (M2CMD = 2)  DS2 = OPN
IF (M2CMD = 2)  TD5 = TDELAY5

IF (M2CMD = 3)  DS2 = CLS
IF (M2CMD = 3)  TD6 = TDELAY6

IF (M1CMD <> 1) OR (M2CMD <> 1) RESET (WDT)

SEQ = 1

GOTO NEXT
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 109
 Created: MLT                          12/11/1986  20:31:55
Modifier: --==[ WHR ]==--              10/31/1989  16:55:59

                              Calculation Entry
                    Title: AUTO SWITCH 1    Type: Normal
  L#  Calculation Statements                                                Units

   1 IF (CONTROL = 1) AND (SWMODE = 2)  GOTO NEXT
   2 IF (CONTROL = 2) AND (NOT SW_MODE) GOTO NEXT
   3
   4
   5 IF (SEQ <> 1)             GOTO 15
   6
   7 IF (HZ1 < FREQ1)          GOTO NEXT
   8
   9 DS2 = OPN
  10 TD1 = TDELAY1
  11 TD5 = TDELAY5
  12 SEQ = 2
  13 RESET (WDT)
  14
  15 IF (SEQ <> 2)             GOTO 25
  16
  17 IF (TD1 > 0.0)            GOTO NEXT
  18
  19 SEQ = 3
  20
  21
  22
  23
  24
  25 IF (SEQ <> 3)             GOTO 35
  26
  27 IF (HZ2 < FREQ2)          GOTO NEXT
  28
  29 DS1 = OPN
  30 TD3 = TDELAY3
  31 SEQ = 4
  32 RESET (WDT)
  33
  34
  35 IF (SEQ <> 4)             GOTO NEXT
  36
  37 IF (CS1 = CLS)            GOTO NEXT
  38 IF (CS1 = NUL)            GOTO NEXT
  39 IF (CS2 = CLS)            GOTO NEXT
  40 IF (CS2 = NUL)            GOTO NEXT
  41
  42 SEQ = 5
  43
  44 GOTO NEXT
  45
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 110
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                              Calculation Entry
                    Title: AUTO SWITCH 2    Type: Normal
  L#  Calculation Statements                                            Units
_____________________________________________________________________________
   1 IF (CONTROL = 1) AND (SWMODE = 2)  GOTO NEXT
   2 IF (CONTROL = 2) AND (NOT SW_MODE) GOTO NEXT
   3
   4
   5 IF (SEQ <> 5)                      GOTO 15
   6
   7 IF (HZ1 > FREQ3) AND (HZ2 > FREQ4) GOTO NEXT
   8
   9 DS1 = CLS
  10 TD4 = TDELAY4
  11 SEQ = 6
  12 RESET (WDT)
  13
  14
  15 IF (SEQ <> 6)         GOTO 30
  16
  17 IF (CS1 <> CLS)       GOTO NEXT
  18
  19 IF (HZ2 > FREQ4)      GOTO NEXT
  20
  21 DS2 = CLS
  22 TD2 = TDELAY2
  23 TD6 = TDELAY6
  24 SEQ = 7
  25 RESET (WDT)
  26
  27
  28
  29
  30 IF (SEQ <> 7)         GOTO 35
  31
  32 IF (TD2 > 0.0)        GOTO NEXT
  33 SEQ = 8
  34
  35 IF (SEQ <> 8)         GOTO NEXT
  36
  37 DS1 = OPN
  38 TD3 = TDELAY3
  39 SEQ = 1
  40 RESET (WDT)
  41
  42
  43 GOTO NEXT
  44
  45
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 111
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                              Calculation Entry
                    Title: ALL CASES 1    Type: Normal
  L#  Calculation Statements                                              Units
-------------------------------------------------------------------------------

IF (HZ1 >= FREQ5) OR (HZ2 >= FREQ6) SET (TMOVER)

IF (NOT TMOVERS) GOTO NEXT

SET (MBTMOVER)

SWMODE = 2
RESET (SW_MODE)

DS1    = CLS
DS2    = CLS

DLY4   = TDELAY4
DLY6   = TDELAY6

GOTO NEXT
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 112
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:55:59

                          Calculation Entry
                    Title: ALL CASES 2    Type: Normal
  L#  Calculation Statements                                          Units

IF (NOT M1CLOSE) AND (NOT M1OPEN) CS1 = NUL
IF (NOT M1CLOSE) AND (    M1OPEN) CS1 = OPN
IF (    M1CLOSE) AND (NOT M1OPEN) CS1 = CLS
IF (    M1CLOSE) AND (    M1OPEN) CS1 = NUL

IF (NOT M2CLOSE) AND (NOT M2OPEN) CS2 = NUL
IF (NOT M2CLOSE) AND (    M2OPEN) CS2 = OPN
IF (    M2CLOSE) AND (NOT M2OPEN) CS2 = CLS
IF (    M2CLOSE) AND (    M2OPEN) CS2 = NUL

RESET (M1OPNCMD)
RESET (M2OPNCMD)
RESET (M1CLSCMD)
RESET (M2CLSCMD)

IF (DS1 = OPN)AND(CS1 <> OPN)AND(TD3 > 0.0) SET (M1OPNCMD)
IF (DS1 = CLS)AND(CS1 <> CLS)AND(TD4 > 0.0) SET (M1CLSCMD)
IF (DS2 = OPN)AND(CS2 <> OPN)AND(TD5 > 0.0) SET (M2OPNCMD)
IF (DS2 = CLS)AND(CS2 <> CLS)AND(TD6 > 0.0) SET (M2CLSCMD)

WDT1 = (DS1 <> CS1) AND (DS1 = OPN) AND (TD3 <= 0.0)
WDT2 = (DS1 <> CS1) AND (DS1 = CLS) AND (TD4 <= 0.0)
WDT3 = (DS2 <> CS2) AND (DS2 = OPN) AND (TD5 <= 0.0)
WDT4 = (DS2 <> CS2) AND (DS2 = CLS) AND (TD6 <= 0.0)

IF WDT1 OR WDT2 OR WDT3 OR WDT4                    SET (WDT)

IF (WDT1) DS1 = 0
IF (WDT2) DS1 = 0
IF (WDT3) DS2 = 0
IF (WDT4) DS2 = 0

IF (WDT) SET (MBWDT)

IF (CS1 = CLS) AND (CS2 = CLS) RESET (TMOVER)

GOTO NEXT
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 113
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:56:00

                                Calculation Entry
                     Title: MODBUS #1           Type: Normal
  L#  Calculation Statements                                            Units
_____________________________________________________________________________
   1
   2
   3
   4
   5 SF      = 10.0
   6
   7 REG0000 = FIX (M1PT  * SF)
   8 REG0001 = 0
   9 REG0002 = FIX (M1TT  * SF)
  10 REG0003 = FIX (M2PT  * SF)
  11 REG0004 = 0
  12 REG0005 = FIX (M2TT  * SF)
  13 REG0006 = 0
  14 REG0007 = 0
  15 REG0008 = 0
  16 REG0009 = 0
  17 REG0010 = 0
  18 REG0011 = 0
  19 REG0012 = 0
  20 REG0013 = 0
  21 REG0014 = 0
  22 REG0015 = 0
  23 REG0016 = 0
  24 REG0017 = 0
  25 REG0018 = 0
  26 REG0019 = 0
  27 REG0020 = 0
  28
  29 I = HMCFCNT1
  30 REG0021 = I / 10000
  31 REG0022 = I MOD 10000
  32
  33 I = HMCFCNT2
  34 REG0023 = I / 10000
  35 REG0024 = I MOD 10000
  36
  37 I = HMCFCNT3
  38 REG0025 = I / 10000
  39 REG0026 = I MOD 10000
  40
  41 I = HMCFCNT4
  42 REG0027 = I / 10000
  43 REG0028 = I MOD 10000
  44
  45 REG0029 = 0
  46 REG0030 = 0
  47
  48 GOTO NEXT
  49
  50
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 114
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:56:00

                                 Calculation Entry
                      Title: MODBUS #2           Type: Normal
  L#  Calculation Statements                                              Units

I = MCFCNT1
REG0031 = I / 10000
REG0032 = I MOD 10000

I = MCFCNT2
REG0033 = I / 10000
REG0034 = I MOD 10000

I = MCFCNT3
REG0035 = I / 10000
REG0036 = I MOD 10000

I = MCFCNT4
REG0037 = I / 10000
REG0038 = I MOD 10000

I = ACCVOL1
REG0041 = I / 10000
REG0042 = I MOD 10000

I = ACCVOL2
REG0043 = I / 10000
REG0044 = I MOD 10000

I = ACCVOL3
REG0045 = I / 10000
REG0046 = I MOD 10000

I = ACCVOL4
REG0047 = I / 10000
REG0048 = I MOD 10000

REG0049 = 0
REG0050 = 0
REG0051 = 0

GOTO NEXT
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 115
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:56:00

                              Calculation Entry
                      Title: MODBUS #3    Type: Normal
  L#  Calculation Statements                                         Units
-------------------------------------------------------------------------------
{ REG0051
{ REG0052
{ REG0053
{ REG0054
REG0055 = 0
REG0056 = 0
REG0057 = 0
REG0058 = 0
REG0059 = 0
REG0060 = C1
REG0061 = C2
REG0062 = C3
REG0063 = C4
REG0064 = C5
REG0065 = C6
REG0066 = C7
REG0067 = C8
REG0068 = C9
REG0069 = CA
REG0070 = CB
REG0071 = CC
REG0072 = CD
REG0073 = CE
REG0074 = CF
REG0075 = C10
REG0076 = 0
REG0077 = 0
REG0078 = 0
REG0079 = 0
REG0080 = 0
REG0081 = 0
REG0082 = 0
REG0083 = GCSTREAM
REG0084 = GCSTART
REG0085 = ALARM1
REG0086 = ALARM2
REG0087 = 0
REG0088 = CALFLAG
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 116
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:56:00

                              Calculation Entry
                      Title: MODBUS #4    Type: Normal
  L#  Calculation Statements                                          Units
____________________________________________________________________________
   1
   2
   3
   4
   5 I = HDTCNT1
   6 REG0089 = I / 10000
   7 REG0090 = I MOD 10000
   8
   9 I = HDTCNT2
  10 REG0091 = I / 10000
  11 REG0092 = I MOD 10000
  12
  13 I = HDTCNT3
  14 REG0093 = I / 10000
  15 REG0094 = I MOD 10000
  16
  17 I = HDTCNT4
  18 REG0095 = I / 10000
  19 REG0096 = I MOD 10000
  20
  21 REG0097 = 0
  22 REG0098 = 0
  23
  24 GOTO NEXT
  25
  26
  27
  28
  29
  30
  31
  32
  33
  34
  35
  36
  37
  38
  39
  40
  41
  42
  43
  44
  45
  46
  47
  48
  49
  50
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 117
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:56:00

                            Calculation Entry
                    Title: MODBUS #5    Type: Normal
  L#  Calculation Statements                                          Units
```

```
I = DTCNT1
REG0099 = I / 10000
REG0100 = I MOD 10000
I = DTCNT2
REG0101 = I / 10000
REG0102 = I MOD 10000
I = DTCNT3
REG0103 = I / 10000
REG0104 = I MOD 10000
I = DTCNT4
REG0105 = I / 10000
REG0106 = I MOD 10000
I = ACCDT1
REG0107 = I / 10000
REG0108 = I MOD 10000
I = ACCDT2
REG0109 = I / 10000
REG0110 = I MOD 10000
I = ACCDT3
REG0111 = I / 10000
REG0112 = I MOD 10000
I = ACCDT4
REG0113 = I / 10000
REG0114 = I MOD 10000
REG0115 = 0
REG0116 = 0
REG0117 = 0
REG0118 = 0
REG0119 = 0
GOTO NEXT
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 118
 Created: MLT                          12/11/1986  20:31:55
Modifier: --==[ WHR ]==--              10/31/1989  16:56:00

                          Calculation Entry
               Title: EVENT EXECUTIVE    Type: Normal
  L#  Calculation Statements                                          Units
```

```
IF (CURRHOUR = CHOUR) GOTO START

CURRHOUR = CHOUR

GOTO NEXT
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 119
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:56:00

                            Calculation Entry
                      Title: HOURLY    Type: Normal
  L#  Calculation Statements                                            Units
_____________________________________________________________________________
   1
   2
   3
   4
   5 CLRHH = 2
   6
   7 GOTO NEXT
   8
   9
  10
  11
  12
  13
  14
  15
  16
  17
  18
  19
  20
  21
  22
  23
  24
  25
  26
  27
  28
  29
  30
  31
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  48
  49
  50
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 120
 Created: MLT                          12/11/1986  20:31:55
Modifier: --==[ WHR ]==--              10/31/1989  16:56:00

                              Calculation Entry
                        Title: DAILY    Type: Normal
  L#  Calculation Statements                                          Units
------------------------------------------------------------------------------
IF (CHOUR <> DAYSTART) GOTO NEXT
AVPRES1 = FWPRES1                                                    PSIG
AVTEMP1 = FWTEMP1                                                    DEGF
AVPRES2 = FWPRES2                                                    PSIG
AVTEMP2 = FWTEMP2                                                    DEGF
DMCFCNT1 = MCFCNT1                                                    MCF
DMCFCNT2 = MCFCNT2                                                    MCF
DACCVOL1 = ACCVOL1                                                    MCF
DACCVOL2 = ACCVOL2                                                    MCF
DMCFRTE1 = SFR1                                                      MCFH
DMCFRTE2 = SFR2                                                      MCFH
DDTCNT1  = DTCNT1                                                      DT
DDTCNT2  = DTCNT2                                                      DT
DACCDT1  = ACCDT1                                                      DT
DACCDT2  = ACCDT2                                                      DT
CLRDD    = 2
GOTO NEXT
```

```
2500 Instrument Configuration Report  v500           51305310   2502 Page 121
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:56:00

                           Calculation Entry
                   Title: INTERVAL PRINT      Type: Normal
  L#  Calculation Statements                                             Units

IF (CURHOUR = HOUR) GOTO NEXT
CURHOUR = HOUR

PRNTTIME = (CURHOUR - DAYSTART) MOD NTERVAL

IF (PRNTTIME <> 0) GOTO NEXT

IF (SELECT = 1) PRINT (CURRENT)
IF (SELECT = 2) PRINT (ENTRIES)
IF (SELECT = 3) PRINT (PROCESS)
GOTO NEXT
```

```
2500 Instrument Configuration Report  v500          51305310   2502 Page 122
 Created: MLT                         12/11/1986  20:31:55
Modifier: --==[ WHR ]==--             10/31/1989  16:56:00

                             Calculation Entry
                  Title: FINIS                Type: Normal
  L#  Calculation Statements                                          Units
```

```
GOTO START
```

APPENDIX

This appendix applies to Base25 5.20/P2 and Config25 5.10/P2 software for the Model 2500 Instrumentation System. The two EPROM(s) for the Model 2522 (two boards) can add AGA-8 1992 software for Gross Characterization Methods 1 and 2 (Base 25 Revision 5.20,P2), and Detail Characterization Method (Config25 Revision 5.10, P2). Model 2522 can have two slave ports so that it can be polled by two master computers. However only one slave port can be supported when using the EPROM for the Detail Characterization Method due to the memory requirements of the calculations.

NEW CONFIG25 SYSTEM VARIABLE DEFINITIONS

EMU_PLC2:

PURPOSE:	The EMU_PLC2 function allows Modbus registers to be polled by a true Modicon host processor from a second defined slave port in the Model 2500.
FORMAT:	EMU_PLC2
REMARKS:	To use this feature the variable EMU_PLC2 must be defined in the Selection List Operator Entry Definition Screen. The variable must be in capital letters. Only two options should be defined. Names assigned to the options can be selected by the application programmer. The first option is selected if Daniel Modbus registers are used. The second option is selected to enable PLC emulation type Modbus communication with a true Modicon host processor. It is necessary to decide the type of Modbus that will be used when defining the Modbus registers. When the PLC emulation is used the boolean registers and short integer registers are the only Modbus registers that can be addressed through Modbus communications. When Daniel Modbus is enabled, boolean registers, short integer registers, long integer registers and floating point registers can be addressed. When the PLC emulation option is selected, the boolean registers which were defined at Daniel Modbus locations 1001 through 2999 can be addressed using function codes "1, 5 and 15" at Modicon host processor addresses zero through 1999. The short integers which were defined at Daniel Modbus locations 3001 through 4999 can be addressed using function codes "3, 6 and 16" at Modicon host processor addresses zero through 1999. Long integers and floating point Modbus registers are not supported when using the PLC emulation option.

SPR_DBNC: Short Prover Debounce Time

PURPOSE:	To set the time interval between detection of the short prover's displacer and rearming of the displacer detection hardware by the Model 2500 CPU to sense the next displacer detector.
FORMAT:	SPR_DBNC = X
REMARKS:	The default value for this variable is 200 ms; the maximum value is 1,310 seconds. To use this feature the variable SPR_DBNC must be in capital letters.

PRV_DBNC: Conventional Prover Debounce Time

PURPOSE:	Set the time interval between detection of the conventional prover's displacer and rearming of the displacer detection hardware by the Model 2500 CPU to sense the next displacer detector.
FORMAT:	PRV_DBNC = X
REMARKS:	The default value for this variable is 200 ms; the maximum value is 1,310 seconds. To use this feature the variable PRV_DBNC must be in capital letters.

NBS1045 DENSITY FUNCTION

PURPOSE:	To calculate the density of Ethylene between pressures of 1.0 and 5800.0 PSIA and temperatures between -261.688 and 350.0 DEGF per the NBS1045 method.
FORMAT:	FLG_1045 = X
REMARKS:	FLG_1045 is an integer variable which is used to convey control and status between the application and the NBS1045 calculation module. To use this feature the variable must appear in all capitals. This flag is used as follows: · Set to 1 by the application to initiate a calculation cycle by the NBS1045 module. · Set to -1 by the NBS 1045 module if a solution for density is not achieved. · Set to 0 by the NBS1045 module upon successful completion of a calculation of a density value. The resulting density value is stored in DEN_ETH.
APPLICATION:	TEMP_ETH = Line temperature of ethylene in DEGF PRES_ETH = Line pressure of ethylene in PSIA DEN_ETH = Ethylene density as calculated per NBS1045 in mol/dm3 ERR_1045 - this variable is an integer variable which is set by the NBS1045 module as follows: 0 - No errors 1 - Value of TEMP_ETH is outside the range of -261.688 to 350.0 DEGF or value of PRES_ETH is outside the range of 1.0 to 5800.0 PSIA. 2 - Resulting value of DEN_ETH is in the critical region (e.g. within ±30 percent of the critical density and ±5 percent of the critical temperature). Per the NBS1045 document, the equation of state is not valid in this region.

GRICMP FUNCTION

PURPOSE:	To define Chromatographic input values for AGA-8 1992 Gross Characterization or Detail Characterization calculations. This command must be called before the GRIPROC command is executed in order to perform an AGA-8 1992 calculation. The AGA-8 1992 calculations require a two-board version of the Model 2500 equipped with an optional EPROM with the AGA-8 1992 procedures installed. If the Model 2500 is not configured to perform the AGA-8 calculations, the functions GRICMP and GRIPROC are ignored.
FORMAT:	GRICMP (a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u)

REMARKS:	GROSS CHARACTERIZATION METHOD The variables a through u of the GRICMP function differ depending on which of the gross methods is being used. In either case the first variable "a" is the method number, 1.0 or 2.0, indicating which of the Gross Methods is desired. It should be noted that all variables including the method are passed as floating point numbers. For instance if a = 1, this Gross Method would use gross heating value, relative density, and mole fractions of CO2, H2 and CO. If a = 2, this Gross Method uses relative density and mole fractions of CO2, N2, H2 and CO. When a = 1, the remaining variables are as follows: b = gross heating value of the gas in BTU/FT3 c = reference temperature for the molar heating value, DEGF d = reference pressure for the molar heating value, PSIA e = relative density of the gas (specific gravity) f = reference temperature for relative density, DEGF g = reference pressure for relative density, PSIA h = carbon dioxide mole fraction i = hydrogen mole fraction j = carbon monoxide mole fraction k-u = not used (value passed is ignored) If the Gross Method = 2, the remaining variables are as follows: b = relative density of the gas (specific gravity) c = reference temperature for relative density, DEGF d = reference pressure for relative density, PSIA e = nitrogen mole fraction f = carbon dioxide mole fraction g = hydrogen mole fraction h = carbon monoxide mole fraction i-u = not used (value passed is ignored)

<table>
<tr><td colspan="2">If the Detail Characterization Method is desired for the GRICMP function, an individual EPROM must be used and one slave port will be available for use.</td></tr>
<tr><td>FORMAT:</td><td>GRICMP (a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u)</td></tr>
<tr><td>REMARKS:</td><td>The variables a through u of the GRICMP function represent different components of a gas and are defined in the following table. The GRICMP function must include all twenty one variables although some of them may have a value of zero. The calculation line is limited to 65 characters and this should be kept in mind when naming variables so that the maximum line length is not exceeded. Also, the sum of the values of all twenty variables must equal one. The variables are defined as follows:

a = Nitrogen mole fraction
b = CO2 mole fraction
c = H2S mole fraction
d = Water mole fraction
e = Helium mole fraction
f = Methane mole fraction
g = Ethane mole fraction
h = Propane mole fraction
i= nButane mole fraction
j = iButane mole fraction
k = nPentane mole fraction
l = iPentane mole fraction
m = nHextane mole fraction
n = nHeptane mole fraction
o = nOctane mole fraction
p = nNonane mole fraction
q = nDecane mole fraction
r= Oxygen mole fraction
s = CO mole fraction
t = Hydrogen mole fraction
u = Argon</td></tr>
<tr><td>EXAMPLE:</td><td>GRICMP(a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u)

The values for variables a through t may be supplied for AGA-8 1992 calculations either by operator entry or gas chromatograph.</td></tr>
</table>

WARRANTY CLAIM REQUIREMENTS

To make a warranty claim, you, the Purchaser, must:

1. Provide Daniel with proof of the Date of Purchase and proof of the Date of Shipment of the product in question.

2. Return the product to Daniel within twelve (12) months of the date of original shipment of the product, or within eighteen (18) months of the date of original shipment of the product to destinations outside of the United States. The Purchaser must prepay any shipping charges. In addition, the Purchaser is responsible for insuring any product shipped for return, and assumes the risk of loss of the product during shipment.

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   Daniel Measurement and Control
   P. O. Box 55435
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   When contacting Daniel for product service, the purchaser is asked to provide information as indicated on the following "Customer Problem Report".

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DANIEL INDUSTRIES, INC.
CUSTOMER PROBLEM REPORT

FOR FASTEST SERVICE, COMPLETE THIS FORM, AND RETURN IT ALONG WITH THE AFFECTED EQUIPMENT TO CUSTOMER SERVICE AT THE ADDRESS INDICATED BELOW.

COMPANY NAME:____

TECHNICAL CONTACT:______________________________ PHONE:___________________________

REPAIR P. O. #:__________________________ IF WARRANTY, UNIT S/N:______________________

INVOICE ADDRESS:____

____

____

SHIPPING ADDRESS:____

____

____

RETURN SHIPPING METHOD:____

EQUIPMENT MODEL #:__________________ S/N:________________FAILURE DATE:____________

DESCRIPTION OF PROBLEM:____

____

____

WHAT WAS HAPPENING AT TIME OF FAILURE?____

____

ADDITIONAL COMMENTS:____

____

____

REPORT PREPARED BY:_____________________________ TITLE:_________________________

IF YOU REQUIRE TECHNICAL ASSISTANCE, PLEASE FAX OR WRITE THE MAIN CUSTOMER SERVICE DEPARTMENT AT:

DANIEL MEASUREMENT AND CONTROL
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HOUSTON, TEXAS 77065

PHONE: (281) 897-2900
FAX: (281) 897-2901

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DANIEL