Limited Rights Legend

©2014 HSQ Incorporated. All rights reserved.
Contractor: HSQ TECHNOLOGY, A Corporation.
The following data comprises software and/or hardware documentation relating to computer software and/or hardware furnished with restricted rights:

**RDU User Manual**

**Revision: 11/2014**

Those portions of this technical data indicated as limited rights data shall not, without the written permission of the above Contractor, be either (a) used, released or disclosed in whole or in part outside the Government, (b) used in whole or in part by the Government for manufacture or, in the case of computer software documentation, for preparing the same or similar computer software, or (c) used by a party other than the Government, except for: (i) emergency repair or overhaul work only, by or for the Government, where the item or process concerned is not otherwise reasonably available to enable timely performance of the work, provided that the release or disclosure hereof outside the Government shall be made subject to a prohibition against further use, release or disclosure; or (ii) release to a foreign government, as the interest of the United States may require, only for emergency repair of overhaul work by or for such government under the conditions of (i) above. This legend, together with the indications of the portions of this data which are subject to such limitations shall be included on any reproduction hereof which includes any part of the portions subject to such limitations.

No part of this manual may be reproduced without prior written consent of HSQ Technology, A Corporation.

No responsibility is assumed for the use or reliability of software on equipment that is not supplied by HSQ Technology, A Corporation.

All other brand or product names may be trademarks or registered trademarks of their respective companies or organizations.
Contents

Preface
About This Manual ................................................................. x
Conventions and Notations ......................................................... xi
Margin Icons ........................................................................ xii
Graphics ................................................................................ xii
Support .................................................................................. xii

Section 1: Introduction
1.1—Overview .......................................................................... 1-2
   1.1.1—Starting RDU .............................................................. 1-3
       1.1.1.1—Selection from the MISER Menu ........................... 1-3
       1.1.1.2—From the Command Line ..................................... 1-3
1.2—Menu Screen ................................................................. 1-4
1.3—Definition Screen ............................................................ 1-6
   1.3.1—Screen Header ......................................................... 1-6
   1.3.2—Report Definition Area ............................................. 1-8
   1.3.3—Screen Footer .......................................................... 1-8

Section 2: Layout and Modes
2.1—Cell Pointer ....................................................................... 2-2
2.2—Columns, Rows, Cells, and Ranges ................................. 2-4
   2.2.1—Columns ................................................................. 2-4
   2.2.2—Rows ....................................................................... 2-4
   2.2.3—Cells ....................................................................... 2-4
   2.2.4—Ranges ..................................................................... 2-4
2.3—Screen Modes ..................................................................... 2-6
   2.3.1—EDIT Mode .............................................................. 2-6
   2.3.2—INPUT Mode ........................................................... 2-7
   2.3.3—RANGE Mode .......................................................... 2-7
   2.3.4—READY Mode .......................................................... 2-7
   2.3.5—TEXT Mode ............................................................. 2-8
   2.3.6—VALUE Mode .......................................................... 2-9
       2.3.6.1—VALUE Mode – Operators ................................. 2-9
Section 3: Report Formatting

3.1—Program Commands .................................................. 3-2
3.2—Copy ................................................................. 3-3
3.3—Delete ............................................................... 3-6
3.4—Erase ................................................................. 3-6
3.5—Format ............................................................... 3-7
   3.5.1—Text Justification .............................................. 3-7
   3.5.2—Comma Format ............................................... 3-8
   3.5.3—Currency Format ........................................... 3-8
   3.5.4—Binary Format ............................................... 3-8
   3.5.5—Date Format ................................................ 3-8
   3.5.6—Scientific Notation .......................................... 3-9
   3.5.7—Fixed Format ............................................... 3-9
   3.5.8—General Output Format .................................. 3-10
   3.5.9—Hidden Format .............................................. 3-10
   3.5.10—Time Format ............................................... 3-10
   3.5.11—Zero Suppression Format ................................. 3-11
3.6—History ............................................................ 3-12
   3.6.1—Keep/Add/Interval/Control ................................ 3-12
      3.6.1.1—Keep ................................................... 3-12
      3.6.1.2—Add .................................................... 3-13
      3.6.1.3—Interval ............................................... 3-13
      3.6.1.4—Control ............................................... 3-13
   3.6.2—Interval ...................................................... 3-17
   3.6.3—Keep .......................................................... 3-17
   3.6.4—Add .......................................................... 3-18
3.7—Insert .............................................................. 3-17
3.8—Move ............................................................... 3-18
3.9—Quit ................................................................. 3-19
3.10—Repeat ............................................................ 3-20
3.11—Scroll ............................................................ 3-23
3.12—Width ............................................................. 3-24
3.13—Page Setup ...................................................... 3-25

Section 4: Menu Functions

4.1—Add, Modify, and Delete ........................................... 4-2
   4.1.1—Add .......................................................... 4-2
## Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.2</td>
<td>Modify</td>
<td>4-2</td>
</tr>
<tr>
<td>4.1.3</td>
<td>Delete</td>
<td>4-2</td>
</tr>
<tr>
<td>4.2</td>
<td>Schedule a Report</td>
<td>4-4</td>
</tr>
<tr>
<td>4.2.1</td>
<td>Schedule Time</td>
<td>4-8</td>
</tr>
<tr>
<td>4.2.2</td>
<td>Scheduling Examples</td>
<td>4-9</td>
</tr>
<tr>
<td>4.3</td>
<td>Execute a Report</td>
<td>4-11</td>
</tr>
<tr>
<td>4.4</td>
<td>Copy and Rename</td>
<td>4-12</td>
</tr>
<tr>
<td>4.4.1</td>
<td>Copy</td>
<td>4-12</td>
</tr>
<tr>
<td>4.4.2</td>
<td>Rename</td>
<td>4-12</td>
</tr>
<tr>
<td>4.5</td>
<td>Print a Report Definition</td>
<td>4-13</td>
</tr>
<tr>
<td>4.6</td>
<td>Printing Additional Reports</td>
<td>4-14</td>
</tr>
<tr>
<td>4.7</td>
<td>Output and Input</td>
<td>4-15</td>
</tr>
<tr>
<td>4.7.1</td>
<td>Output</td>
<td>4-15</td>
</tr>
<tr>
<td>4.7.2</td>
<td>Input</td>
<td>4-15</td>
</tr>
<tr>
<td>4.8</td>
<td>Output Acronyms</td>
<td>4-16</td>
</tr>
<tr>
<td>5.1</td>
<td>Report Generator</td>
<td>5-2</td>
</tr>
<tr>
<td>5.1.1</td>
<td>Selection from the MISER Menu</td>
<td>5-2</td>
</tr>
<tr>
<td>5.1.2</td>
<td>From the Command Line</td>
<td>5-2</td>
</tr>
<tr>
<td>5.1.3</td>
<td>Xterm Prompts</td>
<td>5-2</td>
</tr>
<tr>
<td>5.1.4</td>
<td>RDE Examples</td>
<td>5-3</td>
</tr>
<tr>
<td>5.1.5</td>
<td>Command Qualifiers</td>
<td>5-3</td>
</tr>
<tr>
<td>5.1.5.1</td>
<td>Example Command Line Entries</td>
<td>5-4</td>
</tr>
<tr>
<td>5.2</td>
<td>RDP — Report Definition Displays</td>
<td>5-5</td>
</tr>
<tr>
<td>5.2.1</td>
<td>Selection from the MISER Menu</td>
<td>5-5</td>
</tr>
<tr>
<td>5.2.2</td>
<td>From the Command Line</td>
<td>5-5</td>
</tr>
<tr>
<td>5.2.3</td>
<td>Xterm Prompts</td>
<td>5-5</td>
</tr>
<tr>
<td>6.1</td>
<td>Sample Report</td>
<td>6-2</td>
</tr>
<tr>
<td>6.2</td>
<td>The Printed Definition</td>
<td>6-7</td>
</tr>
<tr>
<td>A.1</td>
<td>Modes</td>
<td>A-1</td>
</tr>
<tr>
<td>A.2</td>
<td>READY</td>
<td>A-2</td>
</tr>
<tr>
<td>A.3</td>
<td>Commands</td>
<td>A-2</td>
</tr>
<tr>
<td>B.1</td>
<td>Ranges</td>
<td>B-1</td>
</tr>
<tr>
<td>B.2</td>
<td>Formats</td>
<td>B-2</td>
</tr>
<tr>
<td>B.3</td>
<td>Date and Time</td>
<td>B-2</td>
</tr>
<tr>
<td>C.1</td>
<td>Literals</td>
<td>C-2</td>
</tr>
<tr>
<td>C.2</td>
<td>Operators</td>
<td>C-2</td>
</tr>
</tbody>
</table>
C.3—Variables .................................................. C-2
C.4—Math ....................................................... C-2
C.5—Range ..................................................... C-3
C.6—Database ................................................ C-3
C.7—History ................................................... C-3
C.8—External Value ......................................... C-4
C.9—Data Output ............................................. C-4

Appendix D: Common RDU Applications
List of Examples

Example 2-1: MAX ................................................................. 2-10
Example 2-2: MIN ................................................................. 2-11
Example 2-3: SQR ................................................................. 2-11
Example 2-4: RAVG ............................................................... 2-11
Example 2-5: RMAX ............................................................... 2-11
Example 2-6: RMIN ............................................................... 2-11
Example 2-7: RMNI ............................................................... 2-12
Example 2-8: RMXI ............................................................... 2-12
Example 2-9: RSUM ............................................................... 2-12
Example 2-10: TDIF ............................................................... 2-12
Example 2-11: CHRS ............................................................. 2-13
Example 2-12: DSTS ............................................................. 2-14
Example 2-13: DVAL ............................................................. 2-14
Example 2-14: DTXT ............................................................. 2-14
Example 2-15: CHV ............................................................... 2-14
Example 2-16: HAVG .............................................................. 2-15
Example 2-17: HDON .............................................................. 2-15
Example 2-18: HSON .............................................................. 2-16
Example 2-19: HDOF .............................................................. 2-16
Example 2-20: HSOF .............................................................. 2-16
Example 2-21: XVAL .............................................................. 2-16
Example 2-22: RSEL .............................................................. 2-16
Example 3-1: Cell range copy .................................................. 3-4
Example 3-2: Column range copy .............................................. 3-4
Example 3-3: Row range copy .................................................. 3-5
Example 3-4: Formatting ......................................................... 3-7
Example 3-5: Text justification .................................................. 3-7
Example 3-6: Comma format .................................................... 3-8
Example 3-7: Currency format .................................................. 3-8
Example 3-8: Binary format ..................................................... 3-8
Example 3-9: Date format ......................................................... 3-9
Example 3-10: Scientific notation ............................................... 3-9
Example 3-11: Fixed format ..................................................... 3-9
Example 3-12: General output format ......................................... 3-10
Example 3-13: Time format ......................................................... 3-11
Example 3-14: Zero suppression format ............................................ 3-11
Example 3-15: Keep segment ....................................................... 3-13
Example 3-16: Add segment ........................................................ 3-13
Example 3-17: Interval segment ..................................................... 3-13
Example 3-18: Control segment /A ................................................ 3-14
Example 3-19: Control segment /M ............................................... 3-15
Example 3-20: One month of previous year .................................... 3-15
Example 3-21: One day of current year, previous month plus one day .... 3-16
Example 3-22: Two hours of previous day for the current year and month 3-16
Example 3-23: Two hours of the current day .................................... 3-16
Example 3-24: One week of three months prior ................................ 3-16
Example 3-25: Repeat cells to multiple rows .................................... 3-21
Example 3-26: Repeat multiple cells to a row .................................. 3-21
Example 3-27: Repeat row to multiple rows ................................. 3-22
Example 3-28: Repeat column to multiple columns ......................... 3-22
Example 4-1: Chain Reports ....................................................... 4-8
Example 4-2: Print at noon .......................................................... 4-9
Example 4-3: Print in twelve hours ............................................... 4-9
Example 4-4: Print at the top of the hour ...................................... 4-9
Example 4-5: Print in March ....................................................... 4-9
Example 4-6: Print in three months .............................................. 4-9
Example 4-7: Print on March 7th at 6:30 a.m. ............................... 4-10
Example 4-8: Print in one month at 5:30 a.m. ................................. 4-10
Example 4-9: Print on the first Sunday at 8:45 a.m. ..................... 4-10
Example 4-10: Print in four hours ............................................... 4-10
Example 4-11: Print Monday at 8:10 ........................................... 4-10
Example 4-12: Report Definition .................................................. 4-13
Example 4-13: Output acronym .................................................. 4-16
Example 5-1: Name qualifiers ..................................................... 5-3
Example 5-2: Name and date qualifiers ......................................... 5-3
Example 5-3: Name, date, and time qualifiers ............................... 5-3
Example 5-4: Last execution qualifier ......................................... 5-3
MISER is the proprietary OpenVMS application designed by HSQ Technology for real-time Supervisory Control And Data Acquisition (SCADA), energy management, and other process control applications. MISER consists of general programs and customized software, specific to individual job sites. It conforms to the X Consortium specification for the X Windows System™, Version 11, Release 7 (X11R7) and OSF/Motif Release 1.2-3.

RDU is the Report Generator that creates real-time and historical reports based on the MISER database and historical files. Reports are defined and subsequently scheduled and executed. They can be printed or output to a named file.
About This Manual

The *RDU User Manual* is divided into sections that describe how to create reports from the Miser real-time and historical databases.

- **Preface** — This section. The Preface describes this manual, typographical conventions, and special symbols used throughout the text.
- **Introduction** — Provides an overview of RDU and descriptions of the Menu and Definition screens.
- **Layout and Modes** — Describes how to navigate around the *Report Description* screen and the various screen modes.
- **Report Formatting** — Details the commands used to format and process reports and specify how the printed report should look.
- **Menu Functions** — Outlines creating and managing definitions and scheduling and executing reports.
- **Report Generator** — Describes additional utilities used to create and execute report definitions.
- **Sample Report** — Details how to create a sample report, including all the steps to define it.
- **General Summary** — Summarizes the various Modes and Commands available.
- **Ranges and Formats** — Details the specifics of ranges, formats, and date and time.
- **Variables and Functions** — Describes the variables, math functions, ranges, and history commands.
- **Common RDU Applications** — Provides typical RDU usage.
Conventions and Notations

Throughout this manual, certain typographical conventions are used.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Italics Type</em></td>
<td>This highlights the first use of terminology and unique information. It can also indicate checkboxes, tab names, or text that is important.</td>
</tr>
<tr>
<td><strong>Bold Type</strong></td>
<td>This highlights the names of certain items or features. It can also indicate special note text.</td>
</tr>
<tr>
<td><em>Bold Italic Type</em></td>
<td>This highlights the names of screens.</td>
</tr>
<tr>
<td>Fixed Width Type</td>
<td>This highlights user entered text or computer code.</td>
</tr>
<tr>
<td><em>Fixed Width Italic Type</em></td>
<td>This highlights arguments or variables that are entered as part of a command.</td>
</tr>
<tr>
<td>Press</td>
<td>Press a physical key on the keyboard.</td>
</tr>
<tr>
<td>Select</td>
<td>Choose an item from a menu or selection list.</td>
</tr>
<tr>
<td>[Button]</td>
<td>Indicates the name of an on-screen graphical button.</td>
</tr>
<tr>
<td>hyperlink</td>
<td>This denotes a clickable link to another part of the document in the electronic version of the manual.</td>
</tr>
</tbody>
</table>

Margin Icons

The following text boxes and icons are used throughout the manual to bring to your attention important information.

**FYI:** The *FYI* icon indicates additional information that is good to know when you are using the product.

**Related Docs:** The *Related Docs* icon points you to other relevant documentation that is available.

**Best Practices:** The *Best Practices* icon indicates steps that HSQ recommends to make things easier for you to use the product.
Graphics

In some cases the screens shown in this manual may have been slightly altered after this manual was released.

All efforts have been made to ensure that the latest images are used. In all cases, the functionality described is current at the time of writing.

Support

To request Technical Support, please email HSQ directly at support@hsq.com.

Those interested in receiving information or literature from the HSQ Sales Department regarding software and hardware products that we produce and support, please email sales@hsq.com.

Those interested in budgetary or fixed price quotes for upgrades to existing VisualCL installations, new equipment, spare parts, system expansion, HSQ RTUs, or software modules, may also contact our sales department (sales@hsq.com).

HSQ Technology
26227 Research Road
Hayward, CA 94545-3725

Voice: 510.259.1334
Fax: 510.259.1391

www.hsq.com
SECTION 1
INTRODUCTION

The Report Generator (also called RDU) creates reports based on the MISER real-time database and historical files. Reports are defined and subsequently scheduled and executed. They can be output to a printer or named file. Topics covered in this section include:

- Overview
- Menu Screen
- Definition Screen
1.1 | Overview

RDU is an electronic spreadsheet that prepares and produces custom reports based on MISER activity. The program is similar to standard spreadsheet programs but unique in its ability to access and assimilate MISER real-time values and MISER history. Using RDU, you can create report definitions, instructions that determine report content and format, schedule the definitions to align them with MISER and then execute the reports.

RDU has two main screens, both with online help. The RDU menu screen displays first. The menu screen contains a variety of functions that create, modify, duplicate, rename, print, and delete report definitions and produce and manage reports. The create and modify functions open the spreadsheet or definition screen.

The RDU definition screen contains a header section at the top, a two line footer at the bottom, and in the main area of the screen, the spreadsheet or report area. The report area is a grid of columns and rows. Columns are lettered A to ZZ and proceed across the screen. Rows are numbered from top to bottom, 1 through 32767. The intersection of a row and column is called a cell. If every possible row and every possible column is filled, the report would contain more than twenty-three million cells. Cells, rows, and columns are related. When one of these units is changed, RDU automatically recalculates the report definition.

The RDU definition screen also contains a cell pointer that highlights the current cell. Arrow keys, control keys, and function keys move the pointer up, down, left, right, and directly to specific cells. Each time the cell pointer is moved, a different cell is highlighted. The screen scrolls automatically when the pointer comes to an edge of the viewing area.

A report definition contains text and expressions organized in a manner that best suits the purpose. Text is any combination of letters, punctuation, and numbers used for titles and labeling rows and columns. Text establishes a basic frame of reference and provides emphasis and clarity. Expressions are arithmetic or logical sentences that are calculated by RDU. They can consist of literals (numeric constants), variables (current cell date and time), cell IDs, and functions (mathematical, formula, range, database, history, external value, and select), separated by operators (arithmetic elements). Expressions may include multiple levels of nested phrases.

Calculations are performed by row or if requested, by column. When performed by row, all the expressions contained in the cells in Row 1 are computed, left to right, before those in Row 2. All the expressions contained in Row 2 are computed before those in Row 3 and so on. Calculations by column compute all the expressions in the cells contained in Column A, top to bottom, before those in Column B, etc.

To create a report definition: write text, enter expressions, determine the calculation direction, select printing setups, and schedule it. RDU calculates the definition and produces the report when it is manually executed or the schedule date becomes due.
Best Practices: The report should be planned in advance, especially expressions, keeping in mind that cells are naturally related from left to right and top to bottom. Once a report definition has been saved, modify any of the data as often as needed.

1.1.1 | Starting RDU

1.1.1.1 | Selection from the MISER Menu
Select Report Generator, then Report Definition Utility. An Xterm window opens with the RDU menu screen.

1.1.1.2 | From the Command Line
Type RDU and press <Return>. An Xterm window opens with the RDU menu screen.
1.2 | Menu Screen

The top part of the RDU menu displays program functions. Beneath the menu function is a list of existing report definitions. If there are more definition names than can be displayed, the up/down arrow keys can be used to scroll the list.

Each function is preceded by a call letter. Make a selection by typing the appropriate letter (do not press <Return>).

**Table 1-1. RDU Menu Options**

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Closes RDU.</td>
</tr>
<tr>
<td>A</td>
<td>Adds a new report definition.</td>
</tr>
<tr>
<td>M</td>
<td>Opens an existing report definition so modifications to the text, expressions, and format can be entered.</td>
</tr>
<tr>
<td>D</td>
<td>Deletes a report definition.</td>
</tr>
<tr>
<td>S</td>
<td>Schedules a report. This sets up the time, frequency, and other parameters that determine when a report should be calculated and produced. Once a report is scheduled, the actual production is automatic.</td>
</tr>
<tr>
<td>X</td>
<td>Executes (calculates and produces) a report on demand. The report can be printed or write it to a file.</td>
</tr>
<tr>
<td>C</td>
<td>Copies an existing report definition with a new report name.</td>
</tr>
</tbody>
</table>
Table 1-1. RDU Menu Options (continued)

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>R</strong></td>
<td>Renames a report definition. The new name will appear in the list of existing report definitions in place of the old name.</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>Prints the report definition. The printed definition is a list of the instructions (text, expressions, formatting, etc.) used to create the report.</td>
</tr>
<tr>
<td><strong>O</strong></td>
<td>Outputs the report definition (text, expressions, and format instructions) to an ASCII file.</td>
</tr>
<tr>
<td><strong>I</strong></td>
<td>Inputs a report definition from an ASCII file.</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>Creates a file that lists the acronyms used in a report definition. The file can be displayed and printed with operating system commands.</td>
</tr>
<tr>
<td><strong>L</strong></td>
<td>Generates an additional output file from a previously executed report. Whether the output device is a file or printer(s) is dependent on the originally scheduled report.</td>
</tr>
</tbody>
</table>
1.3 | Definition Screen

Figure 1-2. RDU Definition screen

The report definition screen consists of a header, the report definition or spreadsheet area, and a footer. The header contains fields that identify and fully describe the current cell and the mode indicator. The report definition or spreadsheet area takes up the main portion of the screen. Within the spreadsheet area, a cell pointer or highlight, moves to the left or right, up and down. Prompts and an input echo line appear in the footer.

1.3.1 | Screen Header

The first line of the screen header is comprised of (from left to right) the cell ID, column width, formats, history, and mode indicator.

- **Cell ID** — Identifies the current cell, the one that is highlighted (e.g., D4). When a report definition screen is initially opened, the highlight is in cell A1. The cell ID changes whenever the highlight is moved.

  The cell ID consists of two values, one or two letters followed by a number. The letter represents the column and the number specifies the row.

- **Column Width** — Shows the width setting for the column containing the highlight (e.g., c17). Width is applied globally (g) or by column (c) and can be from one to sixty-three spaces. Width set by column takes precedence over width set globally. The factory default is g9 (global, nine spaces).
- **Formats** — Displays the output formatting that has been applied to the current cell (e.g., \texttt{THH:MM:SS}). Formatting consists of three values, the level, the format type, and additional specifications (one or a string of characters). The level shows how the format has been applied, globally (\texttt{g}), columnar (\texttt{c}), by row (\texttt{r}), or blank. Cell formatting takes precedence over all other levels. If cell formatting has not been specified, RDU looks for the next highest level (column, row, then global).

The format type and any additional specifications reflect details about the format that was applied. See “Format” on page 3-7 for details.

- **History** — Identifies how the current cell acquires data from the MISER history database (e.g., \texttt{gYRMODY/-1DY/1DY}). If this field is blank, history is not involved. When present, history shows the level and timing. The level shows how history has been applied, globally (\texttt{g}), columnar (\texttt{c}), by row (\texttt{r}), or blank. Cell history takes precedence over all other levels. If history has not been entered by cell, RDU looks for the next highest level (column, row, and then global). History timing is relative to the execution date/time. It shows when to start reading history and for how long. For a complete explanation of history timing, see “History” on page 3-12.

- **Mode Indicator** — Shows what RDU is doing (e.g., \texttt{READY}). Modes are:
  - **READY** — RDU is ready for data entry. When this mode displays, it is possible to move from one cell to another, begin a command, enter text for labels or titles, enter an expression, or access HELP.
  - **WAIT** — Processing data. Wait for the mode to return to READY.
  - **INPUT** — Waiting for data entry. The mode changes to INPUT when a command is entered (a slash) and RDU is prompting for additional information.
  - **RANGE** — Waiting for a range entry (cell, column, row, or global).
  - **TEXT** — Waiting for data entry. Text mode begins when you enter a single quote (‘), double quote ("), caret (^), or slash (/). During entry, text echoes at the top left of the screen.
  - **VALUE** — Waiting entry of an expression. Value mode begins when entering a character that is not a single quote, double quote, caret, or slash. During entry, expressions display at the top left of the screen.
  - **EDIT** — Waiting for edits to existing text or expressions. Edit mode becomes active when the <F2> key is pressed.
  - **HELP** — The HELP screen is displayed.

The second line of the screen header contains the text/expressions.

- **Text/Expressions** — Cell contents, text, or expressions, display here. This field can use two lines up to a maximum of 160 characters.
1.3.2 | Report Definition Area

- **Column IDs** — Column identifiers, letters A through ZZ, are listed on the highlighted, horizontal bar.
- **Row IDs** — Row identifiers, numbers 1 through 32767, are listed on the highlighted vertical bar.
- **Current Cell** — The current cell displays in reverse contrast (i.e., white text on a black background). This is the cell where the highlight or cell pointer is. Definitions (text, expression, formatting, history date/timing, etc.) that apply to this cell, display in the header portion of the screen.
- **Report Definition** — The report definition displays in the center portion of the screen. Often the report will be wider than one screen. The displayed portion always contains the current cell. To scroll to the left or right, move the highlight or cell pointer in that direction.

1.3.3 | Screen Footer

- **Input Echo** — The second to last line at the bottom of the screen echoes responses to prompts. Pressing <Return> signals the end of an entry.
- **Prompts/Messages** — The bottom line on the screen displays prompts and program messages.
SECTION 2

LAYOUT AND MODES

The Report Generator definition screen is similar in appearance to a spreadsheet. This section describes how to move around the definition screen and enter data in it. Topics covered in this section include:

- Cell Pointer
- Columns, Rows, Cells, and Ranges
- Screen Modes
2.1 | Cell Pointer

When the definition screen is first initialized, cell A1 is highlighted (cell pointer). From left to right, a standard sized window reveals columns A through H and rows 1 through 18. (The quantity of rows and columns displayed depends on how the Xterm window is sized.) The mode indicator at the top right of the screen exhibits the state. Before moving the cell pointer, it should display READY.

Arrow keys move the pointer cell by cell, in the direction indicated. The following keys and key combinations move the cell pointer as shown below:

Table 2-1. Cell pointer movement

<table>
<thead>
<tr>
<th>Key(s)</th>
<th>Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;Up Arrow&gt;</td>
<td>Up one cell</td>
</tr>
<tr>
<td>&lt;Down Arrow&gt;</td>
<td>Down one cell</td>
</tr>
<tr>
<td>&lt;Left Arrow&gt;</td>
<td>Left one cell</td>
</tr>
<tr>
<td>&lt;Right Arrow&gt;</td>
<td>Right one cell</td>
</tr>
<tr>
<td>&lt;PF1&gt; + &lt;Up Arrow&gt;</td>
<td>Up eight cells</td>
</tr>
<tr>
<td>&lt;PF1&gt; + &lt;Down Arrow&gt;</td>
<td>Down eight cells</td>
</tr>
<tr>
<td>&lt;PF1&gt; + &lt;Left Arrow&gt;</td>
<td>Left eight cells</td>
</tr>
<tr>
<td>&lt;PF1&gt; + &lt;Right Arrow&gt;</td>
<td>Right eight cells</td>
</tr>
<tr>
<td>&lt;PF1&gt; + &lt;PF1&gt;</td>
<td>Cell pointer to cell A1</td>
</tr>
<tr>
<td>&lt;PF1&gt; + &lt;PF2&gt; + Cell ID</td>
<td>Cell pointer to the named cell</td>
</tr>
</tbody>
</table>

Table 2-2. Other keyboard combinations

<table>
<thead>
<tr>
<th>Key(s)</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;PF1&gt;</td>
<td>Modifies what the next key does</td>
</tr>
<tr>
<td>&lt;PF1&gt; + &lt;PF3&gt;</td>
<td>Recalculates the entire report</td>
</tr>
<tr>
<td>&lt;PF2&gt;</td>
<td>EDIT mode</td>
</tr>
<tr>
<td>&lt;PF3&gt; (while in EDIT mode)</td>
<td>Toggles between INSERT and OVERSTRIKE</td>
</tr>
<tr>
<td>&lt;PF3&gt; (outside of EDIT mode)</td>
<td>Opens the REPORT DEFINITION PAGE SETUP screen</td>
</tr>
<tr>
<td>&lt;PF4&gt;</td>
<td>HELP mode</td>
</tr>
</tbody>
</table>
FYI: The <PF1>, <PF2>, <PF3>, and <PF4> keys and key combinations are only applicable on VMS keyboards.

Table 2-3. PC keyboard substitutions

<table>
<thead>
<tr>
<th>Key</th>
<th>Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;PF1&gt;</td>
<td>Numpad &lt;NumLock&gt;</td>
</tr>
<tr>
<td>&lt;PF2&gt;</td>
<td>Numpad &lt;/&gt;</td>
</tr>
<tr>
<td>&lt;PF3&gt;</td>
<td>Numpad &lt;*&gt;</td>
</tr>
<tr>
<td>&lt;PF4&gt;</td>
<td>Numpad &lt;-&gt;</td>
</tr>
</tbody>
</table>
2.2 | Columns, Rows, Cells, and Ranges

Columns, rows, and cells are identified by alphabetic and numeric characters. Columns use letters, rows use numbers, and cells, letters plus numbers.

2.2.1 | Columns

Column identifiers are one or two letters. The first column in a report is always column A. Subsequent columns increment alphabetically (i.e., A, B, C, etc.). The twenty-seventh column is AA and continues on to AZ, the fifty-third column is BA and so on. When columns are added or deleted, they are automatically renumbered to maintain the proper sequence.

2.2.2 | Rows

Row identifiers are numbers, one to five digits, up to 32,676. The first row in a report is always 1. Subsequent rows, going down the screen, increment in ascending order.

2.2.3 | Cells

Cells are the intersection of a column and a row. A cell is identified by a column identifier and a row identifier. The column identifier always comes first (e.g., AA35).

2.2.4 | Ranges

A range identifies an area within a report. It can be comprised of one or more cells, columns, or rows. It may also be global (i.e., the entire report). Columns, cells, and rows cannot be mixed to make up a range.

A range consists of a beginning identifier and an ending identifier separated by a colon (:). The ending identifier must be greater than the beginning identifier. If the identifier on the left side of the colon is omitted, the range defaults to the beginning of the report. If the identifier on the right side of the colon is omitted, the range defaults to the end of the report. If the identifiers on both sides of the colon are omitted, the range is the entire report. To specify a range that is equal to a single cell, a single column, or a single row, enter that identifier without the colon. A single zero represents a global range.

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>AB152:AX223</td>
<td>Cell range AB152 though AX223</td>
</tr>
<tr>
<td>CB:CZ</td>
<td>Column range CB through CZ</td>
</tr>
<tr>
<td>256:365</td>
<td>Row range 256 through 365</td>
</tr>
</tbody>
</table>

Table 2-4. Range examples
### Table 2-4. Range examples (continued)

<table>
<thead>
<tr>
<th>Identifier</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>G6</td>
<td>Only cell <strong>G6</strong></td>
</tr>
<tr>
<td>C</td>
<td>All of column <strong>C</strong></td>
</tr>
<tr>
<td>3</td>
<td>All of row <strong>3</strong></td>
</tr>
<tr>
<td>KS1:</td>
<td>Range of cells, <strong>KS1</strong> through the last cell</td>
</tr>
<tr>
<td>FF:</td>
<td>Range of columns, <strong>FF</strong> through the last column</td>
</tr>
<tr>
<td>25:</td>
<td>Range of rows, <strong>25</strong> through the last row</td>
</tr>
<tr>
<td>:F2</td>
<td>Range of cells, <strong>A1</strong> through <strong>F2</strong></td>
</tr>
<tr>
<td>:DD</td>
<td>Range of columns, <strong>A</strong> through <strong>DD</strong></td>
</tr>
<tr>
<td>:17</td>
<td>Range of rows, <strong>1</strong> through <strong>17</strong></td>
</tr>
<tr>
<td>0</td>
<td>Global range</td>
</tr>
<tr>
<td>:</td>
<td>Global range</td>
</tr>
</tbody>
</table>
2.3 | Screen Modes

RDU uses a number of different modes to enter data:

- **EDIT** — Enables modifications of existing text or expressions.
- **INPUT** — Indicates RDU is waiting for further instructions.
- **RANGE** — Becomes active whenever RDU needs to know which portion (or range) of the report will be affected by a command.
- **READY** — Is the standard waiting RDU mode.
- **TEXT** — Used to enter non-calculated alphanumeric characters.
- **VALUE** — Used to write expressions that perform calculations.

2.3.1 | EDIT Mode

Press <PF2> to start *EDIT* mode. The cursor and the current cell contents display at the top of the screen. Pressing <PF3> toggles between *INSERT* and *OVERSTRIKE*. Edits consisting of standard display characters are interpreted in the context of the entry. Control and function keys move the cursor through the text/expression strings as follows:

- **Down Arrow** — Moves the cursor down one line or to the last character
- **Left Arrow** — Moves the cursor left one character
- **Right Arrow** — Moves the cursor right one character
- **PF1** — Deletes the character to the right of the cursor. In *INSERT* mode, the text/expression shrinks by one character. In *OVERSTRIKE* mode, the deleted character becomes a space.
- **PF3** — Toggles between *INSERT* and *OVERSTRIKE* modes.
- **PF4** — Calls up *HELP* mode.
- **Enter / Return / Ctrl-M / Non-Display Character** — Terminate an entry. The mode returns to *READY*.

In *EDIT* mode, modify existing text or expressions by inserting or replacing (overstrike). Modified text is inserted at the cursor position. Characters to the right of the cursor move one space to the right. The length of the text or expression increases by the number of characters added. When inserting, <Delete> erases the character to the left of the cursor, shrinking the string by one.

During overstrike, new data replaces whatever exists at the current cursor location. Pressing <Delete> erases the character to the left, creating a blank space in its place. In *OVERSTRIKE* mode, the length of the text or expression remains constant.
2.3.2 | INPUT Mode

This mode becomes active when RDU is waiting for further instructions from the user. For example, when a slash is entered to start a command, the mode changes to INPUT until you enter the letter representing the command. If the command prompts for more information, the mode remains as INPUT until the response is completed.

When INPUT mode becomes active, a blinking cursor is displayed at the Echo Input Prompt (bottom of the screen). Whatever is typed echoes to the text expression line at the top of the screen. Standard display characters are interpreted within the context of the entry. Pressing <Backspace> erases the last character typed. Pressing <Return> signals that the entry is complete. Unless additional prompts are appropriate, the mode returns to READY.

2.3.3 | RANGE Mode

The mode changes to RANGE when a command needs to know what portion of the report should be affected (see “Columns, Rows, Cells, and Ranges” on page 2-4 for more information). Not all types of ranges are appropriate to all commands. The DELETE and INSERT commands require a column range or row range. The width command requires a column range. To enter a range the appropriate cell, row, or column IDs are required.

Range entries display on the Input Echo line near the bottom of the screen. Standard display characters are interpreted within the context of the entry. Pressing <Backspace> erases the last character typed. Pressing <Return> signals the entry is complete. The following shortcuts can also be used:

- **Up / Down Arrow** — Enters the current column as the range and terminates range input.
- **Left / Right Arrow** — Enters the current row as the range and terminates range input.
- **PF1 / PF2 / PF3 / PF4** — Enters a global range and terminates input.
- **Return / Enter / Ctrl-M** — Enters the current cell as the range and terminates range input.

2.3.4 | READY Mode

The report definition screen opens in READY mode. While in this mode you can:

- Move the cell pointer to any location in the report.
- Begin an RDU command (commands start with a slash).
- Access TEXT mode (write labels).
- Access VALUE mode (write expressions).
- Access EDIT mode (modifies text or expressions).
- Call up HELP mode.
- Recalculate the report.
- Display the REPORT DEFINITION PAGE SETUP screen.
- Close the report definition, save it, and exit back to the menu.

The following entries are also significant for ready mode:
- Ctrl-W — Refreshes the screen.
- Ctrl-Z — Exits to the menu screen (you are prompted to save the current report).
- / — Starts a command (used in conjunction with the letters C, D, E, F, H, I, M, Q, R, or W).
- " ' ^ \ — Double quote, single quote, caret, and backslash starts TEXT mode.
- Other Display Characters — Starts VALUE mode.

### 2.3.5 TEXT Mode

When in READY mode, type a single quote, double quote, caret, or backslash to enter TEXT mode. The text cursor and entries display at the top of the screen. You can use TEXT mode to write non-calculated information, titles, labels, and explanatory notes to the current cell. Text can be any combination of letters, numbers, punctuation, and other display characters. Text appears to the left of the cursor. Pressing <Backspace> erases the last character typed.

**Best Practices:** If more extensive changes are required, it is best to use EDIT mode.

- ' (Single Quote) — Enters right justified text to the extent of the cell. Excess characters do not display until the column width is increased.
  - For example, if the column width is ten characters wide and you enter: 'Pump A Status and press <Return>, the excess characters “Pum” will not be visible.
- " (Double Quote) — Enters left justified text in strings of up to 160 characters. Left justified text can exceed the extent of cell width.
  - For example, if you enter: Report of Daily Log and press <Return>, the text lines up at the left margin of the cell. In the screen header, Report of Daily Log is displayed whenever the cell pointer moves into this cell.
- ^ (Caret) — Enters centered text to the extent of the cell. Excess characters do not display until the column is widened.
  - For example, if the column is ten characters wide and you enter: ^TIME and press <Return>, the text is centered in the cell and there are three blank spaces on either side of the text.
\ (Backslash) — Repeats a single character throughout the cell. After the backslash, type the character that you want repeated. Additional characters are ignored.

For example, if you enter: \_ and press <Return>, an underscore will be repeated for the width of the entire cell.

### 2.3.6 | VALUE Mode

When in READY mode, type any character that does not is not a single quote, double quote, caret, or backslash. The cursor and characters typed display at the top of the screen. Use value mode to write an expression to the current cell. An expression is an arithmetic or logical sentence that is calculated. It can consist of literals, variables, cell IDs, and functions separated by operators. It can also include multiple levels of nested phrases (each phrase must be bracketed by parentheses).

Type only one expressions per cell using up to 160 characters per expression. Standard display characters are interpreted within the context of the entry. Entries appear to the left of the cursor. Pressing <Backspace> erases the last character typed.

**Best Practices:** If more extensive changes are required, it is best to use EDIT mode.

#### 2.3.6.1 | VALUE Mode – Operators

Operators are the arithmetic elements used by RDU. They include the unary plus and unary minus.

**Table 2-5.** Value mode operators

<table>
<thead>
<tr>
<th>Operator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Add</td>
</tr>
<tr>
<td>-</td>
<td>Subtract</td>
</tr>
<tr>
<td>*</td>
<td>Multiply</td>
</tr>
<tr>
<td>/</td>
<td>Divide</td>
</tr>
<tr>
<td>**</td>
<td>Exponentiation</td>
</tr>
<tr>
<td>()</td>
<td>Parentheses</td>
</tr>
<tr>
<td>-</td>
<td>Unary Minus</td>
</tr>
<tr>
<td>+</td>
<td>Unary Plus</td>
</tr>
</tbody>
</table>
2.3.6.2 | VALUE Mode – Literals

Literals are numeric constants or values (one or more digits with or without a decimal point). If the decimal point is omitted, the value is assumed to be a whole number. When appropriate, literals can be written in scientific notation (append an “E” and the power of ten to the end of the value).

Table 2-6. Literal examples

<table>
<thead>
<tr>
<th>Literal</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1+10) * 5</td>
<td>55</td>
</tr>
<tr>
<td>25 * 5</td>
<td>125</td>
</tr>
<tr>
<td>3 * 2E4</td>
<td>60000</td>
</tr>
</tbody>
</table>

2.3.6.3 | VALUE Mode – Formula Function

Formula functions perform arithmetic calculations. The most basic formula adds, subtracts, multiplies, divides, or raises-to-the-power, two numbers. If the formula contains references to values in other cells, this cell must be to the right of any referenced column and below any referenced row. For example, the formula \((B2 + B3) ÷ C1\) must have its result in cell \(D4\) or greater.

2.3.6.4 | VALUE Mode – Math Function

Math functions return a value. A math function must be followed by an argument that is an expression or a history function. The argument must be preceded by a left parenthesis and followed by a right parenthesis. If the argument contains two parts, they must be separated by commas.

- **ABS** — Absolute value
- **ATN** — Arctangent
- **COS** — Cosine
- **EXP** — Exponential
- **INT** — Truncate
- **LOG** — Natural log
- **MAX** — Maximum of two values

Example 2-1. MAX

\[
\text{MAX} \ (\text{acronym1, acronym2})
\]

\text{MAX} compares the value of acronym1 with that of acronym2. The greater value displays in this cell. The argument is included in the parentheses. Within the argument, the two parts (the acronyms) are separated by a comma.
MIN — Minimum of two values

**Example 2-2.** MIN

```
MIN (HAVG(flow1acr), HAVG(flow2acr))
```

MIN compares the average over the interval of two flow points and returns the lesser value. The parts of the argument are separated by a comma and the argument is included in parentheses.

MOD — Modulo

RND — Round to nearest integer

SIN — Sine

SQR — Square root

**Example 2-3.** SQR

```
1.73*SQR (HAVG (diff_press))
```

Flow rate is computed by multiplying 1.73 times the square root of the average over an interval of point diff_press. The result displays in the cell.

TAN — Tangent

**2.3.6.5 | VALUE Mode – Range Function**

Range functions calculate maximum, minimum, average, and sum for an argument that is a cell range. Range function also calculates the difference between two cells. Cell values that do not print because of history controls (see “History” on page 3-12) are not included in the result. This function is more meaningful if it is invoked in a cell that is not part of the argument.

RAVG — Calculates the average of the values in the range.

**Example 2-4.** RAVG

```
RAVG (C10:F23)
```

RAVG is used with interval reports, it takes an average of all the cells in the range and returns that value.

RMAX — Calculates the maximum value in the range.

**Example 2-5.** RMAX

```
RMAX (C10:C23)
```

RMAX is used with interval reports. It compares the value in the range of cells C10 through C23 and returns the greatest value.

RMIN — Calculates the minimum value in the range.

**Example 2-6.** RMIN

```
RMIN (C10:F10)
```

RMIN is used with interval reports. In this example, RMIN compares the values in the range of cells C10 through F10 and returns the lowest value.
RMNI — Calculates the row containing the minimum range value. **RMNI** returns the row number (counted from the first row in the range).

<table>
<thead>
<tr>
<th>Example 2-7.</th>
<th>RMNI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RMNI (C7:C38)</strong></td>
<td>RMNI determines which row contains the minimum value and returns that row number. If row <strong>C8</strong> has the minimum value, <strong>RMNI</strong> would return “2”. Row <strong>C8</strong> is the second row in the range.</td>
</tr>
</tbody>
</table>

RMXI — Calculates the row containing the maximum range value. **RMXI** returns the row number (counted from the first row in the range).

<table>
<thead>
<tr>
<th>Example 2-8.</th>
<th>RMXI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RMXI (C7:C38)</strong></td>
<td>RMXI determines which row contains the maximum value and returns that row number. If row <strong>C8</strong> has the maximum value, <strong>RMXI</strong> would return “2”. Row <strong>C8</strong> is the second row in the range.</td>
</tr>
</tbody>
</table>

RSUM — Calculates the sum of the values over the range.

<table>
<thead>
<tr>
<th>Example 2-9.</th>
<th>RSUM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RSUM (C7:C38)</strong></td>
<td>RSUM summarizes activity by calculating and returning the sum of the cells (in this example, cells <strong>C7</strong> through <strong>C38</strong>).</td>
</tr>
</tbody>
</table>

TDIF — Returns the difference, in hours, between two cells. Both cells must contain “HHMMSS” time formatting. To perform the calculation, RDU converts **HHMMSS** to **HH,HH** and then subtracts the second cell from the first cell.

<table>
<thead>
<tr>
<th>Example 2-10.</th>
<th>TDIF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TDIF (C10:B10)</strong></td>
<td><strong>TDIF</strong> calculated when a point was turned on and <strong>C10</strong> when the point was turned off, the above expression would determine the number of hours the point was on. The second cell (<strong>B10</strong>) is subtracted from the first cell (<strong>C10</strong>). The format in which the resulting number is written depends on the formatting applied (see “Format” on page 3-7). History functions <strong>HSON</strong> and <strong>HSOF</strong> calculate when a point is turned on and off.</td>
</tr>
</tbody>
</table>

2.3.6.6 | VALUE Mode – Variables

Returns a six digit date (**YYMDD**) or time (**HHMMSS**). A variable is not followed by an argument. To change how the date or time is specified, apply formatting. See “Format” on page 3-7.

**ADAT** — Returns the actual system date the report is produced. If report execution is performed on 15-FEB-2014, using an execution date **01-FEB-2014**, the cell with **ADAT** will display **15–FEB–2014**. If a report definition is executed on three different dates, each report will show the production date. **ADAT** is not affected by history applied to the cell. How the date is written depends on the formatting applied.
\( \text{ATIM} \) — Returns the actual system time the report is produced. If report execution is performed at 10:00, using an execution time of 05:00, the cell with \( \text{ATIM} \) will display 10:00. If the report definition is executed at three different times, each report will show its own production time. \( \text{ATIM} \) is not affected by history applied to the cell. How the time is written depends on the formatting applied.

\( \text{CDAT} \) — Returns the starting date of the history interval applied to the cell. If no history interval is applied to the cell, the starting report execution date is returned. If no history is applied and a report definition execution is performed on 15-FEB-2014, using an execution date of 01-FEB-2014, the cell \( \text{CDAT} \) displays 01-FEB-2014. If the same cell has history of “yr mo dy/-1dy/1dy” and it is executed as above, \( \text{CDAT} \) would return 31-JAN-2014, the date of execution based on history application. The format in which the date is written depends on the formatting applied.

\( \text{CTIM} \) — Returns the starting time of the history interval applied to the cell. If no history interval is applied to the cell, the starting report execution time is returned. If no history is applied and a report definition is executed at 10:00 using an execution time of 05:00, the cell with \( \text{CTIM} \) displays 05:00. If the same cell has history of “yr mo dy/-1dy/1dy” and it is executed as above, \( \text{CTIM} \) would return 0:00, the time of execution based on history application. The format in which the time is written depends on the formatting applied.

\( \text{CHRS} \) — Reads the cell history interval and returns this value in hours. \( \text{CHRS} \) is used in calculations that return rates dependent on the number of hours in a day or the number of hours in a month. When the history interval is specified as days, \( \text{CHRS} \) accounts for daylight savings (a twenty-three hour day in the spring and a twenty-five hour day in the fall).

Example 2-11. \( \text{CHRS} \)

\[ \text{HAVG} (\text{FlowPoint1}) \times 60 \times \text{CHRS} \]

This expression calculates the flow rate of FlowPoint1 for the interval. Assuming history is YRMO/DY/-1MO/1DY, “CHRS” in the expression reads the interval “1DY” as 23, 24, or 25 (depending on the date). If FlowPoint1 measures flow in gallons per minute, \( \text{HAVG} \) calculates the average flow for the interval in gallons per minute. In the formula, the average is multiplied by sixty to convert it to an hourly figure and then by \( \text{CHRS} \) to determine the flow rate for the interval.

If the history interval were instead “1MO”, \( \text{CHRS} \) would calculate the number of hours in the month (based on the actual number of days in the month) and produce a monthly flow rate.

\( \text{EDAT} \) — Returns the ending date of the history interval applied to the cell. This function requires that history be applied to the cell. The format in which the date is written depends on the date formatting applied.

2.3.6.7 | VALUE Mode – Database Functions (READ)

Function arguments are point acronyms. These database functions return the current point status or value for the acronym in the argument. It ignores any history applied to the cell.

\( \text{DSTS} \) (acronym) — Returns the current point status.
2.3.6.8 | VALUE Mode – Database Functions (WRITE)

Function arguments consist of a report cell ID and point acronym. This database function, at report execution, changes the current value of the specified point to the value in the indicated report cell. If the source cell contains a character string (entered during text mode), then the specified point must be a text point. If the source cell contains a numeric value (a constant or an expression to be calculated), then the specified point can be either an analog or binary point. In the latter case, the value in the source cell is checked against the defined limit values of the target point and the value written to the database only if the source cell value falls within these limit values. If out of bounds, the error message “Value out of Limits” is displayed.

- **CHV (cell_id, acronym)** – Writes the given cell value to the designated point.

Example 2-15. CHV

<table>
<thead>
<tr>
<th>CHV (A5, text-point3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHV writes the contents of cell A5 to the point specified by the acronym text-point3 when the report is executed.</td>
</tr>
</tbody>
</table>

2.3.6.9 | VALUE Mode – History Function

The argument is an acronym in the MISER history database. RDU performs the calculation requested (average, maximum, minimum, date of maximum, etc.) and returns the value. It is assumed for this function that the point has been on history for the duration of the interval and that history timing has been applied to the cells involved.

- **HAVG (acronym)** – Returns the average history value for the interval.
2.3.6.10 | VALUE Mode – Additional History Functions

The arguments for the following two functions are the point acronym and the occurrence (the first time, the third time, or the fifth time, etc.). Separate the acronym and occurrence with a single comma. History should be applied to the cells involved. How the resulting time is written depends on the formatting applied.

- **HDON (acronym, n)** — Returns the date (day, month, year) of the interval that represents the n<sup>th</sup> occurrence when a point was turned on. If the point was not turned on during the interval, **HDON** returns a blank.

  **Example 2-17.** HDON

<table>
<thead>
<tr>
<th><strong>HDON</strong> (switch-on, 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The calculation returns the date of the third occasion when the point switch-on was turned on.</td>
</tr>
</tbody>
</table>

- **HSON (acronym, n)** — Returns the time during the interval that represents the n<sup>th</sup> occurrence when a point was turned on. If the point was not turned on during the interval, **HSON** returns a blank.

  **Example 2-18.** HSON

<table>
<thead>
<tr>
<th><strong>HSON</strong> (switch-on, 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The calculation returns the time of the third occasion when the point switch-on was turned on.</td>
</tr>
</tbody>
</table>
HDOF (acronym, n) — Returns the date (day, month, year) of the interval that represents the nth occurrence when a point was turned off. If the point was not turned off during the interval, HDOF returns a blank.

Example 2-19. HDOF

HDOF (switch-off, 2)
The calculation returns the date of the second occasion when the point switch-off was turned off.

HSOF (acronym, n) — Returns the time during the interval that represents the nth occurrence when a point was turned off. If the point was not turned off during the interval, HSOF returns a blank.

Example 2-20. HSOF

HSOF (switch-off, 2)
The calculation returns the time of the second occasion when the point switch-off was turned off.

2.3.6.11 | VALUE Mode – External Value Function

The external value function references a cell from another RDU report and returns the value in that cell.

XVAL (Name of Report, cell ID)

Example 2-21. XVAL

XVAL (REPORT, B21)
XVAL retrieves the value of cell B21 in the report named Report.

2.3.6.12 | VALUE Mode – Select Function

The select function analyzes a test cell and replaces the value of the current cell. The replacement value is taken from one cell, if the test cell is negative, another cell if the test cell is equal to zero, and a third cell, if the test cell is positive. The arguments are the cell IDs for the test cell, the cell to use if the test cell is negative, the cell to use if the test cell is zero, and the cell to use if the test cell is positive. Separate each argument with a comma.

RSEL (Test Cell, Negative, Zero, Positive)

Example 2-22. RSEL

RSEL (T1, A1, B1, C1)
The Report Generator looks at the value of cell T1. If it is negative, it replaces the current cell with the value of A1. If it is zero, it replaces the current cell with the value of B1 and if it is positive, with C1.
SECTION 3
REPORT FORMATTING

The Report Generator program commands define how a report definition is formatted and processed. It also includes a page setup screen that can be used to specify how the printed report should look. Topics covered in this section include:

- Program Commands
- Copy
- Delete
- Erase
- Format
- History
- Insert
- Move
- Quit
- Repeat
- Scroll
- Width
- Page Setup
3.1 | Program Commands

RDU program commands define how a report definition is formatted and processed. Program commands are invoked from the report definition screen. Each command is a slash (/) followed by a letter. The slash readies RDU for the instruction. The letter identifies the specific task. The commands are:

- /C — Copy
- /D — Delete
- /E — Erase
- /F — Format
- /H — History
- /I — Insert
- /M — Move
- /Q — Quit
- /R — Repeat
- /S — Scroll
- /W — Width

All commands prompt you for additional information. All commands except for Quit require the user to identify a range (i.e., the portion of the report will be affected by the command). Commands can be applied to columns, rows, cells, or globally. Formatting applied by column is said to add column settings to the report definition. Formatting applied by row ranges adds row settings to the report definition and those applied by cell, add cell contents. Once settings and cell contents have been added, they can be modified, copied, erased, etc.

Range also determines the level that formatting is applied. Cell ranges have the highest priority level, overriding column, row, and global ranges. Column ranges have the next highest priority level, followed by row ranges, and then the global range. For example, history timing applied to a cell would always override history timing applied to the column in which the cell occurs. Date formats applied to a column always override date formats applied to intersecting rows. Column width applied to a range of columns always overrides global width. To see what settings are active and the setting level, move the pointer to the row, column, or cell in question, and read the description in the screen header.
3.2 | Copy

This command copies cell contents and settings from a source location to a destination location. The data being copied replaces that previously written to the destination location. When a column range is indicated, column settings are copied. When a row range is entered, row settings are copied. If a cell range is indicated, the cell contents are copied. In the duplicated cells, expressions containing references to cell IDs are automatically updated.

The /C command will also copy settings (width, format, and history) from column-to-column or row-to-row. To reproduce a strip of cells in multiple areas of the report, see “Repeat” on page 3-20.

/C - ENTER FROM RANGE

Enter the source column range, source row range, or source cell range.

ENTER TO COL ID, or
ENTER TO ROW ID, or
ENTER TO CELL ID

Enter the destination column ID, row ID, or cell ID. The column, row, or cell ID marks the starting point for copying the range.
**Example 3-1. Cell range copy**

Copy cell range A1 through D3 to cell H6, enter: `/C A1:D3 to CELL ID H6.`

Copy cell D2 to cell K7, enter: `/C D2 to CELL ID K7.`

Copies the Cell History Timing, Formatting, Expression, and Text.

**Example 3-2. Column range copy**

Copy column B to E, enter: `/C B to E.`

Copies column-specified parameters only. For instance, History Timing, Formatting, and Width if specified for the from column.
Example 3-3. Row range copy

Copy row 1 to row 8, enter: /C ROW 1 to ROW 8.

Copies row-specified parameters only. For instance, History Timing and Formatting.
### 3.3 | Delete

This command deletes a range of columns or rows. Everything in the range is deleted (e.g., column settings, row settings, and cell contents). Once a range is deleted it cannot be retrieved. However, before finishing, you can choose not to save the current changes. RDU then reverts to the last stored version of this report.

After columns or rows are deleted, columns to the right and rows below the deleted unit, are renumbered. In all locations, references in expressions are updated to reflect the reorganization.

/D - ENTER COL OR ROW ID

To stop this command, press <Return>. Otherwise, enter the range of columns or rows to be deleted. Deletion takes place immediately.

### 3.4 | Erase

This command erases a range of column settings, row settings, or cell contents. If the range contains columns, RDU erases only column settings. If the range contains rows, it erases only row settings. If it contains cells, RDU erases only the cell contents. Once erased, settings or cell contents cannot be retrieved. However, before finishing, you can choose not to save the current changes. RDU then reverts to the last stored version of this report.

/E - ENTER ERASE RANGE

Enter the range of columns, rows, or cells to be erased. The range is erased immediately after entry.
3.5 | Format

This command applies a variety of output formats to the report. Formats determine how data is presented. By default, formats display from the left cell border (left justified). Optionally, any of the format entries can be preceded with instructions to display centered, right justified, or left justified. Formats are applied to cell ranges, column ranges, row ranges, or globally. Enter them exactly as described.

/F - ENTER FORMAT RANGE

Enter the range of cells, columns, rows, or global to be formatted.

<table>
<thead>
<tr>
<th>ENTER CELL FORMAT or</th>
<th>ENTER COLUMN FORMAT or</th>
<th>ENTER ROW FORMAT or</th>
<th>ENTER GLOBAL FORMAT</th>
</tr>
</thead>
</table>

After entry, RDU repeats the range in one of these prompts. You can enter optional justification instructions and a format. The format should be written exactly as described below. Within the format, the optional parameters are identified with brackets. The brackets should not be included in the entry.

Example 3-4. Formatting

/F H <Return> — This prompts you to enter formatting for row H.
/F D10 <Return> — This prompts you to enter formatting for cell D10.

The following format commands must be preceded by /F.

3.5.1 | Text Justification

- ’ — Right justification. This writes the entry so that it ends at the right column border.
- " — Left justification. This writes the entry beginning at the left column border.
- ^ — Centered. This places the entry in the middle of the column.
- C — This applies left justification to cells containing the expression DTXT (acronym).

Example 3-5. Text justification

"BUP/DOWN displays Binary format, right justified.
^THH : MM displays Time format, centered.
3.5.2 | Comma Format

, [n]

Comma format adds commas every three digits to the left of the decimal point. The optional \( n \) parameter represents the number of decimal places that should be displayed. If \( n \) is omitted, zero decimal places is assumed and the decimal point is suppressed. This format may be preceded with justification.

<table>
<thead>
<tr>
<th>Example 3-6. Comma format</th>
</tr>
</thead>
<tbody>
<tr>
<td>, formats as: 3,456</td>
</tr>
<tr>
<td>,2 formats as: 123,456.78</td>
</tr>
<tr>
<td>,4 formats as: 3,456.5432</td>
</tr>
</tbody>
</table>

3.5.3 | Currency Format

$[n]

Currency format adds a dollar sign ($) to the left of the highest order digit and commas every three digits. The \( n \) represents the number of decimal places. If \( n \) is omitted, two decimal places are assumed. If \( n \) is zero, the decimal point is suppressed. This format may be preceded with justification.

<table>
<thead>
<tr>
<th>Example 3-7. Currency format</th>
</tr>
</thead>
<tbody>
<tr>
<td>$ formats as: $3,456.78</td>
</tr>
<tr>
<td>$0 formats as: $123,456</td>
</tr>
<tr>
<td>$4 formats as: $3,456.5432</td>
</tr>
</tbody>
</table>

3.5.4 | Binary Format

Boff/on

Binary format display binary cell values. The **off** parameter represents the string of characters that display when the cell value is zero. The **on** parameter represents the string of characters that display when the cell value is not zero. Enter B, no space, the off string, a slash, and the on string. The length of the string is governed by column width. This format may be preceded with justification.

<table>
<thead>
<tr>
<th>Example 3-8. Binary format</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUP/DOWN displays: UP or DOWN</td>
</tr>
<tr>
<td>BTRIP/CLOSED displays: TRIP or CLOSED</td>
</tr>
</tbody>
</table>

3.5.5 | Date Format

D[string]

Date format determines how the date displays. It is used wherever the date is calculated. The optional string parameter may include one or more of the date control fields listed
below. If the string is omitted, DD-MMM-YY is assumed. String characters must be entered in upper case exactly as shown below. Additional characters display as they are entered. This format may be preceded with justification.

- **DD** — Two digit day of the month (e.g., 22)
- **DDD...D** — Three to nine character day of the week (e.g., MONDAY)
- **MM** — Two digit month (e.g., 04)
- **MMM...M** — Three to nine character month (e.g., APR or APRIL)
- **YY** — Two digit year (e.g., 14)
- **YYYY** — Four digit year (e.g., 2014)

<table>
<thead>
<tr>
<th>Example 3-9. Date format</th>
</tr>
</thead>
<tbody>
<tr>
<td>D formats as: 01-JAN-14</td>
</tr>
<tr>
<td>DMMM DD, YYYY formats as: JAN 01, 2014</td>
</tr>
<tr>
<td>DDDD DD-MMM-YY formats as: MON 01-JAN-14</td>
</tr>
</tbody>
</table>

### 3.5.6 | Scientific Notation

**E** [n]

Scientific notation determines how many digits of the mantissa should display. If the *n* is omitted, RDU displays the maximum number (up to seven) that can fit in the column. This format may be preceded with justification.

<table>
<thead>
<tr>
<th>Example 3-10. Scientific notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1 formats as: 0.1E+01</td>
</tr>
<tr>
<td>E2 formats as: 0.10E+01</td>
</tr>
<tr>
<td>E3 formats as: 0.100E+01</td>
</tr>
</tbody>
</table>

### 3.5.7 | Fixed Format

**F** [n]

Fixed format sets the number of places to the right of the decimal point. If *n* is omitted, zero is assumed and the decimal point is suppressed. If no other formatting is selected, RDU applies the fixed format (or the default fixed format) to all cells with expressions. This format may be preceded with justification.

<table>
<thead>
<tr>
<th>Example 3-11. Fixed format</th>
</tr>
</thead>
<tbody>
<tr>
<td>F formats as: 3456</td>
</tr>
<tr>
<td>F2 formats as: 456.12</td>
</tr>
<tr>
<td>F4 formats as: 23.4567</td>
</tr>
</tbody>
</table>
\( F[n_1, n_2] \)

Fixed format, sets the number of digits to the left and right of the decimal. The \( n_1 \) represents the total number of digits to the left and the \( n_2 \) represents the number of digits to the right of the decimal.

### 3.5.8 | General Output Format

\( G[n] \)

General output format determines the number of significant decimal places that should display. If the \( n \) is omitted, 7 is assumed. RDU selects a number appropriate for the value. If the value is larger than 9999999, the format changes to scientific notation. Trailing zeros and trailing decimal points are suppressed. This format may be preceded by the justification instruction.

<table>
<thead>
<tr>
<th>Example 3-12. General output format</th>
</tr>
</thead>
<tbody>
<tr>
<td>G formats as: 123.1234567</td>
</tr>
<tr>
<td>G2 formats as: 456.12</td>
</tr>
<tr>
<td>G4 formats as: 34.5678</td>
</tr>
</tbody>
</table>

### 3.5.9 | Hidden Format

\( H \)

Hidden format prevents anything from being displayed or printed. The range appears as an empty space. Hidden format is usually used with cells, columns, rows that hold intermediate results or internal calculations.

### 3.5.10 | Time Format

\( T[string] \)

Time format determines how the time displays. It is used wherever the date is calculated. The optional string parameter may include one or more of the time control fields listed below. If the string is omitted, \( HH:MM:SS \) is assumed. String characters must be entered in upper case exactly as directed. Additional characters display as they are entered. This format may be preceded by the justification instruction.

- \( HH \) or \( 24 \) — Two digit military hour (e.g., 13)
- \( 12 \) — Two digit civilian hour (e.g., 01)
- \( MM \) — Two digit minute (e.g., 44)
- \( SS \) — Two digit second (e.g., 14)
- \( PM \) — Two character civilian day/night indicator

For example, \( T12:MM PM \) will display 9:00 AM in the morning.
3.5.11 | Zero Suppression Format

Z[n]

This format suppresses trailing zeros. The \( n \) represents the number of places to the right of the decimal point. If \( n \) is omitted, zero is assumed and the decimal point is suppressed. This format may be preceded by the justification instruction.

<table>
<thead>
<tr>
<th>Example 3-13.</th>
<th>Time format</th>
</tr>
</thead>
<tbody>
<tr>
<td>T formats as: ( 17:55:01 )</td>
<td></td>
</tr>
<tr>
<td>TTIME:24:MM formats as: ( \text{Time 13:01} )</td>
<td></td>
</tr>
<tr>
<td>T12:MMAM formats as: ( 01:01\text{PM} )</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Example 3-14.</th>
<th>Zero suppression format</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Z ) formats 1200.1100 as: ( 1200 )</td>
<td></td>
</tr>
<tr>
<td>( Z1 ) formats 1200.1100 as: ( 1200.1 )</td>
<td></td>
</tr>
<tr>
<td>( Z2 ) formats 1200.1100 as: ( 1200.11 )</td>
<td></td>
</tr>
</tbody>
</table>
3.6 | History

This applies History Timing to a range of cells, columns, rows, or globally. It determines when and for what duration RDU accesses the MISER history database.

History Timing is based on the scheduled or manual execution of the report. Reports are scheduled to execute once, at regular intervals, or manually on demand. All automatic execution is planned through the “S” option (see “Schedule a Report” on page 4-4). All manual execution is performed through the “X” option (see “Execute a Report” on page 4-11). History uses one or more date/time segments from the execution date/time. To this, a quantity of time is added to mark exactly when RDU should start reading history and finally, a duration indicated. The duration is the length of time for which history is read.

History Timing consists of three required segments (on the right) and one optional segment. The segments, separated by slashes, are called keep/add/interval/control. Keep, add, and interval are required. Control is optional.

Keep (Date)

YRMODY/-1YR/1MO

Interval

Add (in this case, -1 year from the Keep date)

3.6.1 | Keep/Add/Interval/Control

3.6.1.1 | Keep

This represents those units from the execution time that are needed for RDU to be able to correctly align itself with history. Execution time consists of a year, month, day, hour, minute, and second specification. History uses one or more of these units. Time units are abbreviated as shown below and separated by commas or spaces. Units not selected are assumed to be zero.
3.6.1.2 | Add

This pinpoints exactly when RDU should start reading history. It is the offset between the execution time and the history start time. RDU adds the add time to the keep time to determine when it should start reading MISER history. Add should be separated from keep with a slash.

Example 3-16. Add segment

\[\ldots/-1\text{DY}2\text{HR}/\ldots, \ldots/-2\text{MO}/\ldots, \ldots, \text{etc.}\]

3.6.1.3 | Interval

This represents the duration that RDU will read the MISER history database. This segment consists of one of the six time unit designations preceded by an unsigned number. When the time unit is indicated but the number is omitted, the number is assumed to be 1.

If the range contains multiple columns or rows, the interval unit is automatically added to the add segment for all columns or rows after the first one.

Example 3-17. Interval segment

If the column range is A through H and history is entered as \text{MODYHR}/1\text{DY}/\text{HR} then:

Column A = \text{MODYHR}/1\text{DY}/\text{HR}
Column B = \text{MODYHR}/1\text{DY} 1\text{HR}/1\text{HR}
Column C = \text{MODYHR}/1\text{DY} 2\text{HR}/1\text{HR}

\[\ldots\]
Column H = \text{MODYHR}/1\text{DY} 7\text{HR}/1\text{HR}

3.6.1.4 | Control

This is an optional parameter that is entered as /A, /Q, /M, or /D and prevents RDU from including and displaying values for today or for a future period. The control segment is used with annual, quarterly, monthly, and daily reports.
- **/A** — Limits the report to the current year
- **/Q** — Limits the report to the current quarter
- **/M** — Limits the report to the current month
- **/D** — Limits the report to the current day

For example, if you produce daily reports showing hourly information, the **/D** control option prevents RDU from including data for the next day. It also limits the day to twenty-three or twenty-five hours on the day that daylight savings changes. (In order to maximize use of **/D** for daylight savings, set up the day using twenty-five rows or columns. RDU will use the appropriate number and leave any excess blank.)

If monthly reports showing daily information are produced, set up a single monthly definition that can be used with every month in the year. The **/M** control option limits RDU from using any data from a subsequent period. Allow enough lines or columns for thirty-one days. This indicator limits the report to twenty-eight (or twenty-nine) days in February and thirty days in April, etc.

![Example 3-18. Control segment /A](image)

**Example 3-18.** Control segment /A

<table>
<thead>
<tr>
<th>TIME</th>
<th>ADD /-1YR/</th>
<th>INTERVAL /1MO/</th>
<th>KEEP YRMODY/</th>
<th>EXECUTION TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:00:00</td>
<td>00:59:59</td>
<td>00:00:00</td>
<td>10:12:45</td>
<td></td>
</tr>
</tbody>
</table>

Example 3-19. Control segment /M

YRMO / /DY/M

This takes the year and month of the execution date (the keep). The add is zero (blank) so, RDU begins reading history on the execution date for one day (the interval).

If the report executes on April 25, 2014, RDU starts reading history on April 1, 2014 for one day. In this calculation the /M control has no effect. If this timing is used with multiple rows or columns, the interval specification is automatically added to the ADD offset. However, the control prevents accessing of history past the current month.

If the execution date is such that the interval overlaps into the current month, RDU limits its contact with MISER history to the last day of the preceding month.

Example 3-20. One month of previous year

YR/-1YR/1MO

RDU takes the year from the execution date (the keep) and goes back one year (the add is a negative one year) to start reading history. The history is read for one month (the interval).

If the report executes on April 21, 2014, RDU takes the year and goes back one year. It starts reading history on January 1, 2013 and continues for a duration of one month (through January 31, 2013).
Example 3-21. One day of current year, previous month plus one day

YRMODY/-1MO2DY/DY

This takes the year and month from the execution date (the keep) and goes back one month and forward two days (the add is a negative 1MO plus 2DY) to start reading history for one day (the interval is DY).

If the report executes on April 22, 2014, RDU starts reading history on March 3, 2013. The interval is that whole day.

Example 3-22. Two hours of previous day for the current year and month

YRMODY/-1DY/2HR

This takes the year, month, and day from the execution date (the KEEP), and goes back exactly one day (add is a negative 1DY) to start reading history. RDU reads history for two hours (the interval, 2HR). If the report executes on April 15, 2014, RDU starts reading history on April 14, 2014. The interval begins at 0:00 of that day and continues through 1:59 a.m.

This history entry tells RDU to read history for two hours starting at midnight on the day before the execution date.

Example 3-23. Two hours of the current day

YRMODY/ /2HR

This takes the year, month, and day from the execution date (the keep). The add is zero (blank) so, RDU begins reading history on the execution date. RDU reads history for two hours (the interval). If the report executes on April 15, 2014, RDU starts reading history on that day. The interval begins at 0:00 and continues through 1:59 a.m.

This history entry tells RDU to read history for two hours starting at midnight on the day, month, and year executed.

Example 3-24. One week of three months prior

YR/-3MO/7DY

This takes the year of the execution date (the keep) and goes back three months (the add is a negative 3MO) to start reading history for seven days (the interval, 7DY). If the report executes on April 15, 2014, history starts on January 15, 2014. The interval is January 15 through January 22.
3.7 | Insert

This inserts one or more columns or rows of cells. The insert command adds blank columns or rows of cells at the column or row indicated. Columns to the right and rows below the inserted units are renumbered. At all locations, references in expressions are updated to reflect reorganization.

/I - ENTER COL OR ROW ID

To stop the command before inserting, press <Return>. Otherwise, enter the ID for the column or range of columns or row or range of rows to be inserted. For example, to insert one column before the current column (W), enter W. To insert two columns before column W, enter V:W. To insert three rows before the current row (8), enter 6:8.
This moves a range of column settings, row settings, or cell contents from a source location to destination location in the same report. When a column range is specified, column settings are moved. The same holds true for row ranges. If a cell range is indicated, cell contents are moved.

The settings or cell contents being moved replace those previously written to the destination location and are themselves deleted at the source location. After the move, references at all locations are updated to reflect reorganization.

/ M - ENTER FROM RANGE

Enter the source column range, source row range, or source cell range.

ENTER TO CELL ID, or
ENTER TO COL ID, or
ENTER TO ROW ID

Enter the destination column ID, row ID, or cell ID. The column, row, or cell ID marks the starting point for moving the range.
# 3.9 | Quit

This quits the report screen. Before returning to the program menu, the following prompt displays:

**DO YOU WISH TO KEEP THIS REPORT DEFINITION (Y, N, OR R)**

- **Y** — Saves the current, displayed version of the report definition. After entry, the screen clears and RDU returns to the main menu. If this is the first time this report definition has been saved, the report title is added to the index of reports. If you are modifying an existing report definition, the current version replaces the existing report definition.

- **N** — Abandons the current, displayed version of the report. After entry, the screen clears and RDU returns to the main menu. The next time this report is used, RDU reverts to the last saved version.

- **R** — Returns to the report definition screen without saving or abandoning the current displayed definition.
3.10 | Repeat

This command repeats a strip of cell contents and settings in another bank of cells of the same report. The settings or cell contents being repeated replace those previously written in the destination location.

RDU repeats the settings of a single column to another single or range of columns or the settings of a single row to another single or range of rows. RDU repeats cell contents from one cell to another cell, from one cell to a range of cells, or from one range of cells to another range of cells. When repeating cell contents, the source cell range must occur within a single column or a single row. A cell range in a column is repeated in one or more columns and a cell range in a row is repeated in one or more rows.

To reproduce a patch of cells in one other spot in the report, see “Copy” on page 3-3.

Enter the column ID, row ID, or range of cells that should be repeated.

Identify where the source range should be repeated:

- If repeating the contents of a single cell, the destination range can be a single cell or a range of cells that occurs in a single column or single row.
- If repeating contents of a horizontal strip of cells (e.g., A1:E1), the destination can be a single cell (e.g., A2) or a vertical strip of cells (e.g., A2:A25).
- If repeating a vertical strip of cells (e.g., B1:B10), the destination can be a single cell (e.g., E1) or a horizontal strip of cells (e.g., E1:J1).
- If repeating column settings, the destination range can be a single column or a range of columns.
- If repeating row settings, the destination range can be a single row or a range of rows.

If the source range is a cell range in a column, enter the IDs for the topmost cells in the first and last columns to be repeated to. For example, if repeating cells A1 through A10 to C11:G21 (columns C through G at rows 11 through 20), the top most cells in the destination columns are C11 and G11. The RDU should repeat the cell range to C11:G11.

If the source range is a cell range in a row, enter the leftmost cells in the first and last rows to be repeated to. For example, if repeating cells A1 through G1 to C10:I20 (rows 10 through 20 at columns C through I), the leftmost cells in the destination range are C10 and C20. RDU should repeat the cell range to C10:C20.
Example 3-25. Repeat cells to multiple rows

/R A1:E1 to A2:A4
Copies Cell History Timing, Formatting, and Expression.

<table>
<thead>
<tr>
<th>Beginning Cell</th>
<th>Ending Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>E</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

Example 3-26. Repeat multiple cells to a row

/R A1:A8 to C9:G9
Cell A1 will be copied to cells C9, D9, E9, F9, and G9.
Cell A2 will be copied to cells C9, D9, E9, F9, and G9.
•
•
Cell A8 will be copied to cells C9, D9, E9, F9, and G9.
Example 3-27. Repeat row to multiple rows

/R 1 to 6:8

Copy contents of Row 1 to Rows 6 through 8.

Example 3-28. Repeat column to multiple columns

/R A to D:F

Copies contents of Column A to Columns D through F. Column-specified parameters are also repeated.
3.11 | Scroll

Determines where the screen splits to accommodate scrolling. During standard operations, vertical scrolling moves the top row or the leftmost column out of visual range replacing it with a row at the bottom or column to the right. Using the /S switch, you can determine where scrolling occurs. For example, when you set scrolling for row 6, rows 1 through 6 remain on screen. When the highlight is moved below the last row at the bottom, row 7 moves off and the next higher numbered row appears at the bottom. If scrolling is set for column D, columns A through D are always visible. Moving the highlight past the last column on the right causes column E to disappear and the next higher column to display at the right.

/S - ENTER COL OR ROW ID

To curtail the command before scrolling, press <Return>. Otherwise, enter the ID for the highest lettered column or highest numbered row to remain on screen. Columns/rows occurring after this one will scroll. To bring scrolling back to normal, enter 0 (zero) or exit from the report definition screen. Scrolling parameters are not saved as part of the report definition.
3.12 | Width

Sets the width for a range of columns or globally. The minimum column width is two spaces and the maximum is sixty-three spaces. If a smaller width is assigned than is required by the value being calculated, RDU substitutes asterisks. To make the value display/print, increase the column width.

When scheduling reports, you can elect to display data quality. Doing so requires an extra space in the column. If data quality will be displayed, be sure to set columns one space wider than the report values would otherwise require. For more information on data quality display, see “Schedule a Report” on page 4-4.

/W - ENTER WIDTH RANGE

Enter the range of columns to which setting width is applied.

ENTER COLUMN DEFAULT WIDTH, or
ENTER GLOBAL DEFAULT WIDTH

Enter the number of spaces that should make up the column width.
3.13 | Page Setup

RDU defaults call for printing on an LA100 or compatible device, sixty-six lines per page, ten characters per inch, with no allowance for margins. The default calculation direction is by row.

Page Setup modifies the printing defaults and changes the calculation direction, it is accessed through the report definition screen. When the mode is ready, press <PF3> or the numpad <*, the Page Setup screen displays. Page variables (margins, pitch, page length, etc.) appear on the left. A pitch table, the current report name, and the report width are on the right. Prompts appear at the bottom.

![Figure 3-1. Report Definition Page Setup screen](image)

The <Return> key and the Up/Down arrows move the cursor from one variable to another. As each highlights, a prompt and the current value display at the bottom. Accept the current value by pressing <Return> or an arrow key. To enter a change, type the new value and then press <Return> or the arrow.

When satisfied with the modifications as displayed, press <PF3> again. RDU writes the new page settings into the report definition and returns to the report screen.

Pitch defines character width. The program default is 0 (automatic selection by RDU). Pitch codes are listed on the Pitch Table at the right of the screen. Select a code, move to another variable, or press <PF3> (returns to the report definition screen).

When selecting pitch, review the current report width. Report width, the number of horizontal spaces required, is the sum of the width of the columns in the report. Choose a
pitch that prints a maximum number of characters per line that is equal to or greater than the current report width.

Also, consider the printer type. The pitch code table was set up for LA100 and compatible printers. It may be necessary to match up the pitch codes with the capabilities of the printer.

**ENTER TOP MARGIN (0 - 99)**

The top margin is measured by lines. The minimum is zero and the maximum is sixty-six. The default is zero, no top margin. Entering any other value creates a top margin. At the prompt, you can list top margin lines, move to another variable, or press <PF3> (returns to the report definition screen).

**ENTER LEFT MARGIN (0 - 80)**

The left-hand margin is measured by spaces. The minimum is zero and the maximum is eighty. The default is 0 (i.e., no left margin). Entering any other value creates a left-hand margin. At the prompt, list the number of spaces required for the left margin, move to another variable, or press <PF3> (returns to the report definition screen).

**ENTER NUMBER OF ROWS/PAGE (1 - 99), OR 0 FOR NO PAGE BREAKS**

Page length is measured by the quantity of rows. The minimum is one, the maximum is eighty, and the default is sixty-six. If the report exceeds the number of rows set here, RDU prints the remaining portion on second, third, fourth, etc. pages. At the prompt, enter the number of rows per page, move to another variable, or press <PF3> (returns to the report definition screen).

**ENTER CALCULATION DIRECTION (COL OR ROW)**

Enter the direction in which report calculations should be performed. The default is by row. At the prompt, enter <C> to change calculations direction to column, enter <R> to change it to row, move to another variable, or press <PF3> (returns to the report definition screen).
SECTION 4

MENU FUNCTIONS

The Report Generator (RDU) Menu screen presents functions that create and manage report definitions and schedule and execute reports. A report definition contains the text and expressions that make up the report. Scheduling aligns the report with MISER. Executing the report definition calculates and produces the report. The following topics are described in this section:

- Add, Modify, and Delete
- Schedule a Report
- Execute a Report
- Copy and Rename
- Print a Report Definition
- Printing Additional Reports
- Output and Input
- Output Acronyms
4.1 | Add, Modify, and Delete

4.1.1 | Add

To add a new report definition, press <A> at the **Enter Selection** prompt on the menu screen (DO NOT press <Return>). The following additional prompts appears:

**ENTER REPORT DEFINITION NAME**

To switch to another menu function, press <Return>. The message *Invalid Command, Re-Enter* displays and the cursor returns to the **Enter Selection** prompt.

To create a new report definition, enter a new report name (one that does not appear on the list of existing reports). At the end of the name, press <Return>. Report names can be one to nine characters, letters, and numbers (no punctuation) in length.

After entry, the report definition screen opens. Use the report definition screen to enter text, expressions, formats, etc. To exit from the report definition screen, enter */Q* (quit) and respond to the prompt as appropriate.

4.1.2 | Modify

To modify a report definition, press <M> at the **Enter Selection** prompt on the menu screen (DO NOT press <Return>). The following prompt displays:

**ENTER REPORT DEFINITION NAME**

To switch to another menu function, press <Return>. The message *Invalid Command, Re-Enter* displays and the cursor returns to the **Enter Selection** prompt.

To modify a report definition, enter its name and press <Return>. The selection is displayed in the report definition screen. Make whatever changes are necessary to the current expressions, text, formats, page setup, etc.

When finished, press */Q* and respond to the prompt as appropriate.

4.1.3 | Delete

To delete a report definition, press <D> at the **Enter Selection** prompt on the menu screen (DO NOT press <Return>). The following prompts display:

**ENTER REPORT DEFINITION NAME**

To switch to another menu function, press <Return>. The message *Invalid Command, Re-Enter* displays and the cursor returns to the **Enter Selection** prompt. To delete a report definition, enter its report name and press <Return>. 
To stop the delete action and keep the report, press <N>. Otherwise, press <Y>. Deletion takes place immediately. When the screen refreshes, the deleted file will be removed from the list of existing reports.
4.2 | Schedule a Report

Scheduling determines when RDU should calculate a report definition and produce the report. Schedule a single output or setup the report definition for automatic production at regular, timed intervals. Besides setting the time frame, scheduling provides options that add the history data quality bit, link the report definition to a related MISER point status, chain other report definitions to this report definition, and print the report to a file (in RDU, DIF, or XLS format) and/or printers.

To switch to another menu function, press <Return>. The message Invalid command, Re-Enter displays and the cursor returns to the Enter Selection prompt. To schedule a report, enter its name and press <Return>. The scheduling screen opens. Use the arrow keys to move from field to field.

Report Name and Time of Last Schedule are display only fields that appear strictly for informational purposes. If the report is being scheduled for the first time, the time is the current date and time.

RDU directs reports to either printers or files. The file format type can be set to Report, DIF, or Excel. (These designations are only applicable when printing to a file.)
REPORT format is interpreted by Misher and the RDU program and can be used to create standard ASCII text files. DIF format is a standard spreadsheet type format that can be interpreted by a variety of external programs. To transport the converted files the Misher system to the PC, third party software is required (XLS files require binary mode).

For XLS files, RDU converts calculated values (not expressions), text, and formats. Numbers are written in Arial font and text in Arial Narrow font. Columns that are hidden are ignored. RDU interprets cells containing all dashes, all underscores, or all equal signs, or cells containing repeated dash-space, underscore-space, or equal sign-space patterns as horizontal cell borders. It interprets the pipe (|) or multi-pipe (||) characters as a vertical cell border. If horizontal and vertical borders intersect, RDU draws borders around the area as if it were a table (the cells have no relationship with one another).

If the report is being scheduled for the first time, the default report format is REPORT. Otherwise, the default format is the format last selected. To accept the default, press <Return>. To change the format, press <R> for Report, <D> for DIF format, or <E> for Excel (XLS) format.

**ENTER OUTPUT DEVICE:**

Reports, as files, can be sent to any location within the system in standard RDU format or converted into DIF or XLS format. If the report is being scheduled for the first time, the default output device is the system Printer. Otherwise, the default is the device entered the last time the report was scheduled. To accept the default, press <Return>.

To send the report to a file, enter the file name. It is not necessary to enter the file type extension. RDU adds “.RPT” when the REPORT format is being used, “.DIF” when DIF is being used, and “.XLS” when Excel format is being used. However, if an extension other than these three is desired, it must be included. The default directory to which the file will be written is Mnet$DATA in the current online Host. To write the file to another directory, enter its full path.

To simultaneously send the report to a file (RDU format) and print it, enter the filename as above and append the printer qualifiers.

To print to a file and to a named printer, enter:

```
filename/SPn
```

where n is a printer number.

To print to a file and multiple named printers, enter:

```
filename/SPn/SPn.../SPn
filename\n\n...\nfilename/SPn\n\n...\n```

where n is a printer number. Enter either the full printer qualifier, the printer shortcut (a back slash and the printer number) or a combination of both.

To print the report without sending it to a file:

Enter PRINTER for the default printer.
To print the file to multiple named printers:
Enter any combination of the printer qualifier and shortcut (/SPn and \n) as described above.

**ENTER RELATED POINT:**

To base the report output on a MISER point status change, enter the point acronym. Otherwise, press <Return>. (The point being used must have the entry, RUTASK, in the Related Task field of its point definition.)

**Related Docs:** Point definitions are explained in detail in the *MISER Operator Manual, Point Definitions* and *MISER System Manual, DPT–Point Definitions*.

**ENTER RELATED POINT STATUS:**

This field becomes active when a related point has been defined above. Binary points can trigger report output when point status changes to ON, OFF, or both. Analog points can trigger report output when the point status changes to one, all, or a combination of HIHI, HI, NORMAL, LO, and LOLO. Enter one or more status abbreviations, separating selections with a comma or space. If no related point has been specified, the point status display is undefined.

**DISPLAY QUALITY ?:**

Display quality refers to the history data quality definition. It is appropriate to those cells containing expressions based on history values. RDU determines data quality by cell ad prints the definition in the cell using one space. The data quality prints to the right of the value. To assure that the cell value is not truncated while making room for the data quality, set the column width to one greater than is otherwise needed.

Once data quality is added to a report, it remains in place until the report is rescheduled and data quality is removed. However, it does not display in the *Report Definition* screen until the report definition is actually executed. At each execution, RDU updates quality:

- **M** — Point value changed manually
- **E** — History has been edited
- **U** — Point down or inaccessible
- **D** — Point disabled
- **L** — Data lost during history file compression
- **N** — No value available

The default response (N) omits data quality. To accept the default, press <Return>. To include data quality, enter Y and press <Return>.
**NUMBER OF COPIES:**

List the number of copies, from 1 to 9. This field affects only this report. If other reports are chained to this report, the number of copies produced for those chained reports depends on how they are scheduled.

**NUMBER HOURS/DAYS/MONTHS IN REPORT** xxHR xxDY xxMO:

The default response (**ALL**) produces the entire report. To accept the default, press <Return>. To produce a portion of the report, limited to a number of hours, days, or months, enter the number and the time specification (HR, DY, or MO).

If history has been applied by row and the limit is greater than the row history interval (keep/add/interval/control), RDU produces a quantity of rows that is equal to the limit divided by the interval. Row history or not, if the limit is less than the history interval applied, RDU produces the report by reading history from the start of execution time/date through the extent of the limit. The limit remains in effect until it is changed.

**SCHEDULE?**

The default response for this prompt is **N**. To accept the default, press <Return>. To produce the report, enter **Y**. See “Schedule Time” on page 4-8 for details on how RDU handles schedule time.

**RS TIME: TIME <REPORT NAME>**

Use this field to define when the report should be calculated and produced and whether it should be chained to other reports.

Reports can be produced at an absolute time value or synchronized with the MISER system clock. Enter the time, and if another report is chained, a space, a left angle bracket (<), the name of the report being chained, and a right angle bracket (>).

**TIME**: Time is defined by entry of time units and numbers. Time units are the year, month, day, weekday, hour, and minute, as abbreviated below. Use as many different units as necessary, separating each with a slash.

- **YR** — Year
- **MO** — Month
- **DY** — Day
- **WD=x** — Weekday
- **HR** — Hour
- **MN** — Minute
FYI: Weekdays must include the equal sign (=) followed by a day. The day can be
designated by the first three letters (e.g., SUN, WED, etc.), the complete name (e.g.,
Sunday, Wednesday, etc.), or numbers 1 through 7 (1 is Sunday, 4 is Wednesday, etc.). Do
not include WD in the same string with DY.

Examples:

- YR/MO/DY
- MO/DY/HR
- MO/WD=2/HR

Numbers precede the time unit or are appended with an equal sign (=). When numbers
precede time units, printing is synchronized with the Miser system. Appended, they
indicate absolute time. Each string should include only one synchronization with Miser.

REPORT NAME: Chaining report definitions causes a second report to print, on a new
page, along with the first one. Only one report definition can be chained to the one being
scheduled, but that report definition can have another report definition chained to it and
so on. The chain can contain any number of report definitions. When the first report
definition schedule is due and is produced, all the report definitions in the chain are
produced. Chaining only works when the first report runs on an automatic schedule, if it
was executed using X from the RDU Menu subsequent chained reports are not output. To
run a report manually, with chaining, use the RDE Chain command
(see “RDE — Reports On Demand” on page 5-2).

If the first report is output to a file, all subsequent chained reports will be appended to
that same file using form feeds to separate each one.

Chaining goes in one direction. If the second report is executed, the reports chained to it
(the third and all subsequent reports), but not the report to which it is chained (the first
report), are output. Chained reports all print to the device (or file) listed in the first
report.

Chain Report adds a space and the name of the chained report inside angle brackets.
When this report prints the chained report also executes and prints. The output device for
the chained report is the same as for this report.

<table>
<thead>
<tr>
<th>Example 4-1. Chain Reports</th>
</tr>
</thead>
<tbody>
<tr>
<td>MO/WD=1/HR=8/MN=45 &lt;REPORT2&gt;</td>
</tr>
<tr>
<td>DY/HR=8MN=45 &lt;HOURLY_REPORT&gt;</td>
</tr>
</tbody>
</table>

4.2.1 Schedule Time

In RDU, Schedule Time is either absolute or relative. Absolute time sets the report to run
at a particular date and time. It is usually used to produce the report once, on a specific
calendar date and at a certain time. Relative time synchronizes the report with the Miser
system time and sets it up for production at regular intervals.
Scheduled time is written in a time string consisting of numeric values linked to time units. How the values are linked determines whether time is absolute or relative. Numeric values following time units (type an equal sign and then the number), indicate absolute time. Numeric values preceding time units (enter the number, no space, and the time unit), synchronize RDU with MISER.

Synchronization takes place at the next interval of the requested time unit and at subsequent equal units. If the time units are entered but the numbers are omitted, synchronization with MISER is assumed, at intervals of one time unit.

RDU understands the following time units: year (YR), month (MO), day (DY), weekday (WK), hour (HR), and minute (MN). They are identified by numeric values. For example:

<table>
<thead>
<tr>
<th>Example 4-2.</th>
<th>Print at noon</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HR=12</strong></td>
<td>Schedules the report for noon. If the report is rescheduled, it will print at the next occurrence of noon.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Example 4-3.</th>
<th>Print in twelve hours</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12HR</strong></td>
<td>Schedules the report to print at the next interval of twelve hours (i.e., 0:00 or 12:00). If the request time is after midnight and before noon, the report prints at noon. Otherwise, it prints at midnight.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Example 4-4.</th>
<th>Print at the top of the hour</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HR</strong></td>
<td>When the number is omitted, RDU assumes intervals of one hour and prints at the top of the next hour, and if rescheduled, at all successive hours.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Example 4-5.</th>
<th>Print in March</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MO=3</strong></td>
<td>Schedules the report to print in March. If the report is rescheduled, it will print at the next occurrence of March.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Example 4-6.</th>
<th>Print in three months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3MO</strong></td>
<td>Schedules the report to print at the next interval of three months. For instance, if it is January, the report will print in March. If the report is rescheduled, it prints in June, September, and December.</td>
</tr>
</tbody>
</table>

### 4.2.2 Scheduling Examples

Most time strings are made up of multiple time units (only one of the units should be synchronized with MISER). When the RDU processor checks schedules, it reads the entire string. Greater time units are read before lesser time units. YR is read before MO
which is read before DY, which is read before HR and so on. Once the greatest time unit is satisfied, the processor looks to the next greatest time unit, until all units are met.

**Example 4-7.** Print on March 7th at 6:30 a.m.

\[
\text{MO}=3/\text{DY}=7/\text{HR}=6/\text{MN}=30
\]

Prints in the third month (March), on the seventh day at 6:30 a.m. If the report is rescheduled, the processor waits for the next time March 7th, 6:30 a.m. occurs.

**Example 4-8.** Print in one month at 5:30 a.m.

\[
\text{MO/DY}=15/\text{HR}=5/\text{MN}=30
\]

MO synchronizes timing with MISER. The report prints at the next occurrence of a month, on the fifteenth, at 5:30 a.m. If the request date is March 14th, the report prints on April 15th 5:30 a.m. If the report is rescheduled, the next printing will be the fifteenth of the following month at 5:30 a.m.

**Example 4-9.** Print on the first Sunday at 8:45 a.m.

\[
\text{MO/WD}=1/\text{HR}=8/\text{MN}=45
\]

MO synchronizes timing with MISER. The report prints at the next occurrence of a month, on the first Sunday encountered, at 8:45 a.m.

**Example 4-10.** Print in four hours

\[
4\text{HR}
\]

Schedules the report to print at the next interval of four hours. If the request time is 1 p.m., the report prints at 3 p.m. If the report is rescheduled, it would also print at 8 p.m., Midnight, 5 a.m., and 10 a.m.

**Example 4-11.** Print Monday at 8:10

\[
\text{WD}=\text{MON/HR}=8/\text{MN}=10
\]

Prints on Monday at 8:10 and if rescheduled, on subsequent Mondays at 8:10. This report is not synchronized with MISER.
4.3 | Execute a Report

To calculate and produce a report on demand, press <X> at the **Enter Selection** prompt on the menu screen (DO NOT press <Return>). The report will print using its scheduled method (printer or file). See “Schedule a Report” on page 4-4 for details. If it has not been scheduled it will, by default, print.

**ENTER REPORT DEFINITION NAME**

To switch to another menu function, press <Return>. The message *Invalid command, Re-Enter* displays and the cursor returns to the **Enter Selection** prompt. To calculate and produce a report, enter the report name and press <Return>.

**ENTER DATE OF EXECUTION <CR> FOR dd-mm-yyyy**

The program default date for calculating and producing the report is the last date that it was scheduled or if it has never been scheduled, today. To accept the default, press <Return>. Otherwise, enter a date using the format DD-MMM-YY or DD-MMM-YYYY (two or four digit year).

**ENTER TIME OF EXECUTION <CR> FOR hh:mm:ss**

The program default time for calculating and producing the report is the last time that it was scheduled or if it has never been scheduled, now. To accept the default, press <Return>. Otherwise, enter a time using a twenty-four hour clock and the format HH:MM:SS.

The screen clears and the report executes. Afterward, the RDU menu returns with the cursor at the **Enter Selection** prompt.
4.4 | Copy and Rename

4.4.1 | Copy

The copy function duplicates exactly a report definition and its current scheduling. To copy a report definition, press <C> at the Enter Selection prompt on the menu screen (DO NOT press <Return>).

```
ENTER REPORT DEFINITION NAME
```

To switch to another menu function, press <Return>. The message Invalid Command, Re-Enter displays and the cursor returns to the Enter Selection prompt. To copy a report definition, enter the name for the report definition and press <Return>.

```
ENTER NEW REPORT DEFINITION NAME
```

Enter the name of the report to use as the copy “from” definition and press <Return>. After entry, the screen refreshes. The new report definition name displays in the list of existing reports (as does the original report definition name).

4.4.2 | Rename

To rename a report definition, press <R> at the Enter Selection prompt on the menu screen (DO NOT press <Return>).

```
ENTER REPORT DEFINITION NAME
```

To switch to another menu function, press <Return>. The message Invalid Command, Re-Enter displays and the cursor returns to the Enter Selection prompt. To rename a report definition, enter its current name and press <Return>.

```
ENTER NEW REPORT DEFINITION NAME
```

Enter the name for the report and press <Return>. After entry, the screen refreshes. The new name replaces the old one in the list of existing reports.
4.5 | Print a Report Definition

To print a report definition, press <P> at the **Enter Selection** prompt on the menu screen (DO NOT press <Return>).

<table>
<thead>
<tr>
<th>ENTER REPORT DEFINITION NAME</th>
</tr>
</thead>
</table>

To switch to another menu function, press <Return>. The message *Invalid Command, Re-Enter* displays and the cursor returns to the **Enter Selection** prompt.

To print the report definition, enter a report name and press <Return>. The screen clears while the definition prints at the system spool printer.

The report definition lists all the instructions that will be used to execute the report. With the exception of global applications that appear first, it is organized by cell ID, left to right, top to bottom. Each line includes the formatting command applied, the cell ID, and specific details. The report definition uses the following abbreviations:

- **/T** — Text
- **/X** — Expression
- **/F** — Format
- **/H** — History
- **/W** — Width

**Example 4-12. Report Definition**

```
/W 0 10
/F 0 F2
/T D1 "HSQ DEMO"
/T D4 "EVENT INITIATED REPORT"
/T G5 'DATE
/F H5 D
/X H5 CDAT

/T B14 "FLOW1"
/T C14 "FLOW2"
/T D14 "FLOW3"
/T B15 '________
/T C15 '________
/T D15 '________
/T B16 "B2"
/X C16 DVAL(DEMO-FLOW1)
/X D16 DVAL(DEMO-FLOW2)
/X E16 DVAL(DEMO-FLOW3)
```

The example above begins with two global applications, column width (ten spaces) and decimal places (two, fixed). Cells **D1** and **D4** contain left justified text and **G5**, right justified text, **H5** has the date default. It also contains the expression, **CDAT**, a variable that represents the current cell date. Columns **B**, **C**, and **D** contain left justified text (B14-D14) and is underlined in the row beneath (B15-D15). Cell **B16** contains additional text and **C16-E16** contain expressions that display the current value of a point acronym.
4.6 | Printing Additional Reports

To print additional reports, press <L> at the **Enter Selection** prompt on the menu screen (DO NOT press <Return>).

| ENTER REPORT DEFINITION NAME |

To switch to another menu function, press <Return>. The message *Invalid Command, Re-Enter* displays and the cursor returns to **Enter Selection** prompt.

To print the report, enter a report name and press <Return>. The screen clears while the definition prints at the system spool printer or to a file.

This option only works for reports that have already been scheduled and executed. The output device, either a disk file or printer(s), is determined by the setting in the original report scheduling definition.
4.7 | Output and Input

4.7.1 | Output

To output a report definition to an ASCII text file, press <O> at the Enter Selection prompt on the menu screen (DO NOT press <Return>). The resulting file can be displayed, edited, and printed using standard non-MISER programs.

To switch to another menu function, press <Return>. The message Invalid Command, Re-Enter displays and the cursor returns to the Enter Selection prompt. To output the report definition, enter its name and press <Return>.

Enter the complete name for the ASCII text file that will include the report definition. If the file extension and directory location are not included, RDU will add “.LIS” and write the file to the SYSSLOGIN directory. The file produced is a list of all the instructions that will be used to execute this report. See “Print a Report Definition” on page 4-13.

4.7.2 | Input

To input an ASCII text file to an existing report definition, press <I> at the Enter Selection prompt on the menu screen (DO NOT press <Return>).

To switch to another menu function, press <Return>. The message Invalid Command, Re-Enter displays and the cursor returns to the Enter Selection prompt. To input the ASCII text file, enter the name of an existing report definition to send the file to and press <Return>. Data from the ASCII file will replace the text in the existing definition.

Enter the name of the ASCII text file that is being imported and press <Return>. Be sure to include the full file name. This may include a directory specification and a file extension.

While RDU is converting the ASCII file, it checks for syntax errors. If any are detected, the error line and a message will be displayed. Press <Return> to continue or <Q> to Quit. If quit is selected, the existing report definition will be left untouched. Otherwise, the ASCII file, with errors, is input.
4.8 | Output Acronyms

To create a list of all the acronyms used in a single report definition, press <N> at the
Enter Selection prompt on the menu screen (DO NOT press <Return>). The last menu
selection produces a file that lists all the acronyms used (in expressions) in a single report
definition.

The resulting file is an ASCII file that can be displayed, edited, and printed with operating
system commands. The list can be given any name and sent to any directory location.
However, by default, RDU assigns it to the current SYS$LOGIN directory with a file
extension of “.LIS”.

Titled, Acronym Verification Report of reportName (where reportName is the name of
the report definition), the list itemizes acronyms and the cells they occur in. Acronyms
appear in the same order as they occur in the report definition. Cells are itemized from
left to right.

<table>
<thead>
<tr>
<th>Example 4-13. Output acronym</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACRONYM VERIFICATION REPORT OF report1</td>
</tr>
<tr>
<td>ACRONYM: ZONE-1305-FLOW</td>
</tr>
<tr>
<td>C9  C10  C11  C12  C13  C14</td>
</tr>
<tr>
<td>C15  ...</td>
</tr>
<tr>
<td>ACRONYM: ZONE-1380-FLOW</td>
</tr>
<tr>
<td>E9  E10  E11  E12  E13  E14</td>
</tr>
<tr>
<td>E15  ...</td>
</tr>
<tr>
<td>ACRONYM: ZONE-1440-FLOW</td>
</tr>
<tr>
<td>G9  G10  G11  G12  G13  G14</td>
</tr>
<tr>
<td>G15  ...</td>
</tr>
</tbody>
</table>

ENTER REPORT DEFINITION NAME

To switch to another menu function, press <Return>. The message Invalid Command,
Re-Enter displays and the cursor returns to the Enter Selection prompt. To produce
the listing, enter the name of a report definition and press <Return>.

ENTER OUTPUT FILE NAME

Enter a file name for the acronym list you are creating. The list is created immediately and
the screen refreshes.
Report Generator utilities are used to create and execute report definitions. The Report Generator utilities are:

- **RDE — Reports On Demand**
- **RDP — Report Definition Displays**
5.1 | RDE — Reports On Demand

RDE executes report definitions that have been created through the Report Generator (RDU). It performs the same function as the Execution option on the RDU main menu, only from the system prompt. You need to know the exact name of the report definition you are executing.

5.1.1 | Selection from the MISER Menu

Select Report Generator, then Reports On Demand. An Xterm window opens and prompts you for additional information.

5.1.2 | From the Command Line

Type RDE and press <Return>. An Xterm window opens and prompts you for additional information.

5.1.3 | Xterm Prompts

Figure 5-1. Reports On Demand screen

Enter report name:

The report name must be one to nine characters in length. After the entry, RDE assumes the execution time and date to be the current time and date and executes the report.
To change the execution date/time, add the report name and a new date/time to the
command line. To modify schedule parameters for this execution, you can also add one or
more qualifiers (see “Command Qualifiers” on page 5-3) to the command line.

5.1.4 | RDE Examples

Example 5-1. Name qualifiers

\textbf{RDE name/qualifiers}

\textit{Name} represents the report name. \textbf{RDE} assumes the time and date to be the current time and date
and executes the named report immediately.

Example 5-2. Name and date qualifiers

\textbf{RDE name date/qualifiers}

\textit{Name} represents the report name. \textit{Date} is a specific execution date in the format \texttt{dd-mmm-yy} or
\texttt{dd-mmm-yyyy}. \textbf{RDE} assumes the time is the current time and executes the named report on the date
specified.

Example 5-3. Name, date, and time qualifiers

\textbf{RDE name date time/qualifiers}

\textit{Name} represents the report name. \textit{Date} is a specific execution date, and \textit{time} is a specific execution
time using the format \texttt{hh:mm}. \textbf{RDE} executes the named report on the date and time specified.

Example 5-4. Last execution qualifier

\textbf{RDE name LAST/qualifiers}

\textit{Name} represents the report name. \textbf{RDE} executes the named report using the time and date of the last
execution.

5.1.5 | Command Qualifiers

The qualifiers listed below may be added, in combination, to the command line after the
report name.

<table>
<thead>
<tr>
<th>Qualifier</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>/OUT=PRINTER</td>
<td>Sends the report to the default printer.</td>
</tr>
<tr>
<td>/OUT=/SPn/SPn.../SPn</td>
<td>(Where (n) is a printer number.) Prints to multiple named printers. You can enter the full printer qualifier (/SPn), the printer shortcut (n), or a combination of both.</td>
</tr>
<tr>
<td>/OUT=filename</td>
<td>Sends the report to a named file. The \textit{filename} should follow standard naming conventions. RDE adds the file type extension based on the \texttt{/TYPE} qualifier. The file is sent to the $\text{Mnet}$\text{DATA} directory of the online Host.</td>
</tr>
</tbody>
</table>
5.1.5.1 | Example Command Line Entries

$ RDE name/OUT=filename/TYPE=DIF/CHAIN/LIMIT=3DY
$ RDE name date time/NUMBER=3/CHAIN/LIMIT=2HR
$ RDE name last/OUT=PRINTER/NUMBER=4/CHAIN
$ RDE name/TYPE=DIF/CHAIN/OUT=filename$$
5.2 | RDP — Report Definition Displays

RDP displays report definitions in the RDU definition screen. The display includes a cursor that moves throughout the report definition. By moving the cursor and reading the two header lines, you can determine how each column, row, and cell was defined. While in the definition screen, you can scroll from an identified row or column (use the /S command), recalculate (<PF1> followed by <PF3>), and return to the menu (Q).

RDP opens to a menu screen with two options Exit and Display. Below the options is a list of the existing report definitions. If there are more definitions than can fit on screen, the up and down arrow keys scroll the list.

5.2.1 | Selection from the MISER Menu

Select Report Generator, then Reports On Demand. An Xterm window opens with the RDP menu screen.

5.2.2 | From the Command Line

Type RDP and press <Return>. An Xterm window opens with the RDU - REPORT DEFINITION UTILITY screen.

5.2.3 | Xterm Prompts

![Figure 5-2. Report Definition Displays screen](image)

Figure 5-2. Report Definition Displays screen
Select an option:

- **(E) - EXIT RDU** — (default) Exits RDP. Press <Return> to close the Xterm and return control to XView.
- **(D) - DISPLAY A REPORT DEFINITION** — Displays a report definition. The following prompt appears.

<table>
<thead>
<tr>
<th>ENTER REPORT DEFINITION NAME</th>
<th>DISPLAY OPTION</th>
</tr>
</thead>
</table>

Enter the name of a report definition from the list above this prompt and press <Return>. The definition opens for display purposes only. You cannot enter modifications.
This section includes a sample report and describes all the steps required to define it. Included is a copy of the definition. Detailed in this section:

- Adding a Report Definition
- The Printed Definition
6.1 | Adding a Report Definition

This will describe how to create a simple report named *Sample Report Definition* that will be scheduled on a daily basis. It will calculate the status of **PUMP-STATUS**, a binary point and the average flow of **LOOP-FLOW**, an analog point. The values used to perform calculations will be read from the MISER history database.

In the report, the title, labels, and blank areas were positioned according to visual appeal. Where possible, cell data was duplicated (rather than re-entered). Calculation direction was set to *Row*. The report uses rows 1 through 35 and columns A through G. Rows 1 through 11 set up title and column labels. Rows 12 through 35 contain formatting instructions for history timing. Column **B** displays the start time for each interval when the history database should be accessed. Column **C** holds the calculations for binary values and column **D**, for analog values.

![Figure 6-1. Report Definition screen](image)

The following steps describe how the *Sample Report Definition* is created.

1. Type **RDU** in the XView command line or in a DECterm to open the Report Definition Utility program.
2. Press **<A>** to add a new report (DO NOT press <Return>). RDU prompts you to enter a report definition name.

```
ENTER REPORT DEFINITION NAME              ADD     OPTION
```

Enter the name this report will be saved as and press <Return> (e.g., **SAMPLE**). The *Report Definition* screen opens.
3. Using the arrow keys, move the highlight from its default position (A1) to cell C4. The mode is \textit{READY} and in the header portion of the screen, the current cell ID will display C4.

Press <" (double quote). The mode changes to \textit{TEXT} and the cursor appears in the header, just below the current cell ID. Type Sample Report Definition and press <Return>. The mode will return to \textit{READY}.

The double quote (") forces the text to be left justified. The report title, “Sample Report Definition” contains twenty-nine characters. Twenty-nine exceeds the RDU default column width of nine. However, left justified text can be written in strings of up to 160 characters.

4. Move the cell pointer to cell G5 in preparation for entering the report date and time to the right and below the report title. To setup the date, type the expression \texttt{CDAT} and press <Return>.

\textbf{FYI:} As soon as a letter is typed, the mode changes to \textit{VALUE}. \textit{VALUE} mode is used when writing expressions. \texttt{CDAT} is the variable that calculates the current cell date. When <Return> is pressed, the mode returns to \textit{READY}.

RDU displays the current date in cell G5 using its default date formatting, YYMMDD, which produces a six digit number.

To override the default date formatting with our own date formatting, type </F>. With the / (slash), the mode changes to \textit{INPUT} and then the “F” changes it to \textit{RANGE}. RDU prompts you with:

\begin{center}
\textbf{ENTER FORMAT RANGE.}
\end{center}

Enter a range that consists of one cell, G5. Press <Return> (the default entry for a range that is the current cell) or type <G5> and then press <Return>. The mode changes back to \textit{INPUT}. The following displays:

\begin{center}
\textbf{ENTER CELL FORMAT}
\end{center}

Press <D> and <Return>, this is a shortcut for the DD-MMM-YY format. The date in cell G5 is rewritten and the mode returns to \textit{READY}.

5. Next, enter the History for the cell. \texttt{CDAT} gives the date at the beginning of the specified history interval. Press </H>. At the prompt:

\begin{center}
\textbf{ENTER HISTORY RANGE.}
\end{center}

press <Return> to take the current cell. At the prompt:

\begin{center}
\textbf{ENTER CELL HISTORY.}
\end{center}

Enter the following for history:

\texttt{DYOYR/-1DY/1DY} and press <Return>

6. To setup the time, move the cell pointer to cell G7 and type the expression \texttt{CTIM} and press <Return>. 
RDU displays the current time in cell G7 using its default time formatting, HMMSS.

To override the default date formatting with our own time formatting, type \</F\. At the prompt:

```
ENTER FORMAT RANGE.
```

press <Return> to take the current cell. At the prompt:

```
ENTER CELL FORMAT
```

press <T> and <Return>, this is a shortcut for the HH:MM:SS format. The time in cell G7 is rewritten and the mode returns to READY.

7. Now set the column labels, move the cell pointer to B10. Type \'<\> (single quote). The mode changes to TEXT. Type TIME and press <Return>. The mode returns to READY.

The single quote (') will force the column labels displayed in columns B, C, and D as right justified text. However, use left justified or centered, as desired.

In cell C9, press <'> and then type PUMP and press <Return>.
In cell C10, press <'> and then type STATE and press <Return>.
In cell D9, press <'> and then type AVG and press <Return>.
In cell D10, press <'> and then type FLOW and press <Return>.
In cell D11, press <'> and then type (GPM) and press <Return>.

8. In this report, calculations are based on values read from the MISER history database. To access MISER history, you must apply history timing. History timing sets the date, time, and duration for RDU.

Type \</H\> (history timing). At the prompt:

```
ENTER HISTORY RANGE.
```

enter the range of rows:

\texttt{12:36} (begins with row 12 and ends with row 36) and press <Return>.

Row 12 was selected to start the range since it is the first row that does not overlap column titles. A range of rows is used because the report is being calculated by row.

The report should access the MISER history database one day before (.../-1DY/...) the scheduled or execution month, day, and year (YRMOY/.../...) and read history in intervals of one hour (.../.../HR). The report will adapt to Daylight Savings Time by including twenty-five rows, one for each possible hour and using the .../D control. At the prompt:

```
ENTER ROW DEFAULT HISTORY.
```

enter the history timing:

\texttt{YRMOY/-1DY/HR/D} and press <Return>.
Since the range contains multiple rows, the interval is automatically added to the “add” offset for all rows after the first one. This way, each row reads a different hour of history.

9. Move the cell pointer to B12 and type the expression CTIM and press <Return>. Column B will calculate the start time for each interval when the MISER database is accessed. To accomplish this, the time variable must be entered as an expression and the time formatting applied. For this example, time will display the hour in military format, followed by two zeroes.

Press </F>. At the prompt:

```
ENTER FORMAT RANGE.
```

define a range that consists of one column. Press the down arrow or enter <B> and press <Return>. At the prompt:

```
ENTER COLUMN DEFAULT FORMAT
```

type \text{TTHOO} and press <Return>. The new format is applied to the cell date.

10. Move the cell pointer to C12 and type:

\text{HSVL(PUMP-STATUS)} (or appropriate binary status point acronym) and press <Return>.

Column C will calculate the status of the binary point “PUMP-STATUS” at the start of the interval. This requires applying the HSVL expression and binary formatting. Binary formatting informs RDU what string of characters should represent the zero and one states of the point. \text{OFF} will represent the zero state and \text{ON}, the one state.

To apply binary formatting, press </F>. At the prompt:

```
ENTER FORMAT RANGE.
```

define a range that consists of one column. Press the down arrow or enter <C> and press <Return>. At the prompt:

```
ENTER COLUMN DEFAULT FORMAT
```

type \text{BOFF/ON} and press <Return>.

11. Move the cell pointer to D12 and type:

\text{HAVG(LOOP-FLOW)} (or appropriate binary status point acronym) and press <Return>.

Column D will calculate the average value over the interval for the point “LOOP-FLOW”. The value should be written with two decimal places. This requires using the HAVG expression and fixed decimal formatting.
Adding a Report Definition

To apply fixed decimal formatting, press </F>. At the prompt:

**ENTER FORMAT RANGE.**

define a range that consists of one column. Press the down arrow or enter <D> and press <Return>. At the prompt:

**ENTER COLUMN DEFAULT FORMAT**

**type F2 and press <Return>**.

12. Finally, to repeat the definitions entered in cells B12, C12, and D12 to rows 13 through 36, press </R>. At the prompt:

**ENTER FROM RANGE.**

**type B12:D12 and press <Return>**. At the prompt:

**ENTER TO CELL RANGE.**

**type B13:B36 and press <Return>**.

The report is now complete. Before returning to the menu, enter the page setup. Press <PF3> to open the REPORT DEFINITION PAGE SETUP screen. Make any applicable changes.

**FYI:** Because this report is only sixty-four spaces wide, you can select any pitch.

Press <PF3> to return to the report screen. To exit the report, press </Q>. At the prompt:

**DO YOU WISH TO KEEP THIS REPORT DEFINITION (Y, N or R)**

press <Y> to save the changes.
6.2 | The Printed Definition

See “Print a Report Definition” on page 4-13 and “Output” on page 4-15 for details on how to view a report definition.

/F B THH00
/F C BOFF/ON
/F D F2
/H 12 YRMODY/-1DY/1HR/D
/H 13 YRMODY/-1DYHR/1HR/D
/H 14 YRMODY/-1DY2HR/1HR/D
... ...
/H 34 YRMODY/-1DY22HR/1HR/D
/H 35 YRMODY/-1DY23HR/1HR/D
/H 36 YRMODY/-1DY24HR/1HR/D
/T C4 "SAMPLE REPORT DEFINITION
/H G5 YRMODY/-1DY/1DY
/F G5 D
/X G5 CDAT
/F G7 T
/X G7 CTIM
/T C9 'PUMP
/T D9 'AVG
/T B10 'TIME
/T C10 'STATE
/T D10 'FLOW
/T D11 '(GPM)
/X B12 CTIM
/X C12 HSVL(PUMP-STATUS)
/X D12 HAVG(LOOP-FLOW)
/X B13 CTIM
/X C13 HSVL(PUMP-STATUS)
/X D13 HAVG(LOOP-FLOW)
... ...
/X B35 CTIM
/X C35 HSVL(PUMP-STATUS)
/X D35 HAVG(LOOP-FLOW)
/X B36 CTIM
/X C36 HSVL(PUMP-STATUS)
/X D36 HAVG(LOOP-FLOW)
APPENDIX A

GENERAL SUMMARY

The following subjects are summarized in this appendix:

- **Modes**
- **READY**
- **Commands**

A.1 | Modes

<table>
<thead>
<tr>
<th>Mode</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>READY</td>
<td>Ready for input. Other modes are not in use.</td>
</tr>
<tr>
<td>EDIT</td>
<td>Modify text and expressions with inserts or overstrikes.</td>
</tr>
<tr>
<td>INPUT</td>
<td>Command or prompt is active. Data input is required.</td>
</tr>
<tr>
<td>RANGE</td>
<td>Range prompt is active. Enter cell, column, row, or global range.</td>
</tr>
<tr>
<td>WAIT</td>
<td>Data is being processed. Wait for READY.</td>
</tr>
<tr>
<td>HELP</td>
<td>Display online help screen.</td>
</tr>
<tr>
<td>TEXT</td>
<td>Ready for writing labels, notes, etc.</td>
</tr>
<tr>
<td>VALUE</td>
<td>Ready to write an expression.</td>
</tr>
</tbody>
</table>
A.2 | READY

FYI: The following keyboard combinations are applicable for VMS keyboards only.

- `<PF1>` Modify next key.
- `<PF1> + <F1>` HOME cell (A1).
- `<PF2>` EDIT mode.
- `<PF1> + <PF2>` + Cell ID Specified cell.
- `<PF3>` Page setup.
- `<PF1> + <PF3>` Recalculate report.
- `<PF4>` or `<?>` HELP mode.
- `<Ctrl> + <W>` Refresh screen.
- `"`, `<`, `<@>`, `<` TEXT mode.
- `<Ctrl> + <Z>` Quit report screen.
- `</>` Start command.

**Other characters** VALUE mode.

A.3 | Commands

- `/C` Copy column settings, row settings, or cell contents.
- `/I` Insert columns or rows.
- `/D` Delete columns or rows.
- `/M` Move column settings, row settings, or cell contents.
- `/E` Erase column settings, row settings, or cell contents.
- `/R` Repeat column, settings, row settings, or cell contents.
- `/F` Format by row, column, cell, or globally.
- `/S` Adjust history timing by row, column, cell, or globally.
- `/H` Apply history timing by row, column, cell, or globally.
- `/W` Set column width, by column or globally.
- `/Q` Quit the RDU report screen.
The following topics are detailed in this appendix:

- Ranges
- Formats
- Date and Time

## B.1 | Ranges

FYI: Note placement of the colon (:).

<table>
<thead>
<tr>
<th>Description</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific Units (columns, rows, cells)</td>
<td>Beginning ID : Ending ID</td>
</tr>
<tr>
<td>One unit (column, row, cell)</td>
<td>Beginning ID</td>
</tr>
<tr>
<td>Specified unit through End</td>
<td>Beginning ID :</td>
</tr>
<tr>
<td>HOME through the specified cell</td>
<td>: Ending ID</td>
</tr>
<tr>
<td>All cells</td>
<td>:</td>
</tr>
<tr>
<td>Global</td>
<td>0 (Zero)</td>
</tr>
<tr>
<td>Default for current cell</td>
<td>&lt;Enter&gt; or &lt;Ctrl&gt; + &lt;M&gt;</td>
</tr>
<tr>
<td>Default for current column</td>
<td>Up/Down Arrow Keys</td>
</tr>
<tr>
<td>Default for current row</td>
<td>Left/Right Arrow Keys</td>
</tr>
<tr>
<td>Default for global range</td>
<td>Any PF Key</td>
</tr>
</tbody>
</table>
**B.2 | Formats**

" Format left justified
' Format right justified
^ Format centered
[,]n Comma - n decimals
H Hidden - nothing displayed
$n Currency - n decimals
E[n] Scientific - n mantissa digits
BOFF/ON Binary with off and on codes
BSTOP/RUN Binary with stop and run codes
G[n] General format - n decimals
F[n] Fixed format - n decimals
Z[n] Suppress “0” - n decimals
F[n1,n2] Fixed (n1 digits, n2 decimals)
C Left justified for DTXT (acronym)

**B.3 | Date and Time**

D[string]

<table>
<thead>
<tr>
<th>String</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>YY</td>
<td>Two digit year</td>
</tr>
<tr>
<td>YYYY</td>
<td>Four digit year</td>
</tr>
<tr>
<td>MM/DD</td>
<td>Two digit month / day</td>
</tr>
<tr>
<td>MMM/DDD</td>
<td>Three to nine characters, month / day</td>
</tr>
</tbody>
</table>

T[string]

<table>
<thead>
<tr>
<th>String</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH or 24</td>
<td>Two digit military hour</td>
</tr>
<tr>
<td>12</td>
<td>Two digit civilian hour</td>
</tr>
<tr>
<td>MM</td>
<td>Two digit minute</td>
</tr>
<tr>
<td>SS</td>
<td>Two digit second</td>
</tr>
<tr>
<td>AM or PM</td>
<td>Two characters, day/night</td>
</tr>
</tbody>
</table>
Appendix C

Variables and Functions

The following topics are detailed in this appendix:

- Literals
- Operators
- Variables
- Math
- Range
- Database
- History
- External Value
- Data Output
C.1 | Literals

Numeric constants.

C.2 | Operators

+ - * /  Arithmetic elements
+ -  Unary plus and minus

C.3 | Variables

ADAT  Date cell was created
ATIM  Time cell was created
CDAT  Date cell was produced
CTIM  Time cell was produced
CHRS  Cell history interval (hours)
EDAT  Ending date of interval

C.4 | Math

ABS  Absolute value
ATN  Arctangent
COS  Cosine
EXP  Exponential
INT  Truncate
LOG  Natural logarithm
MAX  Maximum of two values
MIN  Minimum of two values
MOD  Modulo
RND  Round to nearest integer
SIN  Sine
SQR  Square root
TAN  Tangent
C.5 | Range

- **RMAX**: Maximum range value
- **RMIN**: Minimum range value
- **RAVG**: Average range value
- **RSUM**: Sum of range value
- **RMAXI**: Row with maximum range value
- **RMNI**: Row with minimum range value
- **TDIF**: Time difference

C.6 | Database

- **DVAL**: Current point value
- **DSTS**: Current point status
- **DTXT**: Current value of text points

C.7 | History

- **HAVG**: Average over the interval
- **HMAX**: Maximum in interval
- **HMIN**: Minimum in interval
- **HSV**: Value at interval start
- **HEV**: Value at end of interval
- **HTMX**: Time of maximum
- **HTMN**: Time of minimum
- **HDMX**: Date of maximum
- **HDMN**: Date of minimum
- **HCNT**: Changes per interval
- **HINT**: Totalization
- **HDIF**: Difference over the interval
- **HS**: Time ON, nth occurrence
- **HOS**: Time OFF, nth occurrence
- **HDON**: Date ON, nth occurrence
- **HDOF**: Date OFF, nth occurrence
- **HVAL**: Value at specified date and time
C.8 | External Value

XVAL  Reference from other report
RSEL  Select replacement value

C.9 | Data Output

CHV  Change value of a database point
To get the runtime for a unit in hours (for whatever history interval applies to the cell), take the time average of a On/Off Status Point and multiply by the number of hours in the history interval. For example:

\[ \text{HAVG(PS1-PMP1-SS)} \times \text{CHRS} \]

For water flow in DSF for one day

To get the number of days in a history interval (usually an intermediate step), round-off the quantity CHRS/24. This gives the accurate number of days even if a daylight savings time switch takes place during the interval. For example:

\[ \text{RND(CHRS/24)} \]

For total MWH (megawatt hours) from an ANALOG MW rate point, multiply the MW by the hours. For example:

\[ \text{HAVG(CH1-PMP1-MW)} \times \text{CHRS} \]

For total MWH from a COUNTER MW rate point, if the counter point resets each hour (flow point with time interval 1H, RATE/UNIT H):

1. Take the HAVG of the counter point over the interval desired times the hours. Since the counter updates only once an hour, this will actually give the MWH starting one hour BEFORE the start of the desired time interval and ending one hour before the end of the desired interval.

2. Subtract the MWH for the hour before the start of the right time interval, i.e., the counter points' value during the first hour of the right time interval.
3. Add the MWH for the last hour of the right time interval, that is the counter points’ value during the first hour after the right interval. All this can be done with hidden cells for the three values aforementioned. A visible cell would be: hidden cell (a.) minus hidden cell (b.) plus hidden cell (c.). For example:

MWH for ST1 PUMP 1 for last month:
- In cell C20, Format H
  - History: MOYR/-1MO/1MO
  - Function: HAVG(ST1-PMP1-MWH) * CHRS
- In cell D20, Format H
  - History: MOYR/-1MO/5MN - an interval five minutes long
  - Function: HEVL(ST1-PMP1-MWH) - value at end of interval
- In cell E20, Format H
  - History: MOYR//5MN - first five minutes of this month
  - Function: HEVL(ST1-PMP1-MWH)
- In cell F20, Format F1
  - History: N/A
  - Function: C20+D20+E20 - corrected MWH

- RSUM — an issue when adding up Range Values
  If the values in the cells contain more significant figures than are displayed in the cells, the LSD (least significant digit) of the result may be one more /less than the result if the visible figures were added up by hand, because of rounding (the computer includes the invisible digits in its calculation).

- RMAX — an issue when taking Range Maximums
  If the values in the cells contain more significant figures than are displayed and two cells are displaying the same greatest number, the second cell may really be greater than the first. Therefore, the second cell will show up as greater, while it is usually preferred that the first cell should show greater