GFK-0641

GE Fanuc Manual Series 90-30

CIMPLICITY 90-ADS Alphanumeric Display System
Reference Manual

GE Fanuc Automation

Programmable Control Products

CIMPLICITY® 90-ADS
Alphanumeric Display System

Reference Manual

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Warnings, Cautions, and Notes as Used in this Publication

Warning

Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

Caution notices are used where equipment might be damaged if care is not taken.

Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

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Preface

Content of this Manual

This manual provides reference information for the CIMPLICITY® 90-ADS Alphanumeric Display System that you will need to build a custom operator interface system for the Series 90-70 or Series 90-30 (Model 331 or Model 341) Programmable Logic Controller. The CIMPLICITY 90-ADS software runs on the Alphanumeric Display Coprocessor (ADC) module, and communicates over the Series 90-70 or Series 90-30 PLC's backplane to monitor and optionally modify data tables in the PLC.

Before using this reference manual to build an operator interface system you should read GFK-0499, the CIMPLICITY 90-ADS User's manual. That manual contains the information you need on how to install the ADC module, select and setup the computer and terminal you will be using, install the ADS software on your computer and download it to the ADC module, view the demonstration systems, and walk through the development tutorial.

Revisions to This Manual

Appropriate changes have been made to this manual to reflect the features of Release 4.01 of the CIMPLICITY 90-ADS Alphanumeric Display System. Additionally, corrections have been made where necessary. Following is a list of the revisions to this manual as compared to the previous version (GFK-0641).

- *Page 1-3, added LUDCO.TBL to list of valid settings for terminal module.*
- *Page 1-4, added TTY.TBL to list of valid settings for printer module.*
- *Page 2-2, changed README.251 to README.401 in second paragraph under "Entering the ADS Builder Program".*
- *Page 2-3, added note at bottom of page.*
- *Page 2-5, Revised column 4 of Table 2-1.*
- *Page 2-6, changed README.251 to README.401 in fourth paragraph.*
- *Page 3-3, added LUDCO... to list of terminals.*
- *Page 3-29, added third sentence to CAUTION.*
- *Page 6-7, added LUDCO after VT100 in column 1.*
- *Page 6-10, changed content of items i - 5 in the list.*
- *Page 6-11, added items 5 and 6 to list and added new paragraph after the list.*
- *Page 9-1, added"Refresh System in RAM and Execute System in RAM" to first sentence in third paragraph.*
- *Chapter 9, added Section 7, "Refresh System in RAM" and Section 8, "Execute System in RAM".*

- *Page 12-1, in item 1 of the list, deleted end of sentence beginning with "as COM1..." and added "appropriately". Deleted item 2 from list.*
- *Page 12-2, last paragraph, second sentence - changed "your computer's TERMF" to "the target terminal's". Added "If your system..." to beginning of third sentence.*
- *Added new Chapter 13, Options - PID.*
- *Former Chapter 13 is now Chapter 14.*
- *Former Chapter 14 is now Chapter 15.*
- *Former Chapter 15 is now Chapter 16.*
- *Page 16-1, added sentence beginning with "Also, refer to ..." at end of paragraph under "Overview of the PID Module".*
- *Page 16-3, added NOTE after first paragraph. Deleted "(see Appendix ...)" at end of item 3 in list.*
- *Page 16-4, Added NOTE after first paragraph under "Setup Screen".*
- *Page A-1, added LUDCO and TTY to "ADS Menu Screen Items".*
- *Page A-2, added LUDCO to list of terminals under "Modify System Parameters".*
- *Page A-9, changed several entries in column 4.*

Content of this Manual

This manual contains the following information:

Chapter 1. ADS Main Menu describes the ADS menu screen which allows you to select either the ADS Builder (create or modify a system) or the ADS Executor (execute an existing system).

Chapter 2. Introduction to Using the ADS Builder provides a description of components of an ADS system and how to begin using the system.

Chapters 3 through 10 describe the various submenus that you will use when creating an Operator Interface System and guide you through the entries for each operation.

Chapter 3. Configuration Operations

Chapter 4. Screen Operations

Chapter 5. Report Operations

Chapter 6. Screen Painter and Report Painter

Chapter 7. Dynamic Objects

Chapter 8. Alarm Operations

Chapter 9. Load/Save Operations Using ADS Builder on ADC Module

Chapter 10. Print System Summary

Chapter 11. Exiting the ADS Builder describes how to exit the ADS Builder after building or modifying a system.

Chapter 12. Terminal (ADS Offline PC-Based Builder Only)

Chapter 13. Options - PID describes how you can configure a PID module through the Options PID menu without the need to use the PID option module's built-in setup screen.

Chapter 14. Running an ADS System: Starting the ADS Execution describes how a system is executed, once it has been built with the ADS Builder, using the ADS Executor software. It explains what you can expect when viewing data on the screen and how alarms are handled during system execution.

Chapter 15. Fault Tables Module describes the optional PLC and I/O Fault Tables software module which you can access from the ADS main menu.

Chapter 16. PID Templates Module describes the optional PID Templates software module which you can access from the ADS main menu.

Appendix A. CIMPLICITY 90-ADS System Builder Guide provides a quick reference to the ADS system setup parameters and parameter requirements for building an Operator Interface System. A Key Functions pullout card provides a convenient listing of the CIMPLICITY 90-ADS key functions.

Related Publications:

GFK-0499: CIMPLICITY™ 90-ADS Alphanumeric Display System User's Manual. Explains how to install the ADC module in a Series 90-30 or 90-70 PLC and download the ADS software onto the module. Also included is information about the demonstration systems which let you view the ADS system capabilities and a development tutorial which walks you through development of an example operator interface system.

GFK-0255: Series 90™ Programmable Coprocessor Module and Support Software User's Manual. Provides information required for configuration, programming and operation of the Series 90 Programmable Coprocessor Module (PCM).

GFK-0262: Series 90™-70 Programmable Controller Installation Manual. Provides the information required for system planning and installation. Describes the hardware components of a system and system configuration, and provides installation and field wiring information for planning purposes and actual system installation.

GFK-0401: Workmaster® II PLC Programming Unit Guide to Operation. Describes installation and operation of the Workmaster II computer, specifically when used as the programming device for a Series 90 Programmable Logic Controller.

GFK-0263: Logicmaster™ 90 Programming Software User's Manual. Explains how to use the Logicmaster 90 software to configure the Series 90-70 Programmable Logic Controller and create application programs.

GFK-0265: Series 90™-70 Programmable Controller Reference Manual. Describes the programming instructions used to create application programs for the Series 90-70 Programmable Logic Controller. Provides fault explanations and corrections, and contains CPU operation and performance data.

GFK-0466: Logicmaster™ 90-30 Programming Software User's Manual. Explains how to use the Logicmaster 90-30 software to configure the Series 90-30 Programmable Logic Controller and create application programs.

GFK-0467: Series 90™-30/90-20 Programmable Controller Reference Manual. Describes the programming instructions used to create application programs for the Series 90-30 Programmable Logic Controller.

GFK-0487: Series 90™ Programmable Coprocessor Reference Manual. Describes how to use the PCM programmer software (PCOP) and provides details for developing applications for the PCM.

GFK-0505: Operator Interface Terminal (OIT). Explains how to install, startup, and program the OIT.

GFK-0361: Operator Interface Terminal, Mini OIT Supplement. Explains how to power up, operate, and configure the Mini OIT.

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Henry A. Konat
Senior Technical Writer

Chapter 1 ADS Main Menu

When the ADS *development environment* is loaded onto the ADC module, and the module is either soft reset, or the rack the module resides in is power cycled, or the Series 90-70 PLC main rack containing the CPU module is power cycled, the ADS menu screen is displayed. The ADS menu screen allows you to switch between running the *ADS Builder* to create or modify a system and the *ADS Executor* to execute an existing system. This screen also allows you to run any of the items which are currently installed. Any of the items: ADS Builder, ADS Executor, Fault Tables, or PID may or may not be installed. If an item is installed, "Loaded" will be displayed next to that entry; items not installed will have "Not Loaded" displayed next to that entry.

Filling-in the ADS Main Menu

The following example is the ADS menu screen that you will interact with. Note that in this example the ADS Builder and Executor are both shown as being Loaded.

```
          C I M P L I C I T Y (tm)  9 0  -  A D S
                       Version 3.01
COPYRIGHT 1989-1992   GE FANUC AUTOMATION, NORTH AMERICA, INC.
          Prepared for GE Fanuc Automation by
 Control Systems International Pty. Ltd.  -  Perth, Australia

     1.  Run ADS Builder                 : Loaded

     2.  Run ADS Executor                : Loaded

     3.  Set default system name         :

     4.  Set default terminal module     :

     5.  Set default printer module      :

     6.  Run ADS Fault                   : Not loaded

     7.  Run ADS PID                     : Not loaded

        Enter item number [1-7, 9 to exit] :
```

Required User Entries

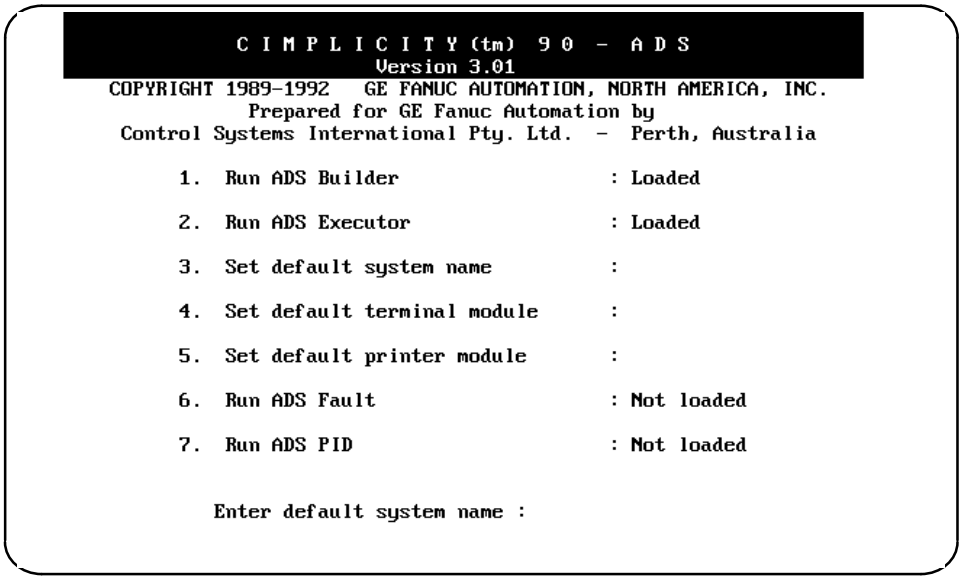
While in this screen, you must define and make the following entries on the menu:

- *system name*
- *terminal module*
- *printer module*

Note that these entries correspond to what must be defined by you in order to load the ADS *Execute-Only* environment onto the ADC module.

Selecting a Menu Entry

To select a menu entry to fill in, simply press the numeric key corresponding to the entry and then press the [Enter] key. At that point the ADS menu program will prompt you for the needed information. For example, to define a system name of PUNCH, press the key sequence [3] [Enter].



Next, at the prompt for the default system name, type in the name you have selected for the system which in this example is PUNCH. PUNCH may either be a new or an existing system (see Chapter 3, Section 1 for a discussion of valid system names).

```
C I M P L I C I T Y (tm)  9 0  -  A D S
                Version 3.01
COPYRIGHT 1989-1992   GE FANUC AUTOMATION, NORTH AMERICA, INC.
          Prepared for GE Fanuc Automation by
 Control Systems International Pty. Ltd.  -  Perth, Australia

     1.  Run ADS Builder                 : Loaded

     2.  Run ADS Executor                : Loaded

     3.  Set default system name         :

     4.  Set default terminal module     :

     5.  Set default printer module      :

     6.  Run ADS Fault                   : Not loaded

     7.  Run ADS PID                     : Not loaded

        Enter default system name : PUNCH
```

Pressing the [Enter] key completes the system name entry. The system name PUNCH is now displayed on the menu screen. Until the system name entry is changed, running either the ADS Builder or the ADS Executor will automatically cause the system named PUNCH to be accessed.

```
C I M P L I C I T Y (tm)  9 0  -  A D S
                Version 3.01
COPYRIGHT 1989-1992   GE FANUC AUTOMATION, NORTH AMERICA, INC.
          Prepared for GE Fanuc Automation by
 Control Systems International Pty. Ltd.  -  Perth, Australia

     1.  Run ADS Builder                 : Loaded

     2.  Run ADS Executor                : Loaded

     3.  Set default system name         : PUNCH

     4.  Set default terminal module     :

     5.  Set default printer module      :

     6.  Run ADS Fault                   : Not loaded

     7.  Run ADS PID                     : Not loaded

        Enter item number [1-7, 9 to exit] :
```

For a more detailed discussion of how the ADS Builder and Executor determine where to find the indicated system, refer to Section 1, Load System, of Load / Save Operations, located in Chapter 9.

The entries for items 4 and 5 (terminal module and printer module) are filled in similar to the system name - with the exception that entries are not arbitrarily selected; specific defined valid entries must be made. You should choose the terminal table that matches the one the software is being run on now, not the intended target terminal (except in the

case of using the mini or touch mini OIT, these are generally one and the same). For example, if you are going to access the Builder (menu choice 1) on a GE Fanuc Workmaster II, but the target terminal is a Touch Mini, you would specify MIBM; to execute the system on the touch mini (menu choice 2), you would specify TMINI. Valid settings for item 4, terminal module, are:

- *COIT.TBL - Color GE Fanuc Operator Interface Terminal: (IC600KD512/514, 532/534);*
- *MOIT.TBL - Monochrome GE Fanuc Operator Interface Terminal: (IC600KD510/513, 530/533)*
- *MINI.TBL - Mini GE Fanuc Operator Interface Terminal (monochrome only): IC600KD515*
- *TMINI.TBL - Touch mini OIT (monochrome only): IC600KD516*
- *VT100.TBL - VT100 compatible, or superset, terminal*
- *MIBM.TBL - Monochrome IBM compatible personal computer running TERMF*
- *CIBM.TBL - Color IBM compatible personal computer running TERMF*
- *TCOIT.TBL - color OptiTOUCH screen terminal from Nematron*
- *TMOIT.TBL - monochrome OptiTOUCH screen terminal from Nematron*
- *LUDCO.TBL - Lucas Deeco ST-2200*

Note

Neither the ADS Menu Program, the ADS Builder, or the PID module may be run on the Mini OIT. Only the execution of a system built using another type of terminal can be run on the Mini OIT. When building a system, you must be careful to create screens which are sized to fit within a 15 line by 80 character display when using a Mini OIT.

The valid settings for item 5, printer module, are:

- *ASCII.TBL - Generic ASCII character printer;*
- *TTY.TBL - Generic ASCII Teletype character printer (no form feed support);*
- *EPSON.TBL - Epson printer;*
- *PCNEC.TBL - NEC printer;*
- *LA100.TBL - DEC LA100 printer (or compatible).*

Specification of the .TBL extension is optional; the ADS menu program will automatically fill in the .TBL extension for any of the entries if it is not specified.

The user selections of the above items (system name, terminal module, and printer module) are automatically saved to the file MENU.DAT on the ADC board. This allows these options to be held across system runs and board resets.

Executor Debug Mode

The Executor may be invoked while in debug mode during the system development cycle, if desired. Pressing the [Ctrl-X] key will cause the debug mode to toggle on / off; when *on* a <debug> indicator will be displayed next to the Executor menu option. With debug mode enabled, the Executor will display error messages at the bottom of the display screen anytime it is unable to execute a particular command. For example, pressing a function key to which a command to remove an alarm page is attached will display an error message if the alarm page is not actually displayed. If debug mode is turned off, the above situation is handled visually as a no operation (which is actually the desired effect).

Exiting the ADS Main Menu

Exit from the ADS menu program is done by selecting item number 9. Upon exiting (which takes 1 to 2 seconds on a Series 90-70 ADC, or 10 to 20 seconds on a Series 90-30 ADC), communications may be re-established with a computer running TERMF **without** needing to hard reset the ADC module. This is particularly useful if the IBM PC-based Builder is being used rather than the ADC - based Builder. Refer to Chapter 8, in the ADS User's Manual, for more detailed information on using the IBM PC-based Builder.

Chapter 2 Introduction to Using the ADS Builder

The ADS Builder software allows you to create and modify a custom operator interface system. The ADC-based ADS Builder can only be accessed through the ADS Menu program which is only available when the ADS Development environment is installed on the ADC module. This chapter provides a description of the major components of an ADS system and how they tie together and interact to form a system. The steps required to build an operator interface system are also described.

Components of an ADS System

The following figure illustrates the major components and interconnections of an ADS system. A system is composed of one or more *screens*. *Dynamic objects* may be defined on a screen; these objects will be animated when the system is executed. Dynamic object animation may be changing display attributes (e.g., reverse video, blue, etc.), movement, value display or a combination of one or more attributes.

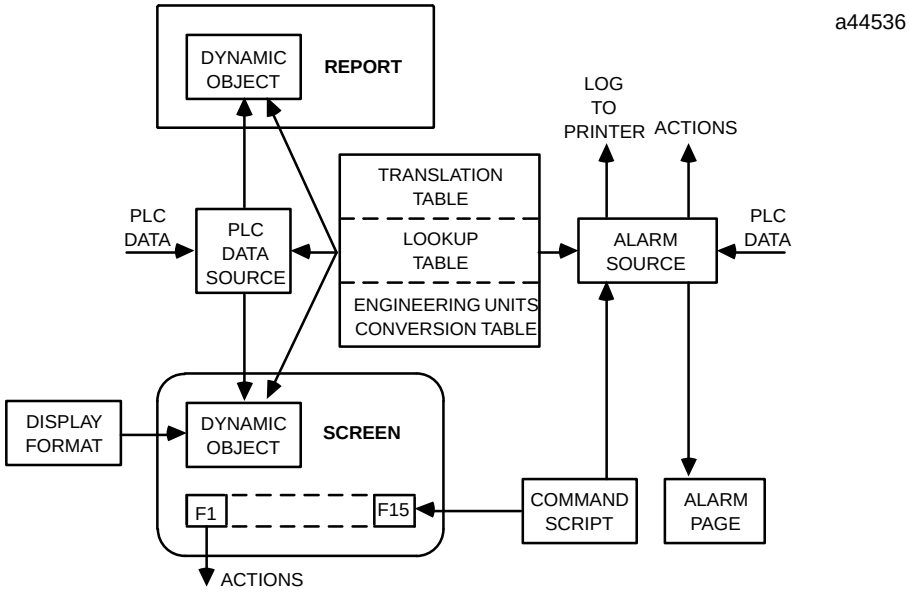


Figure 2-1. ADS System - Major Components and Interconnections

The data used to determine a dynamic object's animation is supplied by a *data source*. A data source controls the access of data from the PLC's memory, including the type of

data (e.g., signed word, etc.), which memory the data comes from, and how frequently it should be gathered. Optionally, the data source's data may be scaled. The data source associated with a dynamic object may be changed at run time using the ATTACH command. *Translation table* entries provide for linear scaling, offsetting, and data type conversion. *Lookup table* entries provide for non-linear scaling and data type conversions (e.g., signed word to string, etc.). *Engineering Unit Conversion table* entries provide for converting a value to engineering units with optional data type conversion. Translation table, lookup table, and engineering unit conversion entries may be used multiple times. The translation, lookup or engineering unit conversion table entries associated with a dynamic object may be changed at run time using the ATTACH command. Since a single data source may be used to animate multiple dynamic objects, the ability is provided to apply scaling directly to the dynamic object to support those cases where the same data must be handled in different forms in different places in the system.

Based on a particular value, the *display format* provides an optional capability to affect a dynamic object's display attributes and movement. A display format may be used with multiple dynamic objects.

Each screen may have up to fifteen user-defined function keys associated with it. Pressing a function key results in some action being taken. This action may be to display a different screen, change a value in a PLC memory, prompt the operator for some action, etc. A *command script* can be attached to a function key when multiple actions are desired as the result of a single key being pressed. A single command script may be used multiple times.

Reports are very similar to screens, except that no function keys are provided and dynamic object animation is restricted to value display. Reports are used to output formatted information to a printer.

An *alarm source* controls the access of data from the PLC's memory for the purpose of detecting a transition of the data into one of up to four predefined alarm ranges. When a particular alarm source transitions into an alarm state, a number of options may be specified.

The occurrence of the alarm may be logged to a printer, including a timestamp of when it occurred. One or more actions (e.g., display a new screen, issue a report, etc.) may be triggered; a command script may be used for defining multiple actions. Alarms may also be logged to one or more *alarm pages*. Alarm pages provide a mechanism which allows you to view and optionally acknowledge alarms.

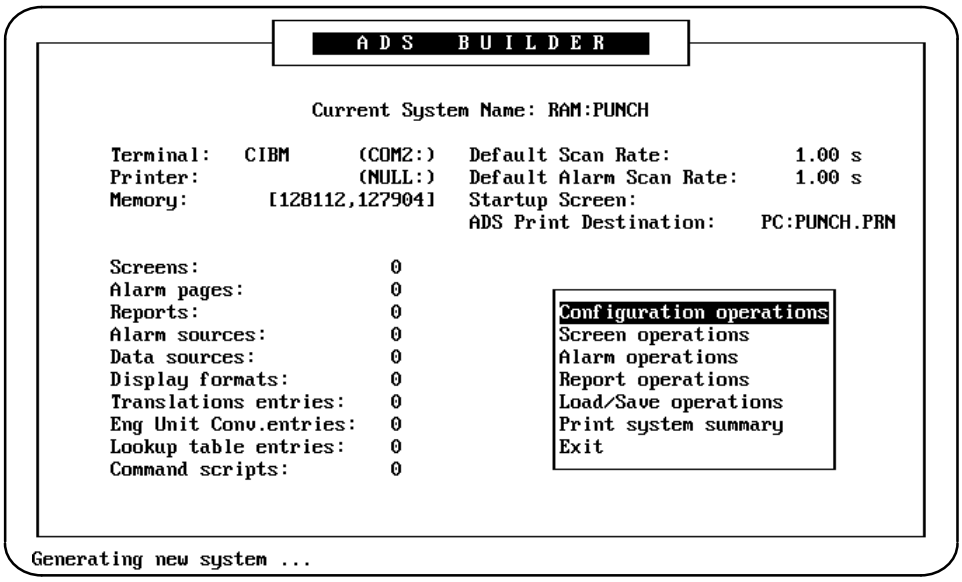
Entering the ADS Builder Program

Two versions of the ADS Builder program are available; the ADC version and an IBM PC version.

You are strongly encouraged to use the PC-based Builder whenever possible as you will typically find it easier to use overall. Refer to chapter 8 in the ADS User's Manual, GFK-0499, for details on the most efficient ways to use the PC-based Builder. Before using the ADC-based Builder you should refer to the section under the heading "Managing the Builder's Memory" later in this chapter. That discussion will also refer to the file README.401 which can be found in the \PCOP\ADS.PCM directory of the hard disk on which you installed the ADS software.

Throughout this chapter comments specific to the IBM PC version will be added. When either version of the Builder is first entered a copyright screen is displayed. While this

screen is displayed, in order to proceed with the Builder, you must press the [Enter] key. After the [Enter] key is pressed the following main menu screen will be displayed (for the ADC version).



To access the IBM PC-based Builder, issue the following command at the DOS prompt:

ADSBUILD <system_name> (<system_path>)

where:

<system_name>	is a valid ADS system name (1-5 alphanumeric and underscore characters).
<system_path>	is the optional complete path specification for where the ADS system may be found.

If the <system_path> specification is not provided, the system will be loaded in a PCM-compatible folder of the same name as the system, beneath the \ADS_PC directory (the folder will automatically be created if it does not exist).

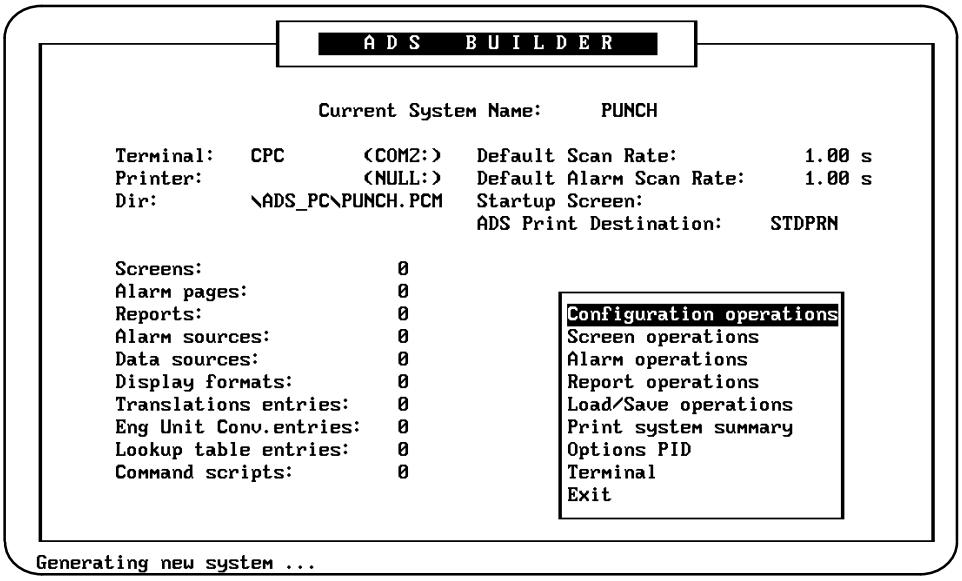
Note

It is recommended that each system be kept in a separate PCM folder. This will be done automatically by the system if you do not specify the <system_path> parameter. Refer to Chapter 8 in the CIMPLICITY 90-ADS Alphanumeric Display System User's Manual, GFK-0499, for more details.

Note

See Chapters 8 and 11 in the CIMPLICITY 90-ADS Alphanumeric Display System User's Manual, GFK-0499, for information on using the Operator Interface Products Menu to access the PC-Based Builder.

For the IBM PC-based version, the following main menu screen will be displayed.



Choosing Items From a Menu

The ADS Builder is organized as a simple pick and choose menu system. When a menu is displayed you can either use the [ ] and [–] keys to select the desired option and then press the [Enter] key, or you can press the key corresponding to the first character of the first word of the desired menu option.

In some cases the selection of a menu option will result in another menu of additional options being displayed. This menu will appear as a separate box or window which will overlay the current menu. When this happens, it indicates that you have progressed *down* a level in the menu tree. In other cases the selection of a menu option will result in the display of a data entry form which you will need to fill out. On data entry forms you proceed from field to field by either pressing the [–] or [Enter] key to select the next field or by pressing the [ ] key to select the previous field. Pressing the [Enter] key when the last field of a form is selected will complete the form.

Note that the [Enter] key may be labeled [Return] on some keyboards; for keyboards with a second [Enter] key located in the numeric keypad area, only the [Enter] key located with the QWERTY keys should be used. Pressing the <Save> key from *any field* immediately completes the form (if all required fields have been filled in). The <Quit> key may be used to return to a *higher* menu level or to abort the data entry form.

Use of [ ] and < > Characters with Key Names

The [ ] and < > character pairs have special meaning in this document when used to indicatekeys.

If a key name is enclosed in brackets ([ ]) the key is actually labeled with that name on the keyboard. If a key name is enclosed by angle brackets (< >) the key's location on the keyboard must be determined from the following table. When using this table be sure to use the column that matches your terminal type (based on terminal selection that you made on the menu program screen described in Chapter 1).

Table 2-1. Key Functions for System Building

Key Function	Terminal		
	MOIT/COIT TMOIT/TCOIT MIBM/CIBM†	VT100	MPC/CPC EIBM/VIBM‡
GOLD	F11	PF1	Insert
Help	F12	PF2	Home
Quit	F10	KP0	Esc or F10
Save	GOLD F10	GOLD KP0	Alt-F10
Object list	GOLD S	GOLD S	Alt-S
Refresh screen	^W	^W	^W
Clear field	^X	^X	^X
Beginning of line	GOLD ←	GOLD ←	GOLD ←
End of line	GOLD →	GOLD →	GOLD →
Top of screen	GOLD ↑	GOLD ↑	GOLD ↑
Bottom of screen	GOLD ↓	GOLD ↓	GOLD ↓
Video select	F1	KP1	F1
Video clear	GOLD F1	GOLD KP1	Alt-F1
Color Black, red, green, Yellow, Blue, Magenta, Cyan, White	F4	KP4	F4
Character set Normal, Alternate Set, Character Set 2, Character Set 3	GOLD F4	GOLD KP4	Alt-F4
Double wide	GOLD W	GOLD W	Alt-W
Double size	GOLD D	GOLD D	Alt-D
Draw toggle (non-rectangular objects or lines)	GOLD F5	GOLD KP5	Alt-F5
Draw area (rectangular and straight lines)	F5	KP5	F5
Delete line	F14	PF4	End
Undelete line	GOLD F14	GOLD PF4	GOLD End
Select toggle	F3	KP3	F3
Cut area	F6	KP6	F6
Paste area	GOLD F6	GOLD KP6	Alt-F6
Start dynamic / predefined object	GOLD F7	GOLD KP7	Alt-F7
End dynamic object	F7	KP7	F7
End predefined objects	GOLD F2	GOLD KP2	Alt-F2
Delete dynamic object	GOLD F8	GOLD KP8	Alt-F8
Modify dynamic object	F8	KP8	F8
Copy dynamic object	F9	KP9	F9
Paste dynamic object	GOLD F9	GOLD KP9	Alt-F9
Touch screen grid	F13	PF3	Delete
Touch screen assignments	GOLD F13	GOLD PF3	GOLD Delete

† Num Lock must be set to OFF for 83-key keyboard; F11 and F12 keys on the enhanced AT and PS / 2 style keyboards cannot be used (use SHIFT-F1 and SHIFT-F2).
‡ The MPC, CPC, EIBM, and VIBM terminal tables are used for the PC-based Builder only.

1. Keys marked as Alt-x refer to the appropriate alternate key (Alt key held down while simultaneously pressing the appropriate key).
2. Keys marked as ^x refer to the appropriate control key (Ctrl key held down while simultaneously pressing the appropriate key).
3. Keys marked as GOLD xxx refer to the two-key sequence of the GOLD key followed by the appropriate key.

Managing the Builder's Memory

The ADS Builder makes all changes to a system in a work space, not affecting the original system until the changes are saved. Screens and reports, due to their size, are only loaded into the work space when you reference them. As more and more screens and reports are created and / or modified, the ADS Builder may run out of memory in its work space to make any additional changes. In the ADC-based Builder, available memory is displayed at the top of the screen next to the entry *Memory:*. Two numbers are shown. The first number indicates the total bytes remaining unused on the ADC module and the second indicates the size of the largest contiguous block of bytes remaining unused. If insufficient memory is available, an error message will be displayed informing you of the situation.

It is recommended that as you see total available memory shrink to below 60,000 bytes or the largest block available shrink below 25,000 bytes, the system be saved to avoid the potential loss of subsequent changes. In saving a system the ADS Builder empties its work space of all screens and reports, thereby freeing up memory to allow you to continue.

In addition, it is good practice to make frequent saves of the ADS Builder's work space to minimize the potential loss of data due to a power failure. Periodic archives of a system to a host computer is also recommended.

Additional information concerning managing the memory of the ADC module can be found in the file \PCOP\ADS.PCM\README.401 which was installed on your computer's hard disk as part of the ADS installation procedure.

Errors Loading Screens and Reports

Caution

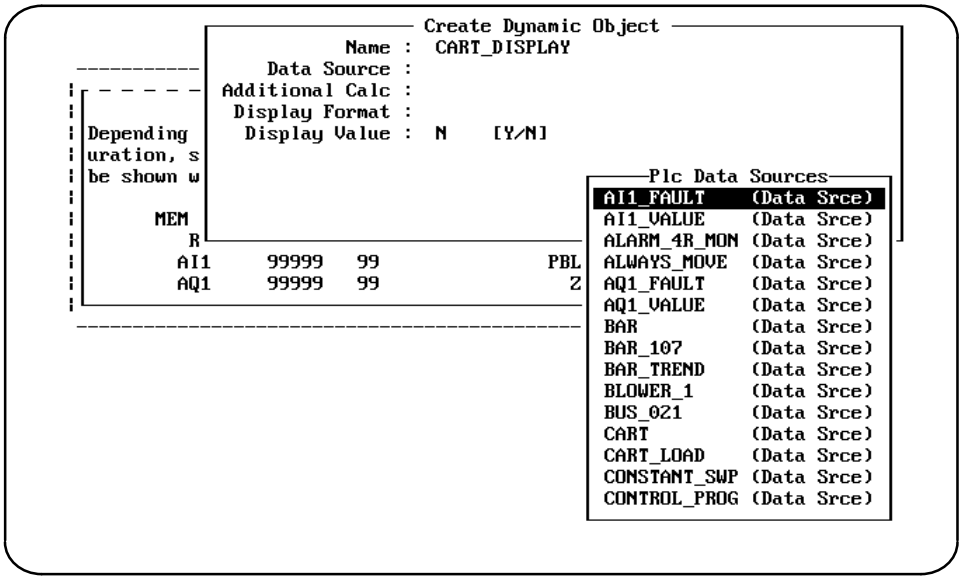
The ADS Builder does NOT check to see if items such as display formats and command scripts are used anywhere in the system prior to performing a user directed delete operation for one of those items. Precautions should be taken to make sure that an item is not referenced any longer before deleting it.

If such a situation occurs, attempting to load a screen or report referencing the deleted item will result in an error message such as Error loading ... or Error verifying ... the given screen or report file. For example, if you attempt to access such a screen via the *Screen paint* submenu option on the *Screen operations* menu, an error message will be displayed and you will not initially be allowed into the screen / report editor. However, the ADS Builder will show the screen as being loaded into its working memory (an asterisk (*) character will be displayed to the right of the screen number in the status area). Attempting to access the screen / report editor a second time for that screen will succeed. Be sure to check all function key assignments and dynamic object definitions to look for references to a previously deleted item. If a problem is found either the offending references must be deleted or the item recreated to correct the problem.

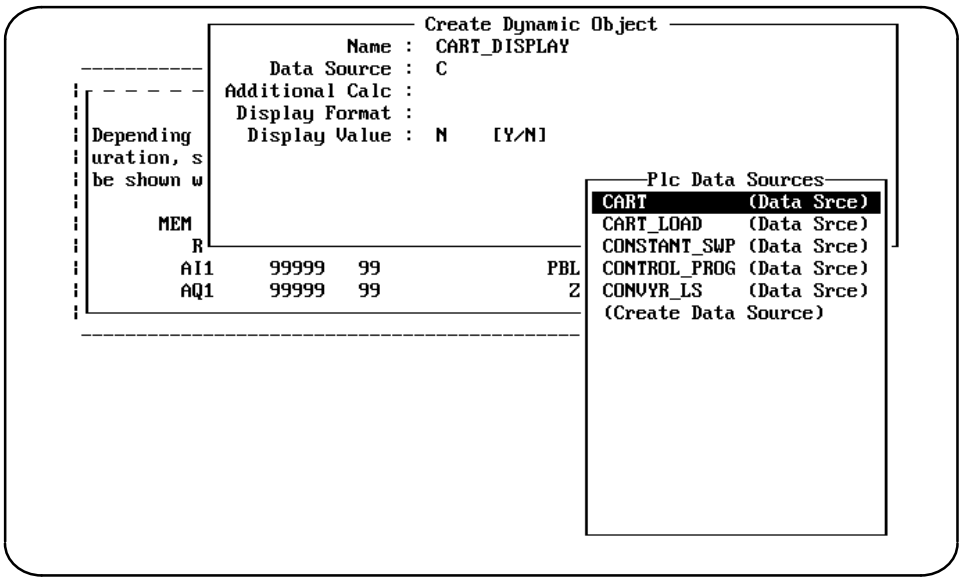
Object Lists

Throughout the Builder you will be able to take advantage of what is called the ”object list”functionality. In general, whenever you are defining an object or filling out a form where you need to reference another, possibly existing, object, you can obtain a list of the relevant existing objects and choose the desired one from the list.

As an example, in the screen below a dynamic object, CART_DISPLAY, is being created. A data source (a type of ”primitive” object) must be referenced or created to be used to animate the dynamic object. Pressing the <object list> key with a blank entry for the ”Data Source” field would result in a window being opened on the screen listing all of the existing data sources.



Alternatively, if you knew that the data source you wished to reference began with the letter "C", you could type that letter into the "Data Source" field prior to pressing the <object list> key. The same window would be opened on the screen, but this time only those data sources beginning with the letter "C" are listed. The option of creating a new data source is also provided.



The [ ] and [–] keys can be used to scroll through the list of objects; the object currently displayed in reverse video is called the current object. Pressing the [Enter] key selects the current object for use; the window is automatically closed when an entry is selected. Pressing the <Quit> key closes the window without selecting any object.

The keys that are available when an object list window is open on the screen are summarized in the table below.

Key	Function
↑	previous entry
↓	next entry
<GOLD> ↑	previous page of entries
<GOLD> ↓	next page of entries
<GOLD> [T]	top of list
<GOLD> [B]	bottom of list
[Enter]	select current entry and close window
<Quit>	close window with no entry selected

Note

Extensive context sensitive help is available in the ADS Builder. Use the <HELP> key to access the help information related to any point in the builder.

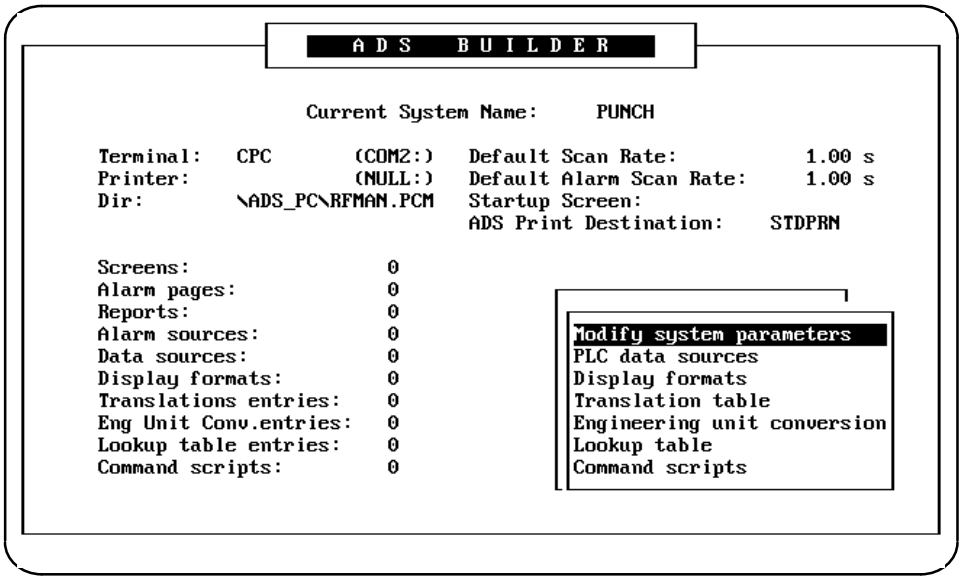
Chapter 3 Configuration Operations

This chapter describes the Configuration operations submenu.

When the *Configuration operations* submenu is selected, the following example screen is displayed. Another menu window is opened on the screen, giving additional options of

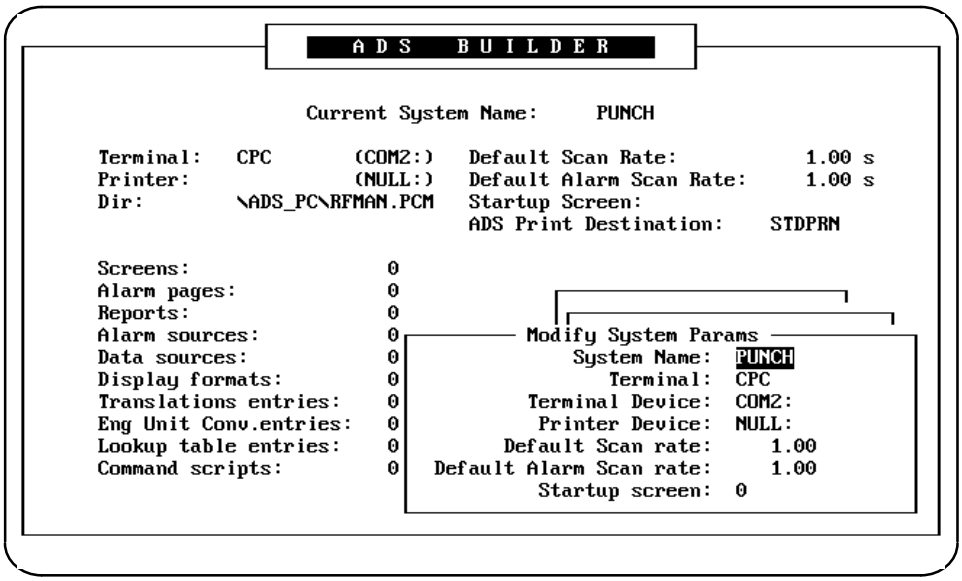
- *Modify system parameters*
- *PLC data sources*
- *Display formats*
- *Translation table*
- *Eng unit conversion table*
- *Lookup table*
- *Command scripts*

This chapter is divided into sections, with each section describing one of the options for the Configuration Operations. Note that in most cases, only the initial screen will be shown for each submenu since the general format for each one is similar. Each of the options from each submenu will be described in the text. Any unique screens will also be shown.



Section 1: Modify System Parameters

When the *Modify system parameters* option is selected, a data entry window is opened containing seven fields which may be set by the user: *System Name, Terminal, Terminal Device, Printer Device, Default Scan rate, Default Alarm Scan rate, and Startup screen.*



System Name

When a new system is created, it is assigned the default name specified on the ADS Menu program screen. A system name can be from one to five alphanumeric and underscore (_) characters in length; the name is NOT case sensitive. The system name is used in the generation of the names of the files making up the system; a unique name relevant to your application should be used for a new system. If a non-unique system name is chosen, the ADS software will NOT warn you of that fact; the original system will be irretrievably lost when a subsequent system save operation is performed. The next example screen assumes that the system name is set to DRILL.

To set the system name type in the desired name of the system, DRILL, overwriting the default name in the reverse video block. To complete the entry, press the [Enter] key. Note that after the [Enter] key is pressed the next field, *Terminal*, is selected next (reverse video block is now on this field).

Terminal

The *terminal* field indicates on what type of terminal the resulting system is to be run. By default it will indicate the same terminal type on which it is currently running. Typically, the setting of this field will never need to be changed. However, it is possible to build a system while connected to one type of terminal and then run the system while connected to a different type. In such a case, you would enter the name the target terminal in the terminal field.

The following target terminal types are supported:

- *COIT - Color GE Fanuc Operator Interface Terminal: (IC600KD512/514, 532/534);*
- *MOIT - Monochrome GE Fanuc Operator Interface Terminal: (IC600KD510/513, 530/533);*
- *MINI - Mini GE Fanuc Operator Interface Terminal: IC600KD515;*
- *TMINI - Touch mini OIT: IC600KD516;*
- *VT100 - DEC™ VT100 compatible, or superset, terminal;*
- *MIBM - Monochrome IBM compatible personal computer running TERMF);*
- *CIBM - Color IBM compatible personal computer running TERMF;*
- *TCOIT - OptiTOUCH (color touch screen from Nematron);*
- *TMOIT - OptiTOUCH (monochrome touch screen from Nematron);*
- *LUDCO - Lucas Deeco ST-2200 terminal.*

Four additional terminal tables are used by the PC-based Builder, MPC for a monochrome computer and CPC for a color computer using the ASCII character set, and EIBM (EGA adapter) and VIBM (VGA adapter) for a computer using the OIT character set. These should always be changed to reflect the target terminal.

The terminal type is never checked by the ADS Builder - only by the ADS Executor. If the Executor is run and a mismatch is detected between the attached terminal and what is indicated by the terminal field of the loaded system, the Executor will warn you of that fact but then continue to execute the system. For example, if a system is built specifying the use of a COIT terminal, but is then executed specifying a VT100 terminal, the message

`Terminal mismatch - using user specified VT100 rather than COIT terminal ...`

would be displayed on the attached terminal. The system will execute correctly, although some terminal specific features such as foreground and background color selections may be lost.

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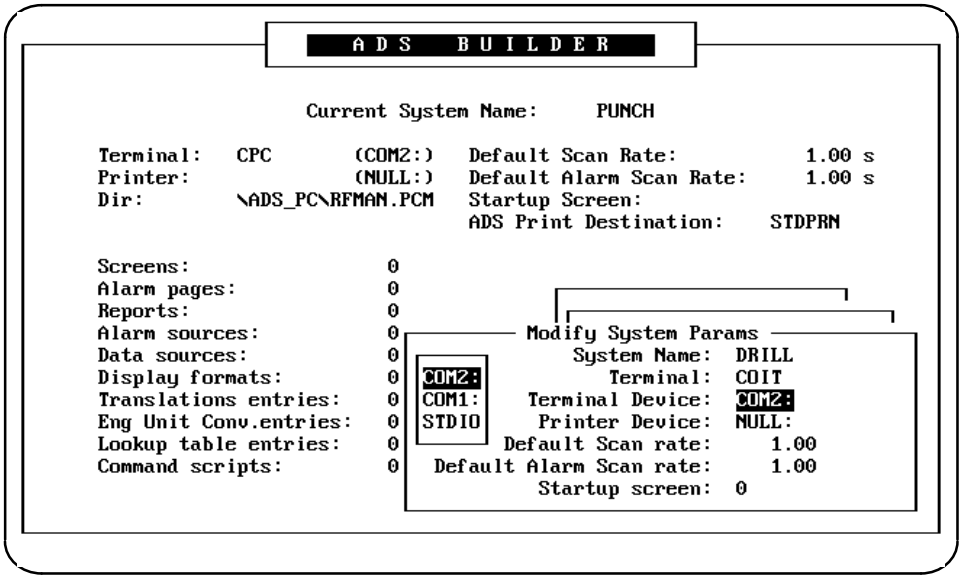
Terminal Device

The *Terminal Device* field indicates to which port on the ADC the terminal is to be connected when the system is actually executed. By default, this field is set to COM2:, which stands for serial communications port 2. COM1: may be selected if the terminal is to be connected to serial communications port 1. A third choice, STDIO:, allows the terminal to be connected to whichever port is specified for the target terminal in the ADS Setup Utility, without actually specifying it as part of the system definition.

When you cursor onto the *Terminal Device* field, a window is opened on the screen showing what choices are available.

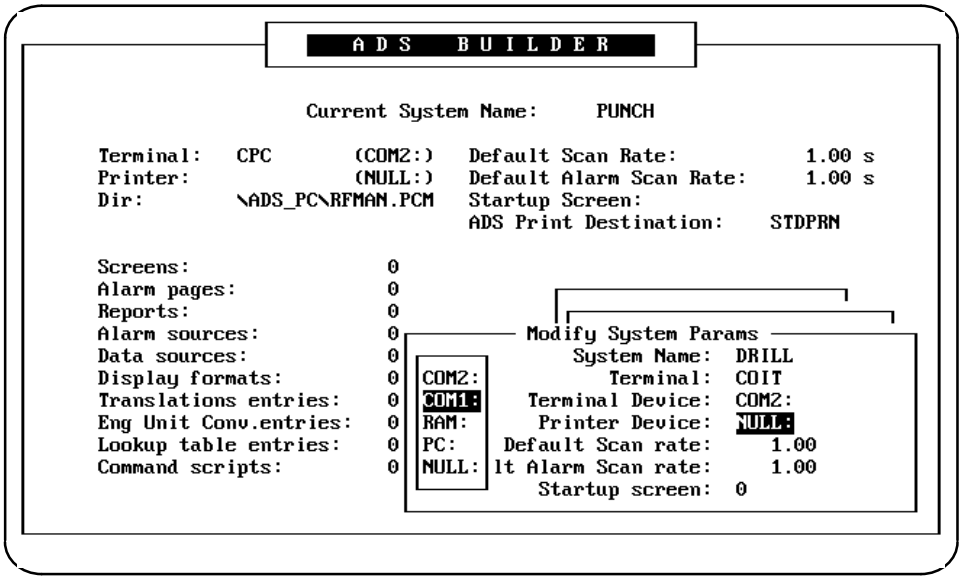


For the COIT terminal, COM2: is the correct choice; press the [Enter] key. The next field, *Printer Device*, is then selected.

Printer Device

Printer output is directed to the device specified by the *Printer Device* field. The following devices are supported: COM1:, COM2:, PC:, RAM: and NULL:. COM1: and COM2: have the same meanings as discussed above for Terminal Device. If PC: is selected, printer output will be directed to a file named SPOOLER.LOG in the current folder on an attached PC (which must be running TERMF). The printer file will be opened when the Executor begins running the system, and will be closed whenever the Executor is exited. The RAM: selection is similar to PC: except that the file is opened on the ADCs RAM disk. If printer output is not to be supported, NULL: is selected. Any subsequent printer output will be lost with NULL: selected as the printer device. By default the printer device is set to NULL: (no printer output).

When you cursor onto the *Printer Device* field, a window is opened on the screen showing what choices are available (choices as mentioned above). Assume that you wish to change the printer device from NULL: to COM1:. To select the desired choice, press the [–] key twice (or the [ ] key three times). COM1: will now be highlighted by the reverse video block.



To complete the selection, press the [Enter] key. The selected choice, COM2:, is now filled in as the printer device and the next field, *Default Scan Rate*, is selected.

Default Scan Rate

All data sources (memories in the PLC) are scanned at a given synchronous rate. Each source can be scanned at a specific rate or the default system scan rate. This field might be edited several different times while a running system is tuned to request its data as infrequently as possible while still providing an acceptable update rate (every time the ADC requests data from the PLC the scan time is affected by several milliseconds).

As a default, the system scan rate is set up for every 1.0 second. This value may be changed, in increments of 0.25 seconds, to any value within the range 0.25 to 9999.75 seconds.

Default Alarm Scan Rate

All alarm sources (memories in the PLC) are scanned at a given synchronous rate. Each source can be scanned at a specific rate or the default system alarm scan rate. This field may also be edited several different times as the running system is tuned to request its data as infrequently as possible while still providing an acceptable update rate (every time the ADC requests data from the PLC the scan time is affected by several milliseconds). As a default, the system alarm scan rate is set up for every 1.0 second. This value may be changed, in increments of 0.25 seconds, to any value within the range 0.25 to 9999.75 seconds.

Note

It is possible, particularly with the Series 90-30 ADC, to select a scan rate too small for the amount of data specified to be gathered. In such a case, the ADS Executor will attempt to "self-regulate" itself to slow down the requests to a rate it can keep up with. It is possible, however, that in conjunction with keyboard input screen response may appear to temporarily "freeze". Slowing down scan rates can alleviate this situation.

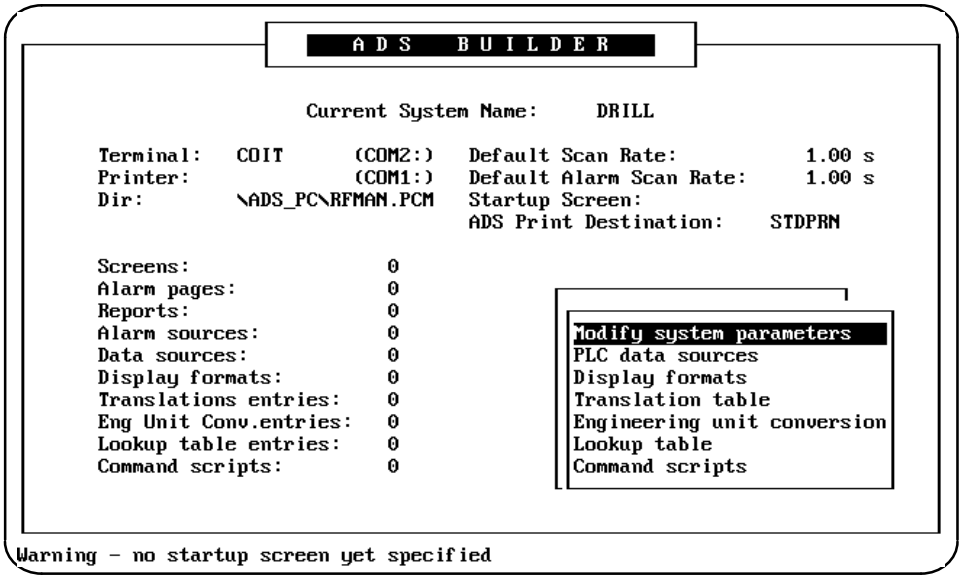
Startup Screen

The *Startup Screen* field designates which screen of the possibly multiple screens making up a system is to be displayed first when the Executor is run. This number can be any legal screen number, ranging from 1 to 999. By default this field is initialized to 0, which allows you to specify the required startup screen at run time. A starting screen may not be specified until the screen actually exists. If the Modify System Params data entry screen is exited without specifying a starting screen number (which you must do if the starting screen has not been created yet), the ADS Builder displays the warning message

`Warning - no startup screen yet specified`

on the message line at the bottom of the screen. Prior to running the system via the Executor, a startup screen should be specified.

This completes the selections on the Modify system parameters screen. The modifications you have made must be saved. To exit the Modify system parameters submenu press the <Save> key from any field or the [Enter] key with the cursor positioned on the Startup Screen field. The modifications are saved and the summary information on the screen is updated to reflect the modifications made to the system parameters.



Error Messages for Modify System Parameters

Error messages and their causes for system parameters are listed below.

Cannot load terminal table XXXXX.TBL

Terminal table ”XXXXX” does not exist; you can only specify an existing terminal table.

ENTRY ERROR :: Default scan time is too large

A default scan rate greater than the maximum supported has been entered.

ENTRY ERROR :: Default alarm scan time is too large

A default alarm scan rate greater than the maximum supported has been entered.

ENTRY ERROR :: Startup screen does not exist

You cannot reference a startup screen that does not exist.

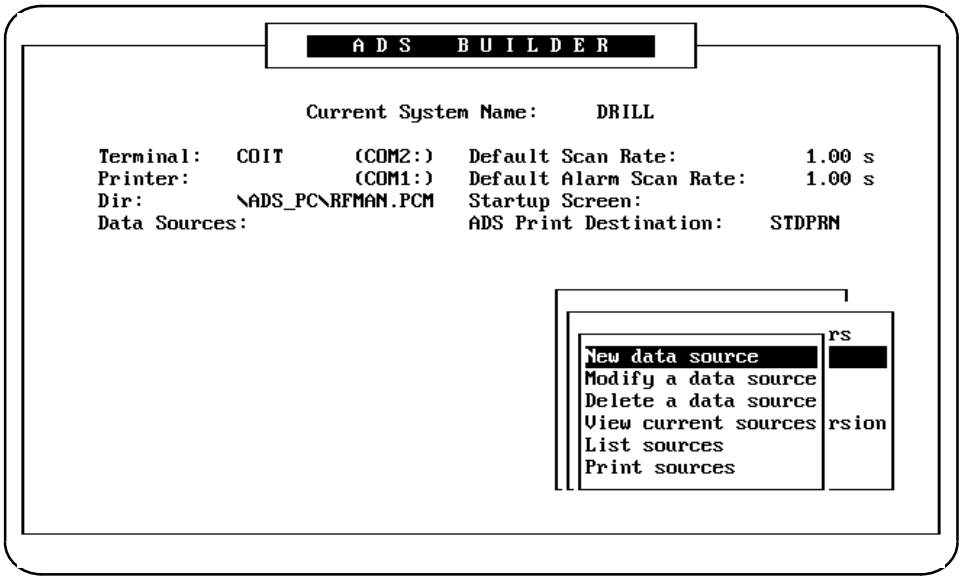
Section 2: PLC Data Sources

The following pages describe how to define the data sources in the PLC from which data is to be read that is to be used in the operator interface system.

The PLC data sources must be defined to indicate from where in the PLC data is to come and how it should be treated. The ADS system can only access those PLC locations which have been defined. There is no predefined limit on the number of data sources which may be defined for a system; you are constrained only by the amount of available memory on the ADC module.

Your data sources can either be defined here before referencing them with a dynamic object (see Screen Operations, Chapter 4), or they can be created from within the Screen Painter when you are creating a dynamic object.

In order to access the *PLC data sources* submenu, cursor to that menu selection.



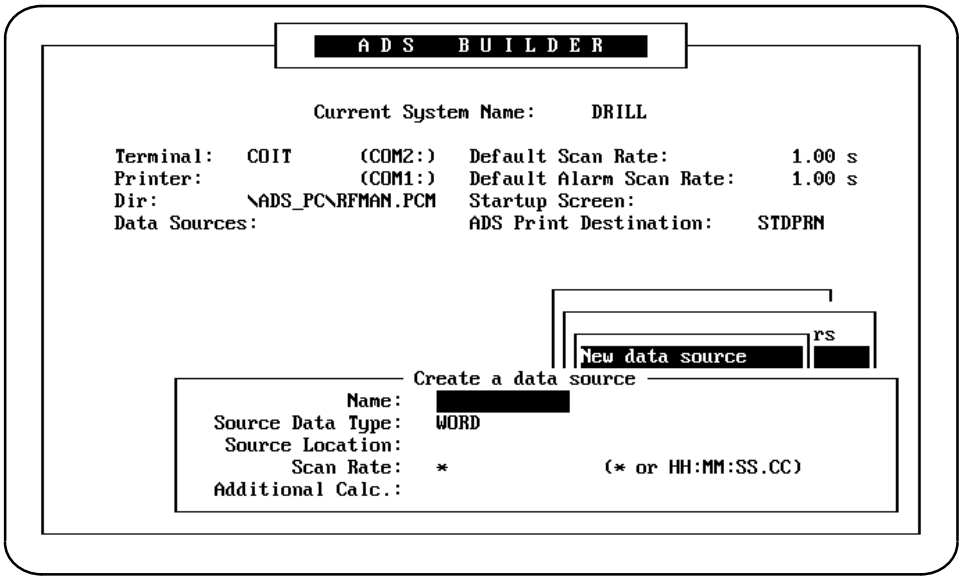
To access the submenu, press the [Enter] key. Another menu window is opened on the screen, giving the additional options of

- *New data source;*
- *Modify a data source;*
- *Delete a data source;*
- *View current sources;*
- *List sources;*
- *Print sources*

Each of these options is described in this section. Note that the status information (Screens:, Alarm Pages:, etc.) which had been displayed along the left hand side of the screen has been replaced with a heading *Data Sources.* As data sources are created, a list of those sources will be maintained in this area.

New Data Source

When the *New data source* option is selected, a data entry window is opened containing five fields which may be set by entering the appropriate information: *Name, Source Data Type, Source Location, Scan Rate* and *Additional Calc.*



Name

Every PLC data source must be given a name. This name must be unique with regards to PLC data source names, but does not need to be unique from all other names in the ADS system (for example, the system itself might be named DRILL and a PLC data source might also be named DRILL). A name may be from one to twelve alphanumeric and underscore (_) characters, and is NOT case sensitive.

It is recommended that you choose names which reflect the meaning of the data which will be retrieved. For example, the names PARTS_COUNT, TEMP_SETTING and ESTOP are much more meaningful than the names REG1 or XYZ. A little forethought in the selection of names will make the resulting system much more self-documenting, and thus more maintainable.

As an example of creating a data source - assume that the you wish to create a data source with the name PARTS_COUNT. Simply type the desired name PARTS_COUNT into the *Name* field which is highlighted by a reverse video block.

To complete the entry press the [Enter] key. Note that after the [Enter] key is pressed the next field, *Source Data Type*, is selected next (reverse video block is now on this field).

Source Data Type

Every data source must be tagged to indicate what type of data it represents. The data types supported by the ADS system are specified in the table below.

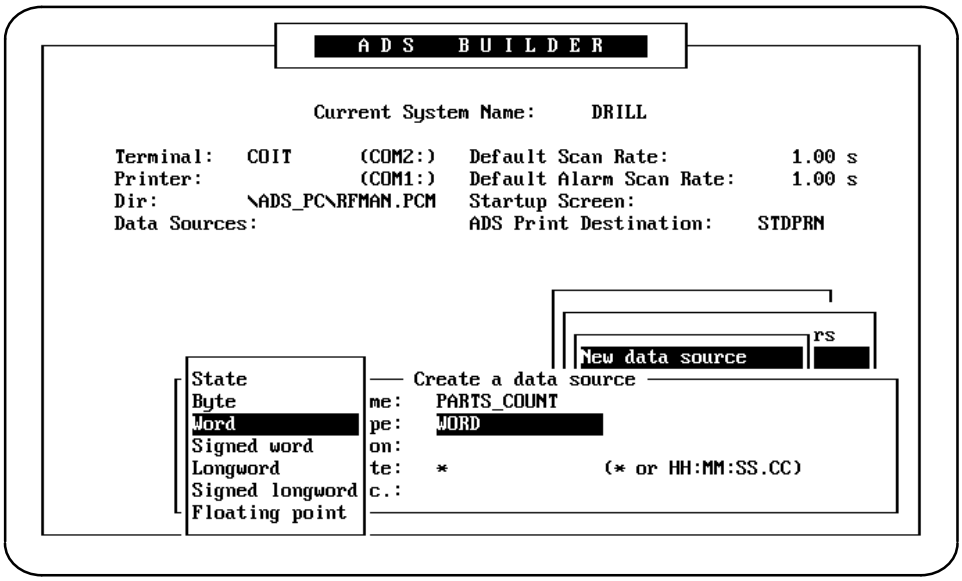
Table 3-1. Source Data Type Supported for Data Sources

Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.9 to +9999999999.99 †

† Only 7 digits of precision.

Selecting a Source Data Type

When you cursor onto the *Source data type* field another window is opened on the screen showing the available choices for data type. By default, the system selects WORD for the source data type.



Use the [ ] and [–] keys to select the data type choice which matches the type of data in the PLC represented by the data source. To complete the selection press the [Enter] key after you have cursored to the desired data type source. After the [Enter] key is pressed the next field, *Source Location*, is selected next (reverse video block now on this field).

Source Location

The *Source Location* field is used to attach a data source to a specific location (reference), or multiple locations, in the PLC. Memory locations in the PLC that are supported by the ADS system are specified in the table below.

Table 3-2. Series 90 PLC References Supported by ADS System

PLC Memory	Description	Size/ Reference	Over	Diags	Slice	Ref	Write
DATE	PLC Date	32	N	N	N	N	N
TIME	PLC Time	32	N	N	N	N	N
PLC_ID[1]	PLC ID	n/a	N	N	N	N	N
PLC_STATUS	PLC Status	16	N	N	Y	N	N
PLC_ACCESS	Control Program / Privilege Level	16	N	N	Y	N	N
PLC_SWEEP	Last Sweep Time	16	N	N	N	N	N
RACK_mm	Fault in Rack mm	1	N	N	N	N	N
SLOT_mn	Fault in Rack m, Slot n	1	N	N	N	N	N
BUS_mno	Fault in Rack m, Slot n, Bus o	1	N	N	N	N	N
M_mnopp	Fault in Rack m, Slot n, Bus o, Module pp	1	N	N	N	N	N
R	Registers	16	N	N	Y	Y	Y
AI	Analog inputs	16	N	Y	Y	Y	Y
AQ	Analog outputs	16	N	Y	Y	Y	Y
I	Discrete inputs	1	Y	Y	N	Y	Y
Q	Discrete outputs	1	Y	Y	N	Y	Y
M	Internal coils	1	Y	N	N	Y	Y
T	Temporary coils	1	N	N	N	Y	Y
S	Special contacts	1	N	N	N	Y	N
SA	Special contacts A	1	Y	N	N	Y	Y
SB	Special contacts B	1	Y	N	N	Y	Y
SC	Special contacts C	1	Y	N	N	Y	Y
G	Global data	1	Y	N	N	Y	Y
GA	Global data A	1	Y	N	N	Y	Y
GB	Global data B	1	Y	N	N	Y	Y
GC	Global data C	1	Y	N	N	Y	Y
GD	Global data D	1	Y	N	N	Y	Y
GE	Global data E	1	Y	N	N	Y	Y
^P [2]	Main program block data	16	N	N	Y	Y	Y
^L [3]	Sub program block data	16	N	N	Y	Y	Y
Z	ADS internal data	16	N	N	Y	Y	Y
MEMORY	ADS internal free memory	32	N	N	N	N	N
MAX_BLOCK	ADS internal free memory, largest block	32	N	N	N	N	N

[1] The PLC_ID is a 1 to 7 character string which contains the identifier name of the PLC CPU. It is a special case where the data type is forced to be BYTE within the ADS Builder yet requires an XXXXXXX field picture in the painter.

[2] The full syntax for Main Program locations is : <program_name>^P<address>.

[3] The full syntax for Sub Program locations is : <block_name>^L<address>.

[4] The parameters listed in this table are as follows:

PLC Memory Refers to the identifier used in the <location_type> field of the location reference syntax.

Size/Reference Data size in bits.

Over Is there an override bit associated with the location type? Override bits are specified by using "O" in the <modifier> field of the location reference syntax.

Diags Is there a diagnostic bit associated with the location type? Diagnostic bits are specified by using "F" in the <modifier> field of the location reference syntax.

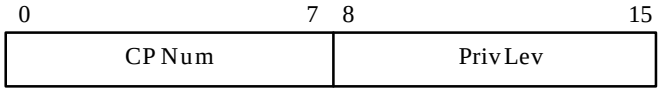
Slice Indicates whether it is possible to specify individual bits, or groups of bits from the location.

Ref Indicates whether it is necessary to provide an address for the location type.

Write Indicates whether a value can be written to the location.

PLC_ACCESS and PLC_STATUS are ”special” locations that allow you to look at individual bits pertaining to program access and system status. These bits are described below.

PLC_ACCESS



CP Num	Indicates the number of the Control Program to which the requesting device is attached. Possible values are -1 to 7, where -1 indicates not attached to any control program. This number is always 0 for Series 90-30.
Priv Lev	Current privilege level of requesting device for accessing memory in the PLC CPU (valid entries are 0 through 4).

PLC_STATUS

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PLC State				N U	Prg chg	OEM prot	Run SW	IO SW	Prg Att	IO flt	PLC flt	IO chg	PLC chg	Con Swp	Ovr Swp

PLC State	Current State (as opposed to switch settings or commanded state). Possible values are: 0 - RUN_ENABLED; 1 - RUN_DISABLED: 2 - STOP_IO_DISABLED 3 - CPU_STOP_FAULTED; 4 - CPU_HALTED; 5 - CPU_SUSPENDED 6 - STOP_IO_ENABLED
NU	Not used (reserved for future expansion).
Prg chg	Program changed flag: 1 = Program change; 0 = No program change (90-70 rel 2.X and later).
OEM prot	OEM protected flag: 1 = OEM protection in effect; 0 = No OEM protection.
Run SW	Front panel RUN / STOP switch setting; 1 = RUN; 0 = STOP.
IO SW	Front panel ENABLE / DISABLE switch setting: 1 = Outputs Disabled; 0 = Outputs Enabled.
Prg Att	Programmer Attachment flag. Shows whether or not there is a programmer attachment in the system. 1 = Programmer attachment found; 0 = No programmer attachment found.
IO flt	I / O Fault Entry present flag; 1 = Fault entry in I / O fault table; 0 = I / O fault table is empty.
PLC flt	PLC Fault Entry present flag: 1 = Fault entry in PLC fault table; 0 = PLC fault table is empty.
IO chg	I / O Fault Entry changed flag: 1 = I / O fault table has changed since last read by this device; 0 = I / O fault table same as when last read.
PLC chg	PLC Fault Entry changed flag: 1 = PLC fault table has changed since last read by this device; 0 = PLC fault table same as when last read.
Con Swp	Constant sweep mode setting: 1 = Constant sweep mode enabled for current control program; 0 = Constant sweep mode not enabled.
Ovr Swp	Oversweep flag (if constant sweep mode enabled). Shows whether the constant sweep value was exceeded on the last sweep. 1 = Constant sweep value was exceeded; 0 = Normal sweep.

The Z, MEMORY, and MAX_BLOCK locations are internal to ADS; i.e., they are not present in the PLC. There are 1024 references in Z memory, Z1 through Z1024. These are typically used for special ”interlocks” in your system. The demonstration systems

provided with the product have a number of examples that show how Z memory can be used. MEMORY returns the number of free (unallocated) bytes of memory left on the ADC module while the Executor is running. It is useful while you are developing your system to monitor the maximum runtime memory usage. You should specify a source data type of LONGWORD. Any dynamic object referencing a data source whose PLC location is MEMORY should allow for up to a 6-digit number. You may need to monitor memory usage on multiple screens since memory "shrinks" and "expands" as screens are pushed and popped. Also, alarm logging continually shrinks memory until alarms are acknowledged. MAX_BLOCK functions identically to MEMORY, except that it returns the size (in bytes) of the largest contiguous block of free (unallocated) memory.

The typical information which you must type in to specify a source location is:

<source location> ::= <PLC memory> <reference> (: <modifier>)

where <PLC memory> is as listed in the table above and <reference> is a numeric value specifying a particular reference offset within the PLC memory. Optionally, a reference <modifier> may be specified for some PLC memory types, where O indicates the reference's override status and F indicates its point / channel fault status.

For example, to indicate a source location for PLC memory reference %R1, you would specify R1. The previous field, *Source Data Type*, determines how many consecutive references are implied by the source location selection. For example, if a source location of I1 were specified along with a source data type of WORD, the data source would include PLC memory locations %I1 to %I16. The reason for this is that the WORD data type requires sixteen bits of storage and that each %I reference is a single bit in size.

As an example of a source location entry, assume that you want to attach the data source to PLC reference %R1. To do this - type R1 into the *Source Location* field. Note that for this example only %R1 is referenced since the data type WORD requires sixteen bits of storage and each %R reference is sixteen bits in size. To complete the entry, press the [Enter] key. Note that the next field, *Scan Rate*, is selected next.

Not all source locations can be specified as simply as in the example above. At times you may only be interested in part of the data stored in a PLC memory location. In other cases you may need to construct a source location for non-consecutive bits of storage in the PLC. In still other cases you may only be interested in a subset of a group of bits of storage in a PLC. To support those situations the following more complicated grammar is supported,

```
<bit reference          ::= <bit offset> (-<bit offset>)
<reference subset>      ::= [<bit reference> 0{, <bit reference>}]
<PLC memory reference   ::= <PLC memory> <reference> (:<modifier>)(reference
subset>)
<Source location>    ::= <PLC memory reference> 0{; <PLC memory reference>)
```

where <PLC memory>, <reference> and <modifier> are as defined above, <bit offset> is a starting bit position within this location, -<bit offset> is the upper limit of a range of bits, <bit offset> indicates a further bit position and; <PLC memory reference> indicates that multiple locations can be defined.

Source locations are evaluated left to right, building up the required data from the least significant bit to the most significant bit. The total number of bits specified must be less than or equal to the number of bits implied by the source data type. Some examples are given below which should help clarify the grammar.

Assume that you wish to access a WORD of data which is located across the upper byte of %R1 (low byte of WORD) and the lower byte of %R2 (high byte of WORD). This could be accomplished by specifying a source location of

```
R1[8-15];R2[0-7]
```

Assume that there are a set of 16 boolean flags in PLC word memory location %AI6, and you want to access the sixth flag beginning with the least significant bit (bit b5). For this example, assume that you have already specified a source data type of STATE. The source location would be specified as

```
AI6[5].
```

Assume that you are only interested in the lower order twelve bits of PLC word memory location %AQ2; it is possible that the upper four bits are not zero. Also assume that you have already specified a source data type of WORD. The source location would be specified as

```
AQ2[0-12].
```

Assume that you wish to compose a word value where bit b0 is from %M1, bit b1 from %I5, bit b2 is from bit b3 of %R123, bits b3 - b5 are from bits b13 through b15 of %R123 and bit b6 is from %T7. In this case you have already specified a source data type of WORD. The source location would be specified as

```
M1;I5;R123[3,13-15];T7.
```

Assume that you wish to access the override indicator for %I12. In this case you would specify a source data type of STATE, and the source location as

```
I12:0
```

Assume that you wish to access the current date as maintained in the PLC. You would specify a source data type of LONGWORD and a source location of

```
DATE
```

Assume that you wish to access the PLC ID as configured in the PLC. You would specify a source data type of BYTE and a source location of

```
PLC_ID
```

Assume that you wish to access the fault indicator for the Genius block configured as block 27 located on bus 1 of the Genius Bus Controller located in slot 5 of rack 1. You would specify a source data type of STATE and a source location of

```
M_15127
```

Assume that you wish to access the PLC state information from the PLC status word. You would specify a source data type of WORD and a source location of

```
PLC_STATUS [12-15]
```

As you can see from the above examples, very complicated source locations may be specified. *When specifying these source locations, you must take care, however, that data values are specified in the correct bit order.* If they are not in the correct order, erroneous data will be gathered and displayed. The ADS system assumes that you are correctly specifying what is really desired, but you must tell it what you actually want.

Scan Rate

The *Scan Rate* field defines the synchronous rate at which the ADS system will gather data from the PLC defined in the Source Location field. By default, this field is set to *, indicating that the data should be gathered at the system default scan rate (see *Modify System Parameters, Default Scan Rate*, earlier in this section). This setting should be changed only if you wish to guarantee a given scan rate regardless of the default setting.

The format for defining a specific scan rate is

```
HH:MM:SS.CC
```

where *HH* refers to hours, *MM* to minutes, *SS* to seconds and *CC* to hundredths of a second.

Any time between 00:00:00.01 and 99:59:59.99, inclusive, may be entered. The ADS system's basic time element is 0.25 second; because of this, the ADS system will round all times up to the nearest 0.25 second. This means that the fastest rate which can be specified is 00:00:00.25, and the slowest 100:00:00.00.

When specifying a time, the entire specification must be given, not just the significant portion. For instance, to specify a scan rate of 3 seconds, you must enter 00:00:03.00, not just 3 or 3.00.

As an example of entering a new scan rate, assume that your system is to scan the contents of PLC memory location %R1 every 1.5 seconds. Type the value 00:00:01.50 into the Scan Rate field. Pressing the [Enter] key completes the entry. When the [Enter] key is pressed, the next field, *Additional Calculation*, is selected.

Note

If a particular data source is being used only to animate a dynamic object on a report form, the scan rate setting will be ignored when the system is executed. When a report is executed, all data sources animating dynamic objects on the report form are gathered once from the PLC. If a data source is used to animate a dynamic object on a screen, the defined scan rate is put into effect.

Additional Calculation

Often data retrieved from the PLC is not in the proper form for use by any part of the ADS system and may need to be converted to a usable format. For example, a counts value might need to be converted to engineering units prior to being used by the ADS system. The *Additional Calculation* field provides a method for doing this. In this field, you can optionally specify one of four different types of calculations.

- *lookup table entry;*
- *translation table entry;*
- *engineering units conversion table entry;*
- *custom translation*.

Only the custom translation calculation will be discussed in detail here; for a discussion of lookup table entries, translation table entries, and engineering unit conversion table entries, see *Lookup Table*, *Translation Table* and *Engineering Units Conversion Table* later in this chapter.

An existing lookup table, translation table or engineering units conversion table entry may be referenced. Multiple calculations can be specified by separating each reference by a space " " (output/input data type matches must be maintained). The <object list> key can be used to obtain a list of existing additional calculations or to create a new one.

A custom translation allows you to apply the formula

```
      (A * (Input Value + B) ) + C

where:  A is the scaling factor
        B is the pre-scaling offset
        C is the post-scaling offset
```

to the data retrieved from the PLC (with the data interpreted according to the Source Data Type field). Note that the formula defined here is the same as defined for translation table entries. In general, if a given translation is to be used only once it should be defined in the PLC data source as a custom translation. If it is to be used multiple times, it is better to define the actual translation only once as a translation table entry and then reference the entry as the additional calculation.

The format for defining a custom translation is

```
(A,B,C)
```

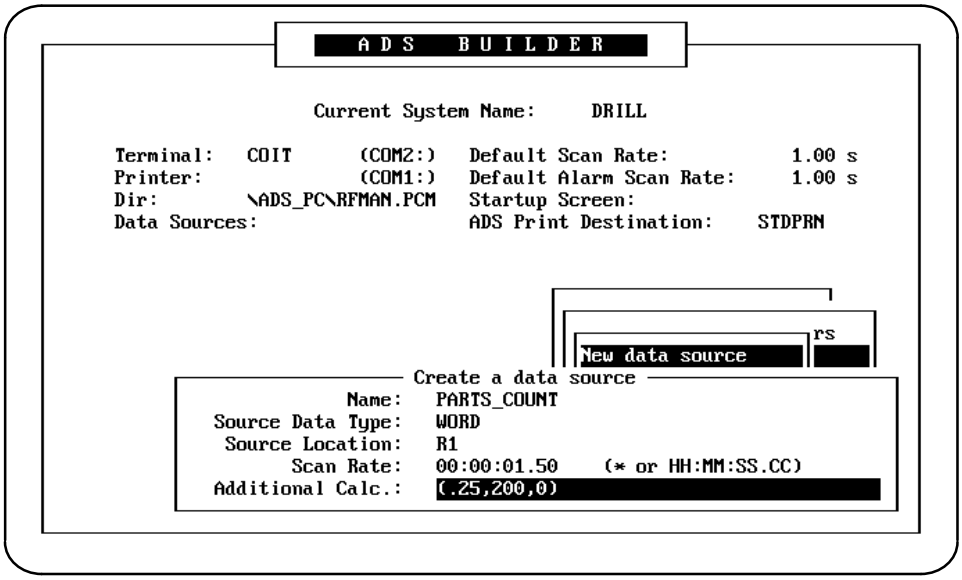
where the parentheses and commas are required parts of the format. The range of data acceptable for each parameter is given in the table below.

Table 3-3. Data Range for a Custom Translation

Parameter	Minimum Value	Maximum Value
A	–100000000	+1000000000
B	–100000000	+1000000000
C	–100000000	+1000000000

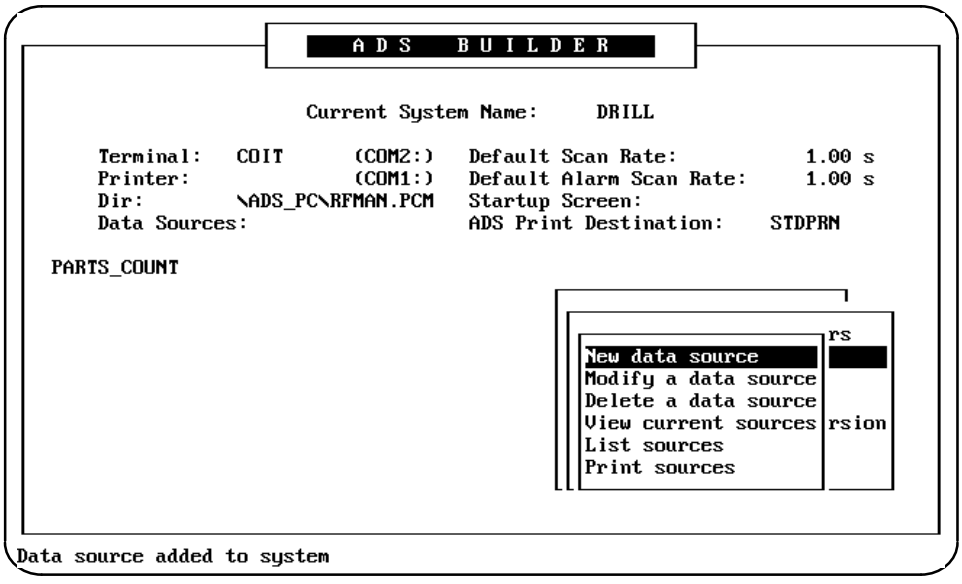
(1) Only 7 digits of precision.
(2) Maximum of 6 digits to right of decimal point.

In the example below, assume that the value retrieved from %R1 is in the range of -200 to 200, but that the ADS system needs to work on the value scaled to the range 0 to 100. A custom translation which would accomplish this is (.25,200,0). The needed translation is typed into the Additional Calculation field.



When you press the [Enter] key at this point, it completes not only the entry of the Additional Calculation field, but also completes the entry of the New data source. An informative message is displayed on the status line indicating the completion of the data source creation.

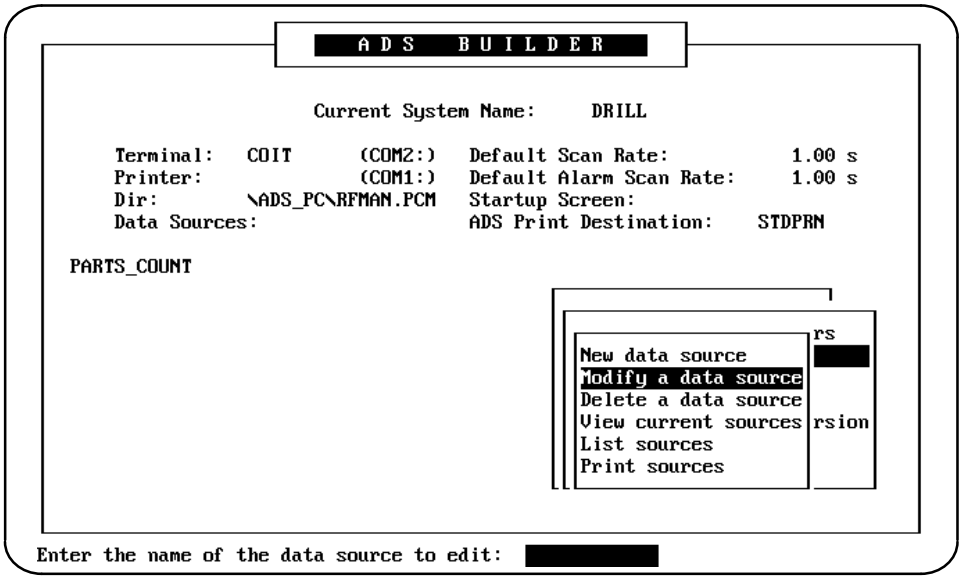
Note that the New data source (which has just been completed), PARTS_COUNT, is now listed in the status area of the screen (left-hand side) as an available data source.



Modify a Data Source

An existing data source may be modified in much the same manner in which it was originally created. All information concerning the data source may be changed except its name. Changing the name of a data source requires you to first delete it and then recreate it with the desired new name.

To initiate a data source modification, first select the *Modify a data source* menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [M] key.



The ADS system will prompt you for the name of the data source to be modified by displaying a message at the lower left of the screen - *Enter the name of the data source to edit:*. Only existing data sources may be modified; the *New data source* menu option must be used in order to create a new data source.

As an example, assume that you wish to modify the data source that you have previously named PARTS_COUNT. Type the data source name into the prompt field. After pressing the [Enter] key the form for the specified data source is displayed with the Source Data Type field initially selected.

You can now proceed to change any of the fields (except the Name field). Pressing the [Enter] key with the Additional Calculation field selected or pressing the <Save> key from any field will complete the modification. You are then returned to the menu page with an informative message displayed in the status line indicating that the modification was completed.

To cancel the modification, disregarding any changes which have been made, press the <Quit> key. An informative message is displayed on the status line indicating that no changes were made to the data source. If a data source is specified which does not currently exist, you will be returned to the menu page with the message

Invalid data source specified.

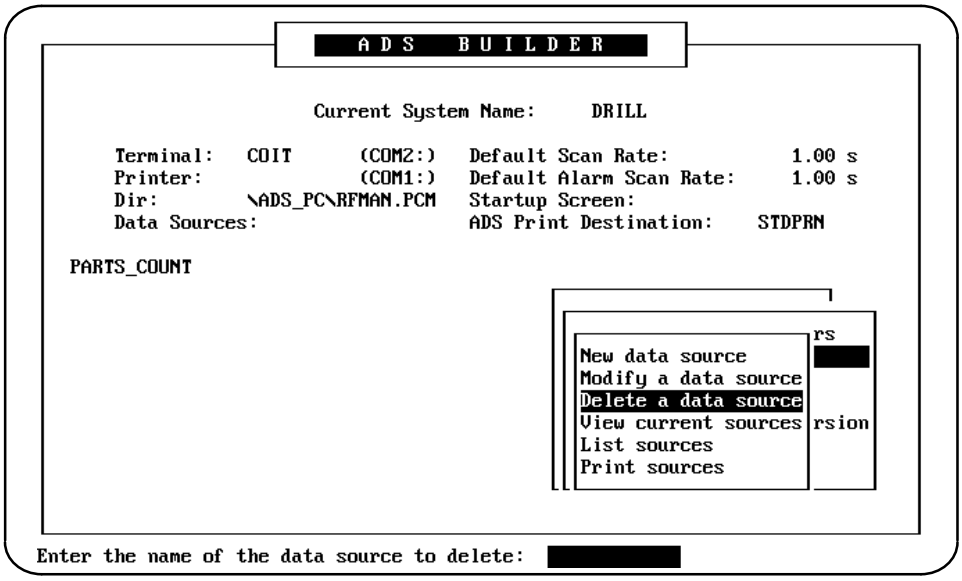
Delete a Data Source

A data source may be removed from a system by deleting it.

Note

A data source removed from a system cannot be recovered. You should exercise caution to not delete a data source referenced by a dynamic object on any screen or report.

To initiate a data source deletion, first select the *Delete a data source* menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [D] key. The ADS system will prompt you for the name of the data source to be deleted. As indicated above, only existing data sources which are not referenced on any screen in the system may be deleted.



For example, to delete the data source PARTS_COUNT, type the data source name PARTS_COUNT into the prompt field. When you press the [Enter] key the current form for the data source is displayed on the screen along with a prompt on the status line asking for confirmation of the delete.

When you press the [Enter] key at this point, the data source will be deleted from the system. Upon deletion of the data source, you are returned to the menu page with an informative message displayed in the status line indicating that the deletion was completed. If you press the <Quit> key indicating that the data source deletion should be aborted, you will be returned to the menu page (no message will be displayed to indicate that the deletion was aborted). If a data source is specified which does not currently exist, you will be returned to the menu page with the message

Invalid data source specified

displayed on the status line.

The ADS system does not allow the deletion of a data source that is referenced by a dynamic object on any screen or report. If this is attempted, you will be returned to the menu page with the message

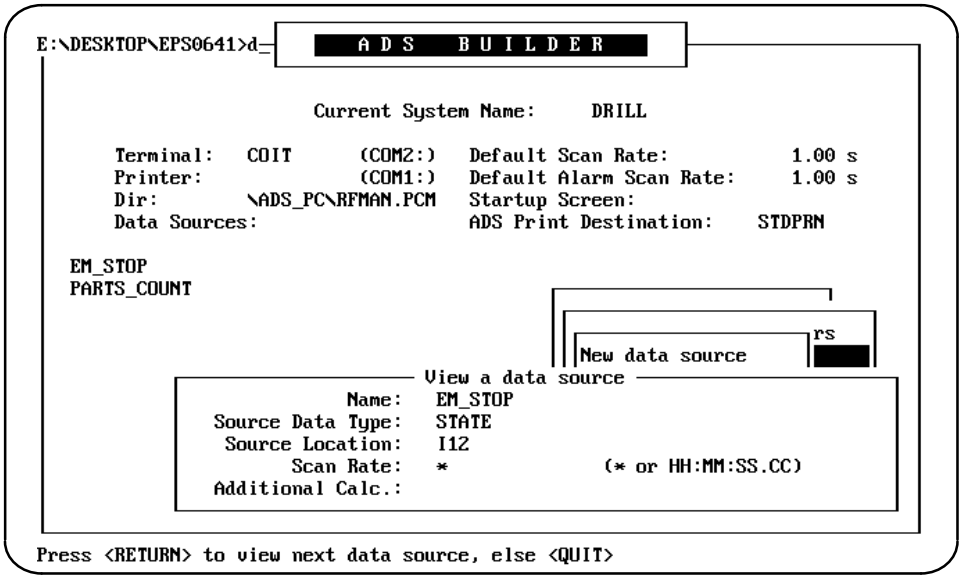
Data source could not be deleted

displayed on the status line.

View Current Sources

The ADS system allows you to view all of the existing data sources in a system one by one in alphabetical order. To initiate the viewing of a system's data sources, first select the View current sources menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [V] key.

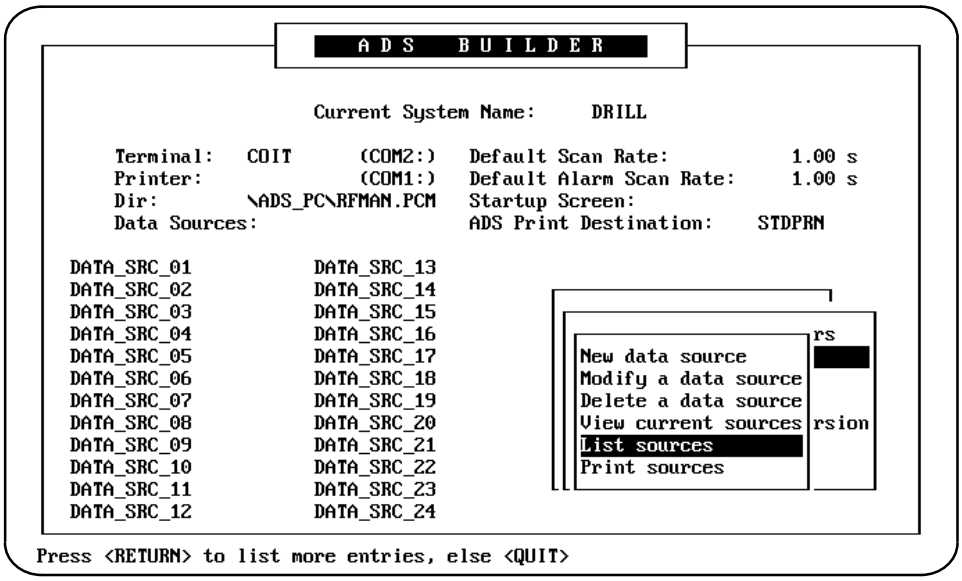
In this example sequence, two data sources are currently defined in the system: EM_STOP and PARTS_COUNT. Upon pressing the [Enter] key the form for the first data source in the list is displayed along with a prompt on the status line giving the choice of viewing the next data source in the list or of quitting the view function.



Pressing the [Enter] key at this point will display the next data source in the list, PARTS_COUNT. Each time the [Enter] key is pressed, the form for the next data source is displayed. After the last data source is displayed, (the next time that the [Enter] key is pressed for this example), the menu page will again be displayed.

List Sources

On the left-hand side of the screen a list of data source names is maintained in alphabetical order. The ADS system provides a way to page through the total list of data source names. To initiate the listing of a system's data source names, select the List sources menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [L] key.

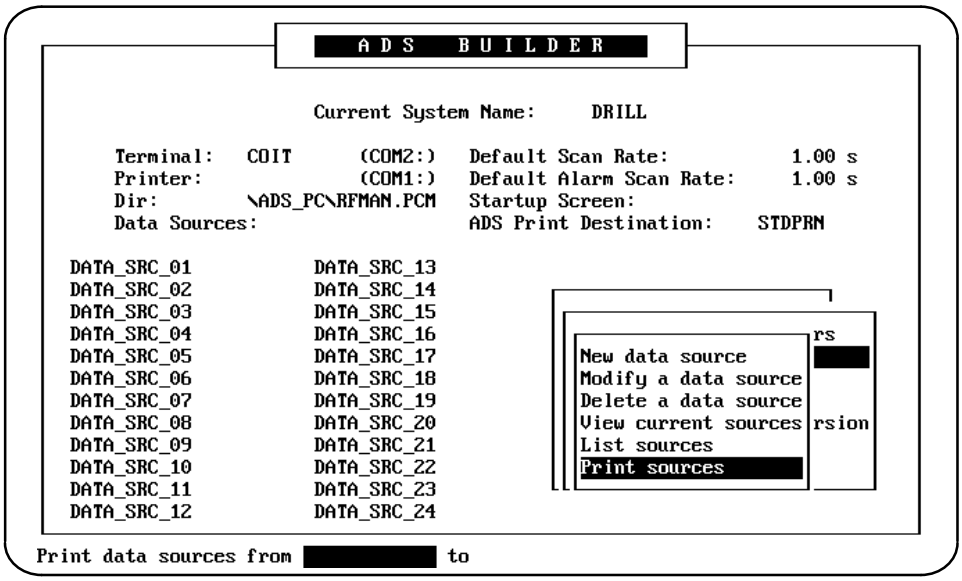


In the example sequence shown above, thirty-five data sources are currently defined in the system. Upon pressing the [Enter] key the first (alphabetical order) group of data source names is displayed along with a prompt on the status line giving the user the choice of listing the next group of data source names or of quitting the list function.

Pressing the [Enter] key at this point will display the remaining data source names. Pressing the <Quit> key exits the list operation. The data source names currently displayed on the screen will remain displayed.

Print Sources

The Print source option allows the details of the defined data sources to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module and Spooler are installed. To initiate a print of the defined data sources, select the Print sources option by either cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

Print data sources from ################ to ################

Depending upon the response entered into the from and to field, several different listings can be generated. The listing options are as shown below.

```
from = "<id1>"   to = "<id2>"   --> print out data sources id1 to id2
from = "<id1>"   to = ""        --> print out data source id1
from = ""        to = "<id2>"   --> print out data source id2
from = "*"       to = "<id2>"   --> print out all data sources up to id2
from = "<id1>"   to = "*"       --> print out all data sources from il1
from = "*"       to = ""        --> print out all data sources
from = ""        to = "*"       --> print out all data sources
from = "*"       to = "*"       --> print out all data sources
```

Pressing the <Quit> key cancels the print operation. After selection of the required range of data sources to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see Load / Save Operations, Chapter 9).

Data source information is formatted as shown in the following examples:

```
Data Source : Q1_OVER                    Data Type : STATE
                                          Location : Q1:0
                                         Scan Rate : *
                                  Additional Calc : (100,0,0)

Data Source : T_SEC                      Data Type : STATE
                                          Location : S5
                                         Scan Rate : 00:00:00.25
                                  Additional Calc :

Data Source : STAT_BITS                  Data Type : WORD
                                          Location : PLC_STATUS [12-15]
                                         Scan Rate : *
                                  Additional Calc :
```

Error Messages for PLC Data Sources

Error messages and their causes for PLC Data Sources are listed below alphabetically.

Bit specifications not allowed on location

Bit specification is not allowed for the specified source location.

Conversion error - invalid time format entered

The scan rate must be specified either as * or HH:MM:SS.CC.

Data source could not be deleted

A data source currently referenced on a screen or report may not be deleted.

ENTRY ERROR :: Data source name not unique

Two data sources cannot have the same name.

ENTRY ERROR :: Invalid Additional calculation specified

The referenced additional calculation does not exist.

ENTRY ERROR :: No data source name

A new name must be specified.

Error parsing bit specification

A bit offset has been specified that exceeds the number of bits provided for by the source data type.

Failed to find the specified location type

Anunspecified / incorrect source location has been specified.

Failed to match input data type for XXXX

The input data type for the referenced additional calculation does not match the data type specified as the source data type.

Too many bits for data type

The PLC location specified requires more storage space (bits) than provided for by the specified source data type.

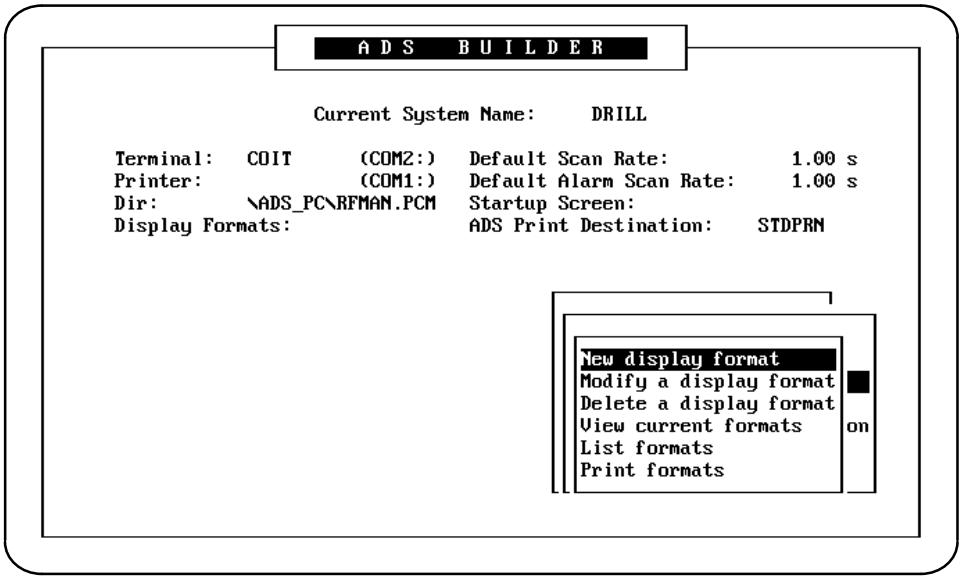
Section 3: Display Formats

Display formats must be defined to control the way in which data is displayed. Display formats are intended to provide an easily accessible method for displaying data without the need to specify separate rules for every screen built. There is no predefined limit on the number of display formats which may be defined for a system; the only constraint is by the amount of available memory on the ADC module.

Your display formats can either be defined here before referencing them with a dynamic object (see Screen Operations, Chapter 4), or they can be created from within the Screen Painter when creating a dynamic object.

In order to access the *Display formats* submenu, first cursor to that item on the menu selection on the displayed screen. By pressing the [Enter] key, the Display format submenu is accessed. Another menu window is opened on the screen, giving the additional options of

- *New display format;*
- *Modify a display format;*
- *Delete a display format;*
- *View current formats;*
- *List formats;*
- *Print formats.*



Note that the status information formerly displayed along the left hand side of the screen has been replaced with a heading *Display Formats.* As display formats are created, a list of those formats will be maintained in this area.

New Display Format

When the *New display format* option is selected, a data entry window is opened containing four fields which may be set: *Name, Data Type, Range* and *Action.*

Name

Every display format must be given a name. This name must be unique with regards to display format names, but does not need to be unique from all other names in the ADS system (for example, a PLC data source might be named VALUE and a display format might also be named VALUE). A name may be from one to twelve alphanumeric and underscore (_) characters, and is NOT case sensitive.

As an example of assigning a name to a display format, assume that you want to create a display format with the name NEG_POS. Type the name which you have chosen into the *Name* field. To complete the entry press the [Enter] key. In addition to completing the entry of your system name, the next field, *Data Type*, is selected.

Data Type

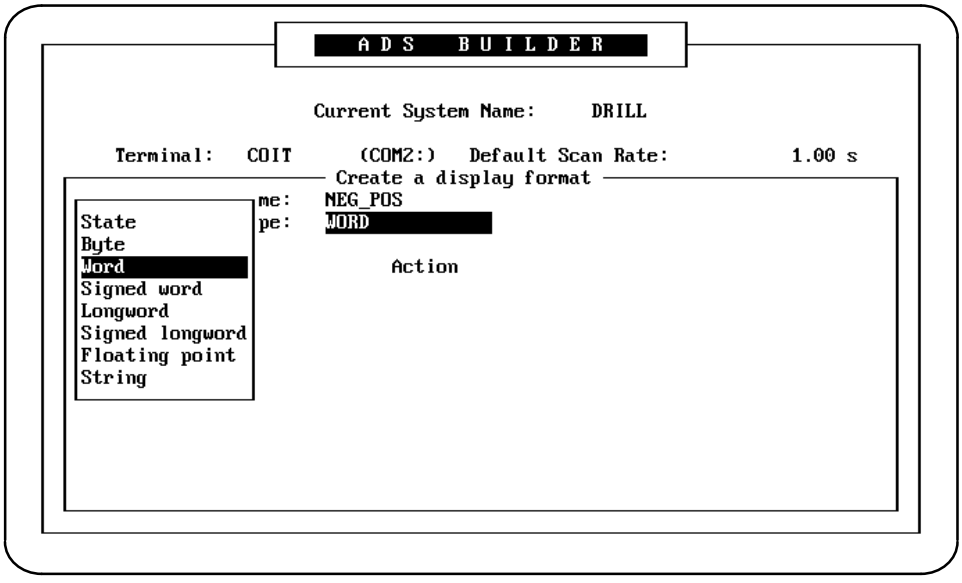
Every display format must be tagged as to what type of data it operates on. The data types supported by the ADS system are specified in the table below.

Table 3-4. Source Data Types for Display Formats

Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.99 to +9999999999.99 †
String	-	1 to 19 ASCII characters

† Only 7 digits of precision.

When you cursor onto the *Data Type* field a window is opened on the screen showing what choices are available. By default, the system selects WORD for the data type.



A data type must be picked which makes sense with regards to its intended use in the system being built; in fact, the ADS Builder will ensure that the type of data specified is consistent with the values specified in the *Range* field (see below) and with any other object (e.g., PLC data source) it is later associated with. For example, if the user specifies a display format data type of SIGNED WORD, that format could only be associated with a PLC data source whose source data type was SIGNED WORD.

To complete the selection, press the [Enter] key. The next field, *Range,* is also selected at this time. An area of the screen directly below the word Range is highlighted in reverse video. This is the area where you will enter the desired range.

Range

Ranges, along with their associated actions, form the heart of the display format. At run time, the input value is checked against the specified ranges, sequencing from top to bottom, with the first range found to include the value being selected. The action associated with the selected range is then carried out. Up to 10 range / action pairs may be specified. The format for specifying a range is

```
<I1> {:<I2>}
```

where I1 must be defined and I2 Š I1.

As previously stated, a given range must be consistent with the display format's assigned data type. This means, for instance, that only ON and OFF may be used as range designators for display formats with an assigned data type of STATE, and that only numbers in the range -32768 to +32767 may be used with an assigned data type of SIGNED WORD.

Assume that you wish to specify an action for the range –32768 to –1 (all single precision negative numbers). Simply type the desired range into the *range* field. To complete the entry, press the [Enter] key. Note that the associated *Action* field is selected next with an area below it highlighted by reverse video which is where you will enter the appropriate action to be taken for the specified range.

Actions Which Control the Appearance of an Object

As stated above, actions are paired with a given range, with a maximum of 10 range / action pairs being supported. Also, a command script may be referenced. Actions indicate what is to happen to the object against which the display format is applied. Multiple actions may be specified (separated by a semicolon ";", or a space " ").

Two basic categories of actions are supported: actions which control the appearance of an object (e.g. move an object, change an object's color, etc.) and actions which cause some event to occur in the system (e.g., display a new screen on the terminal, change a value in the PLC, etc.). Multiple actions may all come from within the same category or may come from both categories.

The first category of actions, actions which control the appearance of an object, is summarized in the following table.

Table 3-5. Actions Which Control Appearance of an Object

Action	Description
INVISIBLE	Make the object invisible
NORMAL	Display the object with normal, default video attributes
BOLD	Display the object with the bold video attribute
REVERSE	Display the object with the reverse video attribute
BLINK	Display the object with the blink video attribute
UNDERSCORE	Display the object with the underscore video attribute
BLACK	Display the object with the black color attribute
RED	Display the object with the red color attribute
GREEN	Display the object with the green color attribute
YELLOW	Display the object with the yellow color attribute
BLUE	Display the object with the blue color attribute
MAGENTA	Display the object with the magenta color attribute
CYAN	Display the object with the cyan color attribute
WHITE	Display the object with the white color attribute
MOVEA(r,c)	Move an object to an absolute row,column (r,c) screen position
MOVER(r,c)	Move an object a relative number of row,column (r,c) screen positions

Not all of the actions listed in the above table are available for every terminal type. For example, the color attributes are supported only for supported color terminals. Also, you should ensure that multiple actions from this group are selected logically - in a way that will make sense. For example, indicating an action of BLUE;GREEN makes no sense as the terminal is not capable of showing a combination of these attributes. The ADS system does NOT attempt to flag such usage as illegal - it is up to the user to choose the correct attributes.

The beginning point for both the relative and absolute movement of an object (MOVER and MOVEA commands, respectively) is at the lower left-hand corner of the object. Movement may be in either a positive or negative direction. Positive direction of movement is to the right for horizontal movement and downwards for vertical movement.

Use of the MOVER (move relative) action must be handled with care. In general, the related range should be a single value and not a value range. An action is carried out when there has been an actual change in value, not just when there has been a change in range.

For example, assume that a MOVER action is associated with the range 12 and another MOVER action is associated with the range 10:20. For the former case, the MOVER action will occur the first time the controlling value evaluates to 12. In this case, only a single MOVER action can occur for the associated range. However, in the latter case the MOVER action will occur whenever the controlling value transitions to 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 or 20. In this case, if the controlling value is being incremented by 1, the MOVER action has the possibility (depending on the controlling value's scan rate) of being executed 11 times for a single range.

Note

When moving dynamic objects on a screen, it is important to note that each dynamic object is processed in the alphabetical order of the dynamic object names. You can use this fact to control which dynamic object should have precedence if more than one occupies the same position on the screen.

Actions Which Cause an Event to Occur

The second category of actions, actions which cause some event to occur within the system, are summarized in the following groups of tables. A command script (see *Command Script* later in this chapter) may also be referenced. The <object list> key may be used to obtain a list of existing command scripts or to create a new one. See Section 7 "Command Scripts" later in this chapter for details on individual commands.

Table 3-6. Get PLC Data

Action	Description
PLCGETB(loc[1])	Get a STATE value from location loc.
PLCGETBY(loc[1])	Get a BYTE value from location loc.
PLCGETW(loc[1])	Get an UNSIGNED WORD value from location loc.
PLCGETI(loc[1])	Get a SIGNED WORD value from location loc.
PLCGETL(loc[1])	Get an UNSIGNED LONGWORD value from location loc.
PLCGETS(loc[1])	Get a SIGNED LONGWORD value from location loc.
PLCGETF(loc[1])	Get a FLOATING POINT value from location loc.

[1] The syntax for specifying the loc reference is the same as for specifying a PLC data source location (refer to PLC Data Sources for details), *except* that the references must be consecutive within the same PLC memory type. For example, PLCGETW(R1) and PLCGETW(R1[1,9]) are valid, but PLCGETW(R1[1];R2[5-9]) and PLCGETW(R1[0-14];Q1) are not.

Table 3-7. Set PLC Data

Action	Description
PLCSETB(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to STATE value v (or prompt if no v).
PLCSETBY(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to UNSIGNED BYTE value v (or prompt if no v).
PLCSETW(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to UNSIGNED WORD value v (or prompt if no v).
PLCSETI(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to SIGNED WORD value v (or prompt if no v).
PLCSETL(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to UNSIGNED LONGWORD value v (or prompt if no v).
PLCSETS(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to SIGNED LONGWORD value v (or prompt if no v).
PLCSETF(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to FLOATING POINT value v (or prompt if no v).

[1] The syntax for specifying the loc reference is the same as for specifying a PLC data source location (refer to PLC Data Sources for details), *except* that the references must be consecutive within the same PLC memory type. For example, PLCGETW(R1) and PLCGETW(R1[1,9]) are valid, but PLCSETW(R1[1];R2[5-9]) and PLCSETW(R1[0-14];Q1) are not.

[2] If no value parameter is specified a prompt will appear on the terminal's display line asking you to input a value. STATE values are specified as 0 for OFF and 1 for ON.

[3] An optional 1-19 character prompt may be specified; any alphanumeric character plus ":".

[4] An additional calculation may be optionally specified; the additional calculation may be either a translation table entry, a lookup table entry or an engineering units conversion table entry.

[5] Min / Max bounding of the user's entry for value v may be optionally specified.

Table 3-8. Screen Commands

Action	Description
SCREEN(n[1])	Remove all screens and go to screen n.
PSHSCN(n[1],r,c)	Overlay screen n at optionally specified row and column positions r and c.
POPSCN(n[2])	Remove last screen overlaid, or all down to and including n.
REMSCN(n[2])	Remove last screen overlaid, or *only* n.

[1] If n = 0 a prompt will appear on the terminal's display line asking you to specify the screen / alarm page to be selected.

[2] If n = 0 only the most recently pushed screen / alarm page will be removed from the terminal display.

Table 3-9. Alarm Page Commands

Action	Description
ALARM(n[3])	Remove all alarm pages and overlay n.
PSHALM(n[1])	Overlay alarm page n.
POPALM(n[2])	Remove last alarm page overlaid, or all down to and including n.
REMALM(n[2])	Remove last alarm page overlaid, or *only* n.
CLRALM()	Remove all currently displayed alarm pages.

[1] If n = 0 a prompt will appear on the terminal's display line asking you to specify the screen / alarm page to be selected.

[2] If n = 0 only the most recently pushed screen / alarm page will be removed from the terminal display.

[3] If n = 0 all alarm pages will be removed from the screen and no new alarm page will be displayed.

Table 3-10. Alarm Source Related Commands

Action	Description
ACTION_OFF()	Disable actions associated with alarms.
ACTION_ON()	Enable actions associated with alarms.
ACK_ALARM()	Acknowledges all alarms in system.
ACK_ALARM(<page number>)	Acknowledges all alarms on a page.
ACK_ALARM(<alarm source>)	Acknowledges a particular alarm.

Table 3-11. Option Module Access Commands

Action	Description
PLC_FAULT(f,b)	Display the PLC Fault table screen with optionally specified foreground and background colors f and b.
IO_FAULT(f,b)	Display the I / O Fault table screen with optionally specified foreground and background colors f and b.
SETUP_LOOP(f,b)	Display the PID Loop Setup screen with optionally specified foreground and background colors f and b.
CONFIGURE_LOOP(f,b)	Display the PID Loop Configure screen with optionally specified foreground and background colors f and b.
MONITOR_LOOP(f,b)	Display the PID Loop Monitor screen with optionally specified foreground and background colors f and b.
TUNE_LOOP(f,b)	Display the PID Loop Tuning screen with optionally specified foreground and background colors f and b.

Table 3-12. Dynamic Object Related Commands

Action	Description
ATTACH(n,o,d,c)	Attach dynamic object o (on screen n) to (optionally) PLC data source d using (optionally) new calculation c.
DYN_EDIT(n,o,v)	Enter edit mode for dynamic object o on screen n using video highlight v to indicate editing mode.
SCN_EDIT(n,v)	Enter edit mode for all editable dynamic objects on screen n using video highlight v to indicate editing mode for object.
WAIT_DATA(n,o)	Pause until data next scanned for dynamic object o on screen n.

Table 3-13. Miscellaneous Commands

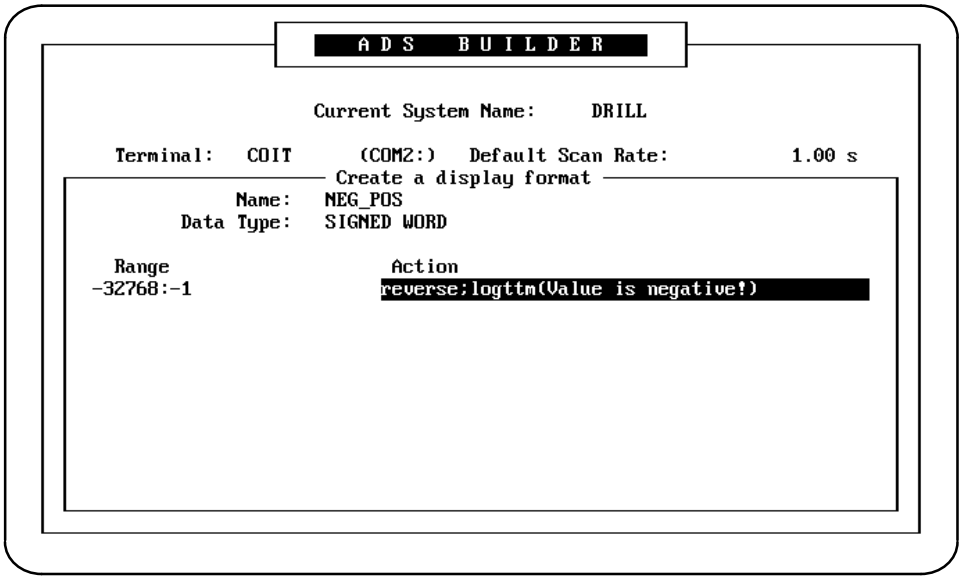
Action	Description
LOGTTM(x)	Log message x to message line on screen.
LOGMES(x)	Log message x to attached printer and to message line on screen.
REPORT(n)	Output report n to the attached printer.
HELP(n)	Overlay help screen indexed by n.
TTDUMP()	Output the terminal's screen to the attached printer.
REFRSH()	Clear and rewrite the screen.
PORTW(p,t)	Output text string to port.
EXIT()	Exit the ADS system.

For more details on the syntax of specifying the above commands, as well as for more details on how to use the commands, refer to the discussion on Command Scripts found later in this chapter.

Caution

Care should be exercised in using any of the SCREEN, ALARM, PSHSCN, POPSCN, or REMSCN commands. While these commands can be powerful in certain circumstances when used with display formats, it is easy to "abuse" their use, and can result in unwanted system behavior (such as lockup of the system execution). In almost all cases alarm sources should be used instead of display formats with those commands for "event driven" screen changes.

As an example of assigning an Action to a range, assume that whenever the associated range is satisfied that the related object should be displayed in reverse video and that the message text, "Value is negative!", should be displayed on the terminal's display line. To do this type the desired commands into the *Action* field.



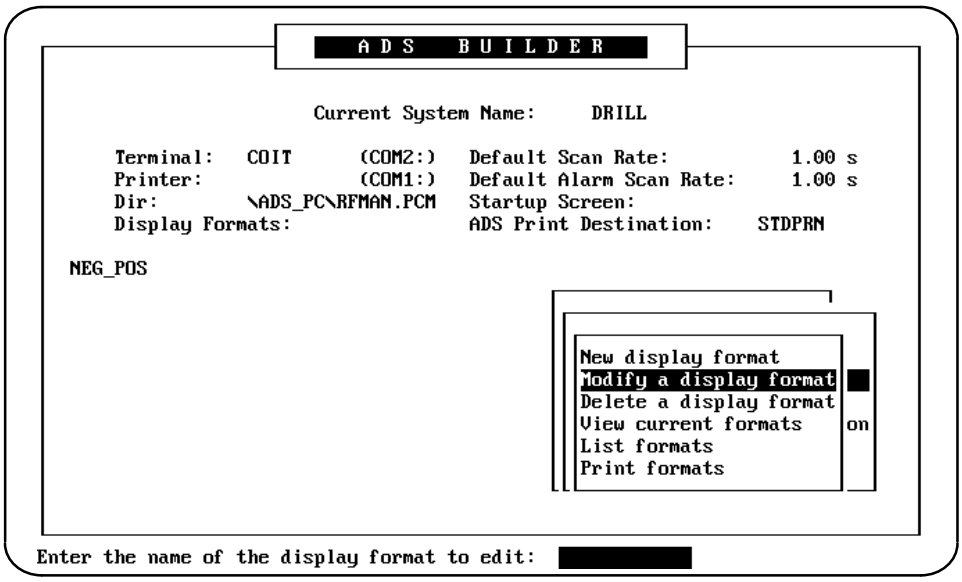
To complete the entry of the action, press the [Enter] key. The entry will be completed and the next *range* field is selected (if more are listed). It is important to remember that all range / action pairs need to be specified to have the system perform as expected. If, for example, an object is to be displayed in red for the range 200:600, but invisible all other times, then you must explicitly indicate the ranges for which the object should be invisible. If a pertinent range is not specified, the effect will be that NO ACTION occurs rather than an assumed default action.

When all the required information has been entered, press the <Save> key from any field or the [Enter] key when on the tenth (bottom) action field to complete the creation of the display format. The ADS system then verifies that the information which has been entered is consistent. If no errors are found the menu screen will be displayed, along with an informative message indicating that the display format has been added to the system. Also, the name of the newly created display format is listed on the screen.

Modify a Display Format

An existing display format may be modified in much the same manner in which it was originally created. All information concerning the display format may be changed except its name. Changing the name of a display format requires the name to first be deleted, and then be recreated with the desired new name.

To initiate a display format modification, first select the Modify a display format menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [M] key.



The ADS system will prompt for the name of the display format to be modified. Only existing display formats may be modified; the New display format menu The desired display format name (NEG_POS) is typed into the prompt field. When the [Enter] key is pressed the form for the specified display format is displayed with the Data Type field initially selected.

At this point, you can proceed to change any of the fields (except the Name field). Pressing the <Save> key from any field or the [Enter] key with the tenth action field selected will complete the modification. You are returned to the menu page with an informative message displayed on the status line indicating the modification was completed.

The ADS system does not prevent the data type of a display format being modified to a value which may conflict with the display format's use elsewhere in the system. Protection is built into the ADS Executor to prevent any abnormal behavior from occurring at run time, however you should use caution when changing data types of display formats that have already been used in the system.

If you change your mind and wish to cancel the modification, disregarding any changes which have been made, press the <Quit> key. An informative message is then displayed on the status line indicating that no changes were made to the display format. If you should specify a display format which does not currently exist, you will be returned to the menu page with the message

Invalid display format specified

displayed on the status line.

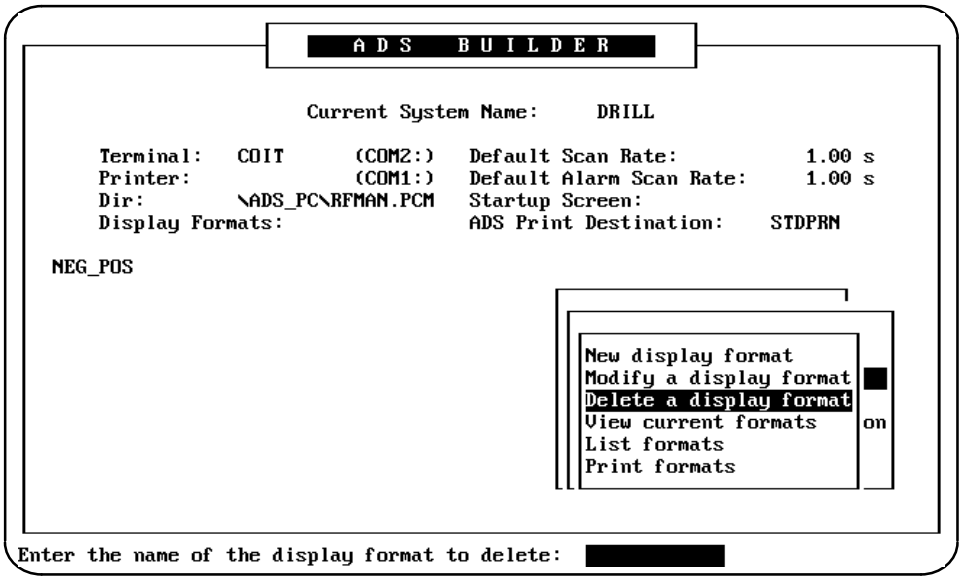
Delete a Display Format

A display format may be (irrecoverably) removed from a system by deleting it.

Note

You must exercise caution to not delete a display format referenced by a dynamic object on some screen.

To initiate a display format deletion, first select the Delete a display format menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [D] key.



The ADS system will prompt for the name of the display format to be deleted. As indicated above, only existing display formats which are not referenced on any screen in the system should be deleted.

For example, assume that the the display format NEG_POS is to be deleted. Type the desired display format name (NEG_POS) into the prompt field. Upon pressing the [Enter] key the current form for the display format is displayed on the screen along with a prompt on the status line asking you to confirm the delete or Quit.

If the [Enter] key is pressed at this point, the display format will be deleted from the system. Upon deletion of the display format, you are returned to the menu page with an informative message displayed on the status line indicating that the deletion was completed.

If the <Quit> key is pressed, indicating that the display format deletion should be canceled, you will be returned to the menu page (no message will be displayed to indicate that the deletion was aborted).

If you specify a display format which does not currently exist, the user will be returned to the menu page with the message

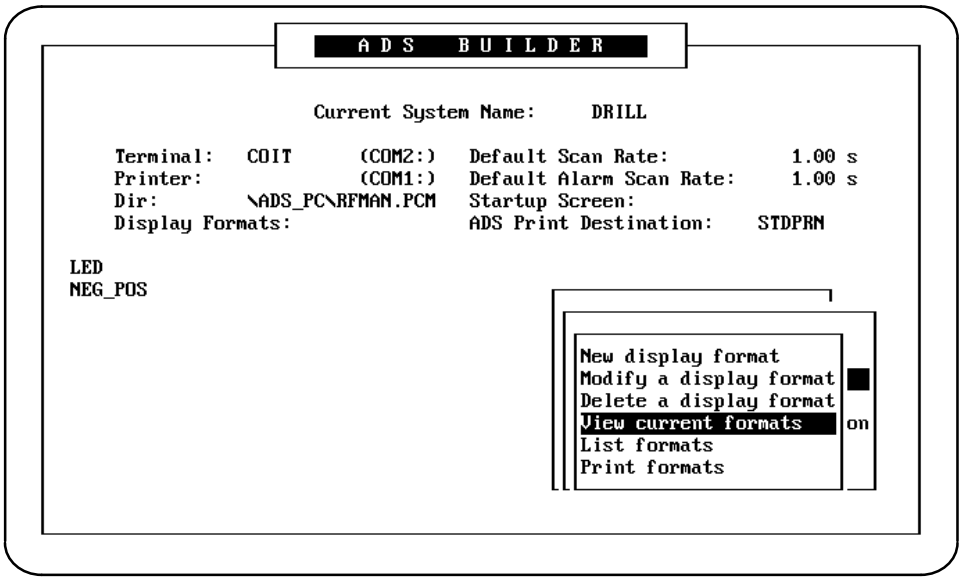
Invalid display format specified

displayed on the status line.

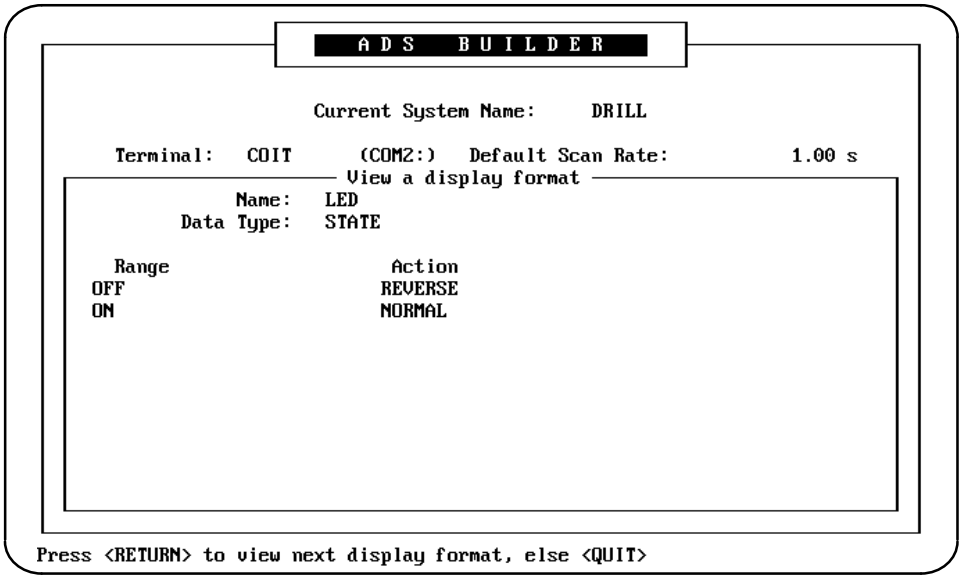
View Current Formats

The ADS system allows you to view all the existing display formats in a system one by one, in alphabetical order.

To initiate viewing a system's display formats, first select the View current format menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [lbV] key.



In this example sequence, two display formats named LED and NEG_POS are currently defined in the system. When the [Enter] key is pressed the form for the first display format is displayed (LED) along with a prompt on the status line giving the user the choice of viewing the next display format in the list or of quitting the view function.

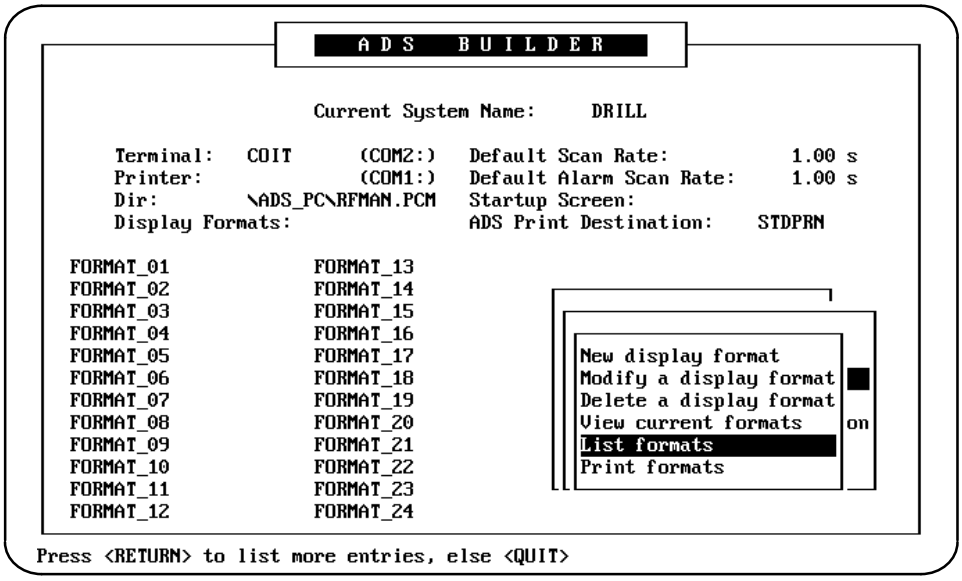


Pressing the [Enter] key at this point will display the next display format in the list, NEG_POS. Pressing the [Enter] key again will return you to the menu page since NEG_POS is the last display format in the list.

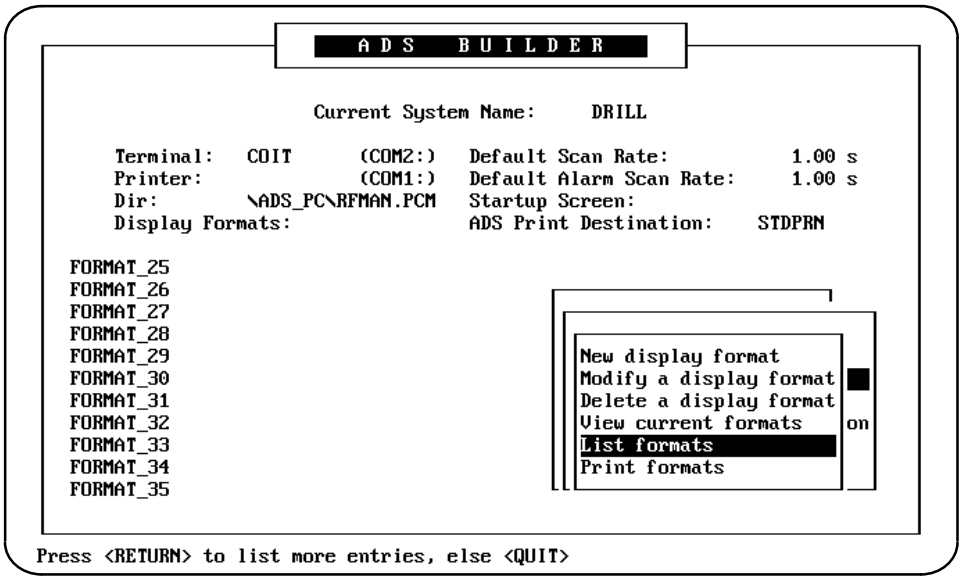
List Formats

On the left-hand side of the screen a list of display format names is maintained in alphabetical order. The ADS system allows you to page through the total list of display format names. To initiate the listing of a system's display format names, first select the List formats menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [L] key.

In this example sequence, thirty five display formats are currently defined in the system. When the [Enter] key is pressed the first (in alphabetical order) group of display format names is displayed along with a prompt on the status line giving the choice of listing the next group of display format names or of quitting the list function.



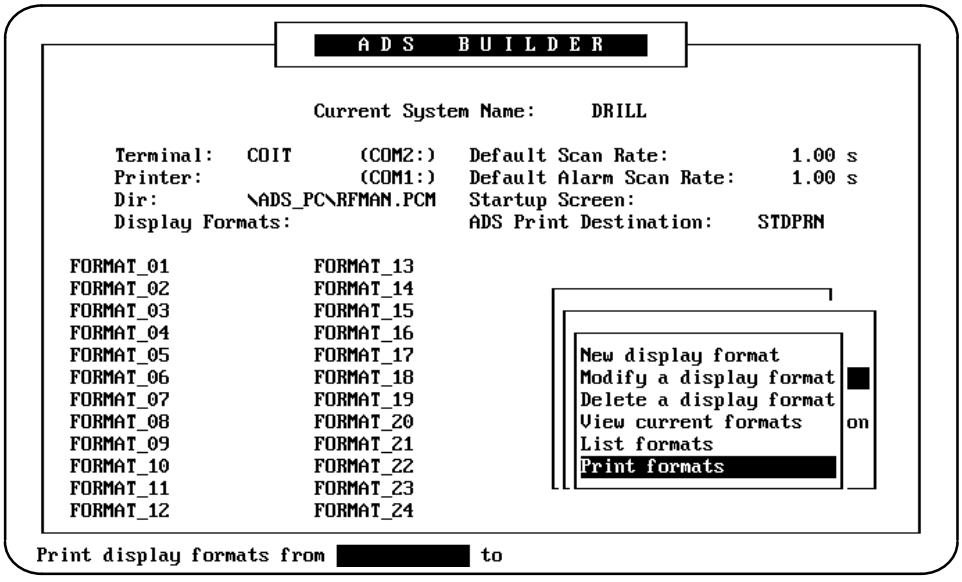
Pressing the [Enter] key at this point will display the remaining thirteen display format names.



Pressing the <Quit> key exits the list operation. The display format names currently displayed on the screen will be left displayed.

Print Formats

The Print formats option allows the details of the defined display formats to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module and Spooler are installed. To initiate a print of the defined display formats, select the Print formats option by either cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

```
Print print formats from ################ to ################
```

Depending upon the response entered into the from and to field, several different listings can be generated. The listing options are as shown below.

```
from  = "<id1>"   to  = "<id2>"   -->  print out data sources id1 to id2
from  = "<id1>"   to  = ""        -->  print out data source id1
from  = ""        to  = "<id2>"   -->  print out data source id2
from  = "*"       to  = "<id2>"   -->  print out all data sources up to id2
from  = "<id1>"   to  = "*"       -->  print out all data sources from il1
from  = "*"       to  = ""        -->  print out all data sources
from  = ""        to  = "*"       -->  print out all data sources
from  = "*"       to  = "*"       -->  print out all data sources
```

Pressing the <Quit> key aborts the print operation. After selection of the required range of display formats to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see Load / Save Operations, Chapter 9).

Display format information is formatted as shown in the following example:

```
            DISPLAY FORMAT LISTING
            ----------------------

    Display Format : COLOR_CHANGE        Data Type : WORD

                     Range                  Action
                      0:10                  GREEN
                     11:20                  YELLOW
                     21:30                  RED
```

Error Messages for Display Formats

Error messages and their causes for Display Formats are listed below.

ENTRY ERROR :: Display format name not unique

Two display formats may not have the same name.

ENTRY ERROR :: No Display format name

A name must be specified.

Entry Error (#n) - Invalid item XXXX

The action command ”XXXX” specified for line number ”n” is unknown.

Entry Error - Range/Action values, line #n

Range specification for line number ”n” is invalid, or of the wrong form for the specified data type.

Note

See Section 7, ”Command Scripts”, for a list of error messages pertaining to particular commands.

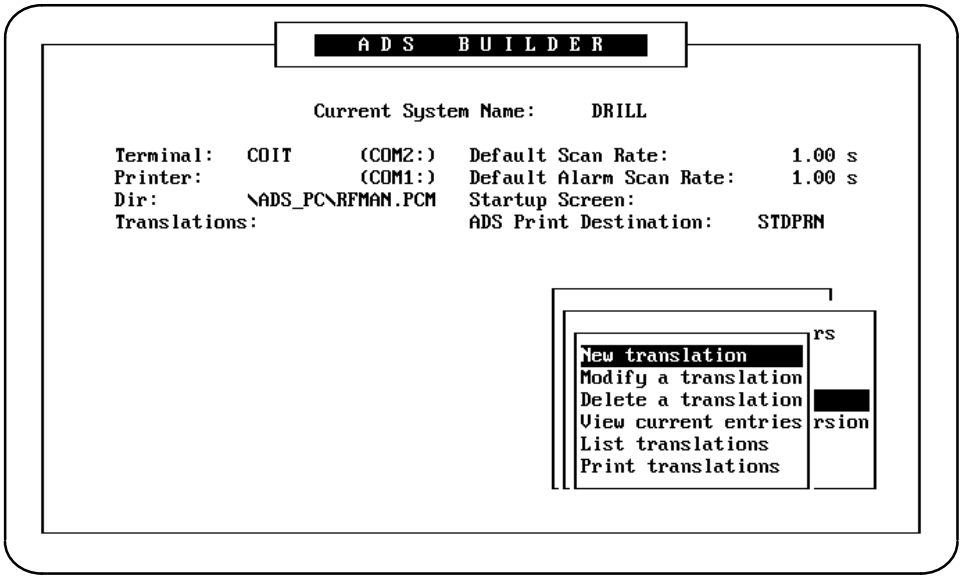
Section 4: Translation Table

Translation table entries must be defined to perform linear scale translations with optional data type conversion on numerical input data. Where a data type conversion is not specified, the input data type remains unchanged following the translation. Truncation of the translated value will be performed if necessary to maintain the data type. Translation table entries are intended to provide a globally accessible method for dealing with translations without the need to individually specify rules for every PLC data source or dynamic object created. There is no predefined limit on the number of translation table entries which may be defined for a given system; you are constrained only by the amount of available memory on the ADC module.

Your translation table entries can either be defined here before referencing them with a PLC data source, alarm source or with a dynamic object (see Screen Operations, Chapter 4), or they can be created from within the PLC data source, or alarm source creation menu or from within the Screen Painter when creating a dynamic object.

In order to access the *Translation table* submenu, first cursor to the appropriate menu selection (Translation table). When the [Enter] key is pressed, the Translation table submenu is accessed. Another menu window is opened on the screen, giving the additional options of

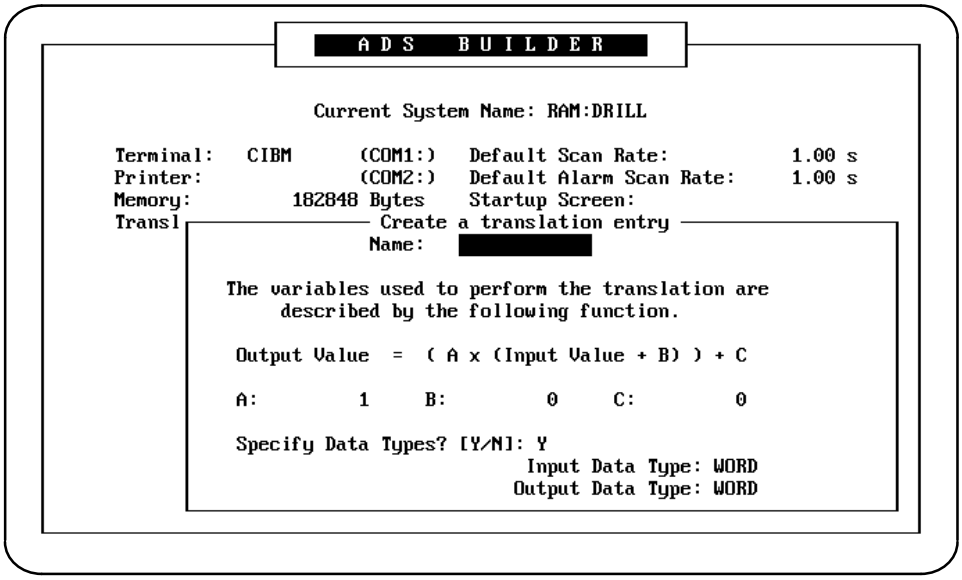
- *New translation;*
- *Modify a translation;*
- *Delete a translation;*
- *View current translations;*
- *List translations;*
- *Print translations.*



Each of these options is described on the following pages. Note that the status information formerly displayed along the left hand side of the screen has been replaced with a heading *Translations*. As translation table entries are created, a list of those entries will be maintained in this area.

New Translation

When the *New translation* option is selected, a data entry window is opened containing seven fields which you can fill in. These fields are: *Name*, the three translation equation fields *A*, *B* and *C*, *Specify Data Types*, *Input Data Type*, and *Output Data type*. A discussion of each field follows.



Name

Every translation table entry must be given a name. This name must be unique with regards to translation table, engineering units conversion table and lookup table entry names, but does not need to be unique from all other names in the ADS system. For example, a PLC data source might be named NEW_VALUE and a translation table entry might also be named NEW_VALUE. A name may be from one to twelve alphanumeric and underscore characters, and is NOT case sensitive.

For example, assume that you want to create a translation table entry with the name ONE_HALF. Type the name ONE_HALF into the *Name* field. To complete the entry press the [Enter] key. Note that after you press the [Enter] key to complete the name entry the next field, which is equation field *A*, is selected.

Translation Equation

The translation equation defines the linear scaling to be applied to the input data value. This equation is represented by the function

```
New Value = ( A * (Input Value + B) ) + C
```

where

```
A is the scaling factor
B is the pre-scaling offset
C is the post-scaling offset.
```

A, B and C are stored as floating point numbers.

The following table defines the possible value range for each parameter.

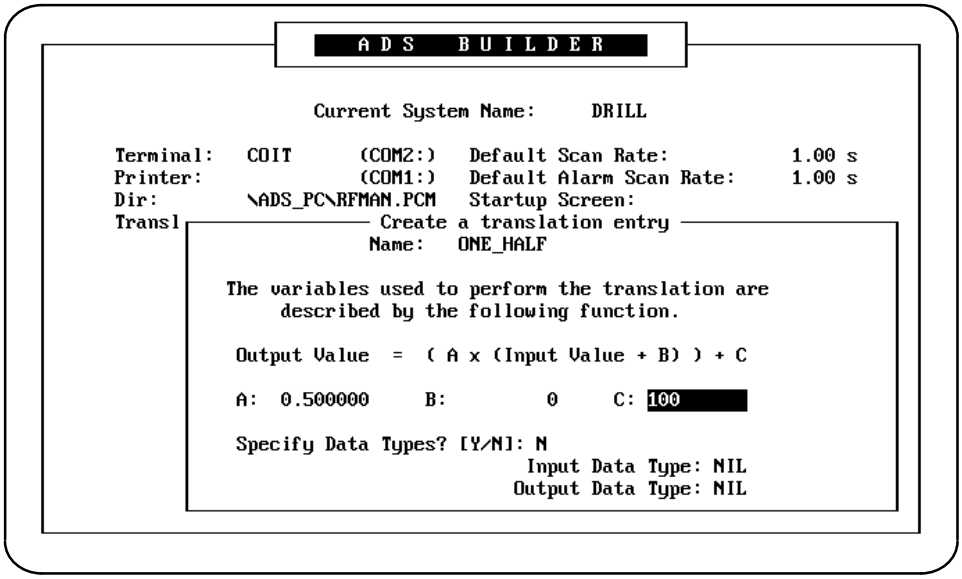
Table 3-14. Data Range for a Translation Equation

Parameter	Minimum Value	Maximum Value
A	–100000000	+1000000000
B	–100000000	+1000000000
C	–100000000	+1000000000

(1) Only 7 digits of precision.
(2) Maximum of 6 digits to right of decimal point.

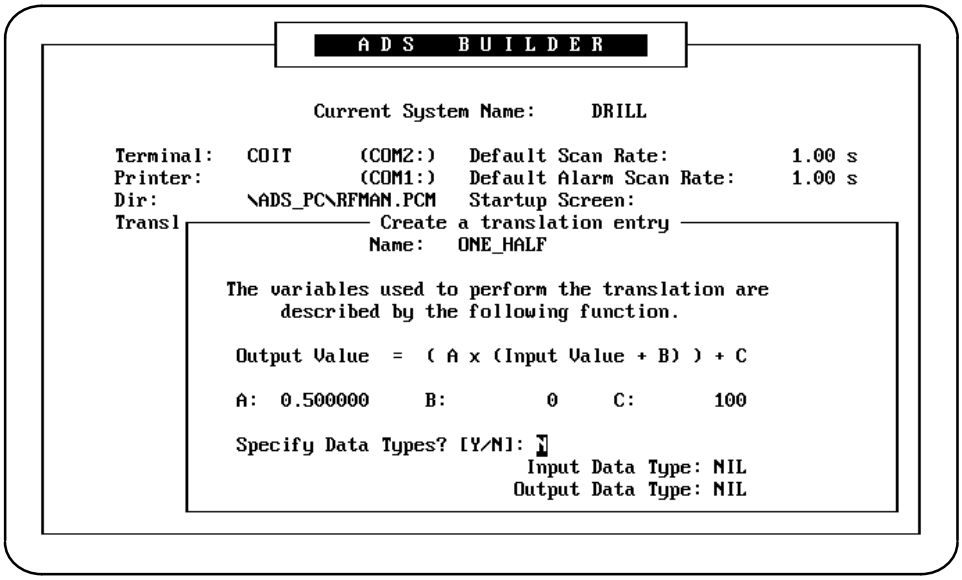
All three parameters of the equation must be provided. If a particular parameter is unwanted, that parameter should be specified as zero (0). By default, the ADS system assigns the values A=1, B=0 and C=0; the default translation thus yields the same value as the input data value.

As an example of creating a translation table entry, assume that you want to scale an input value so that the resulting translated value was 1/2 the input value with a post-scaling offset of 100. You would first type in 0.5 for the scaling factor. To complete the entry of the scaling factor, press the [Enter] key. Note that the next term, the pre-scaling offset, is then selected. Since, in this example, you do not wish to employ a pre-scaling factor, the default value of 0 is left unchanged. To access the final parameter, the post-scaling factor, press the [Enter] key. You now type in the desired post-scaling factor, 100. The following example screen shows all of the factors entered in their respective fields.



Pressing the [Enter] key at this point completes the entry of the post-scaling factor.

The next screen displayed has a Specify Data Types field which must be completed.



Specify Data Types

The Specify Data Types flag indicates whether or not data type conversion is to occur PRIOR to the translation being performed.

For example, if a translation equation with A, B, and C terms of 0.01, 0, 0 is defined (that is, divide the input value by 100 with no pre or post offset) and applied to an input value of type WORD, the result will be truncated to a WORD value (for example, a result of 1.24 will become 1). If, on the other hand, the input data type is first converted to FLOAT, the result will retain its decimal precision.

To indicate that Data Types are to be specified, enter Y in the Specify Data Types field. If N is entered into the field, the next two fields (Input and Output Data Type) are skipped.

Input Data Type

If the Specify Data Type flag has been set to Y, the Input Data Type is used to indicate the data type of values passed to the translation table entry. Valid data types are:

Table 3-15. Input Data Types Supported for Translation Tables

Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.9 to +9999999999.99 †

† Only 7 digits of precision.

If the Specify Data Type flag has been set to N, the Input Data Type field will be set to NIL.

Output Data Type

If the Specify Data Type flag has been set to Y, the Output Data Type is used to indicate the data type that the input value is to be converted to prior to the translation equation being applied. This data type becomes the output data type of the translation table entry.

As an example of data type conversion, assume that you want to store floating point values as word values in the PLC. This might be done by multiplying the floating point value by 100 prior to storage in the PLC and then dividing the value by 100 after subsequent retrieval. Taking into account truncation of values, this would mean that a value such as 1.456 would be stored in the PLC as 145 (that is, 1.456 multiplied by 100 equals 145.6 and then truncated to a word value gives 145). When retrieved, the value is then divided by 100, yielding a value of 1.45.

The translation equation terms A, B, and C would be defined as 0.01, 0, and 0 respectively (that is, multiply by 0.01 with a 0 pre offset and 0 post offset). The Specify Data Type flag would set to Y, with Input Data Type as WORD and Output Data Type as FLOATING POINT.

Table 3-16. Output Data Types Supported for Translation Tables

Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.9 to +9999999999.99 †

† Only 7 digits of precision.

If the Specify Data Type flag has been set to N, the Input Data Type field will be set to NIL.

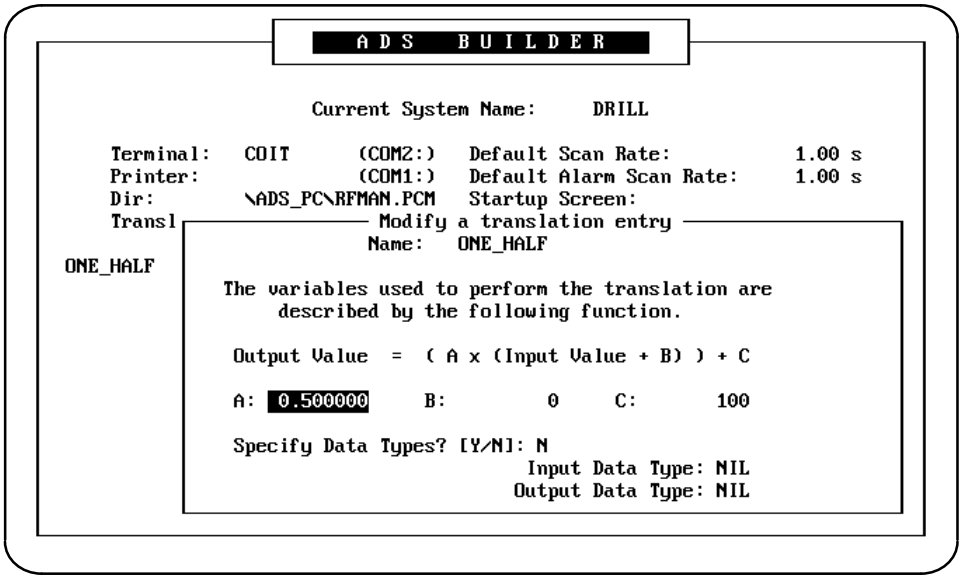
Pressing the [Enter] key at this point completes the entry of the translation table entry. An informative message is displayed on the status line indicating the completion of the translation table entry creation. Note that the just-completed translation table entry, ONE_HALF, is now listed in the status area of the screen (left-hand side) as an available translation table entry.

Modify a Translation

An existing translation table entry may be modified in much the same manner in which it was originally created. All information about the translation table entry may be changed except its name. Changing the name of a translation table entry requires you to first delete it and then recreate it with the new name.

To initiate a translation table entry modification, you must first select the Modify a translation menu option, either by cursoring to the Modify a translation option and then pressing the [Enter] key, or by pressing the [M] key. The ADS Builder will prompt you for the name of the translation table entry to be modified. Only existing translation table entries may be modified; the New translation menu option must be used in order to create a new translation table entry.

In this example, assume that you wish to modify the translation table entry, ONE_HALF. Type the translation table entry name (ONE_HALF) into the prompt field. When you press the [Enter] key the form for the specified translation table entry is displayed with the equation "A" field initially selected.



You can now proceed to change any of the fields (except the Name field). Pressing the [Enter] key with the last field selected or pressing the <Save> key from any field will complete the modification. You are returned to the menu page with an informative message displayed on the status line indicating that the modification was completed.

If you want to cancel the modification, disregarding any changes that have been made, press the <Quit> key. If this is done, an informative message is displayed on the status line indicating that no changes were made to the translation table entry.

If you should specify a translation table entry which does not currently exist, you will be returned to the menu page with the message

`Invalid translation entry specified`

displayed on the status line.

Delete a Translation

A translation table entry may be (irrecoverably) removed from a system by deleting it.

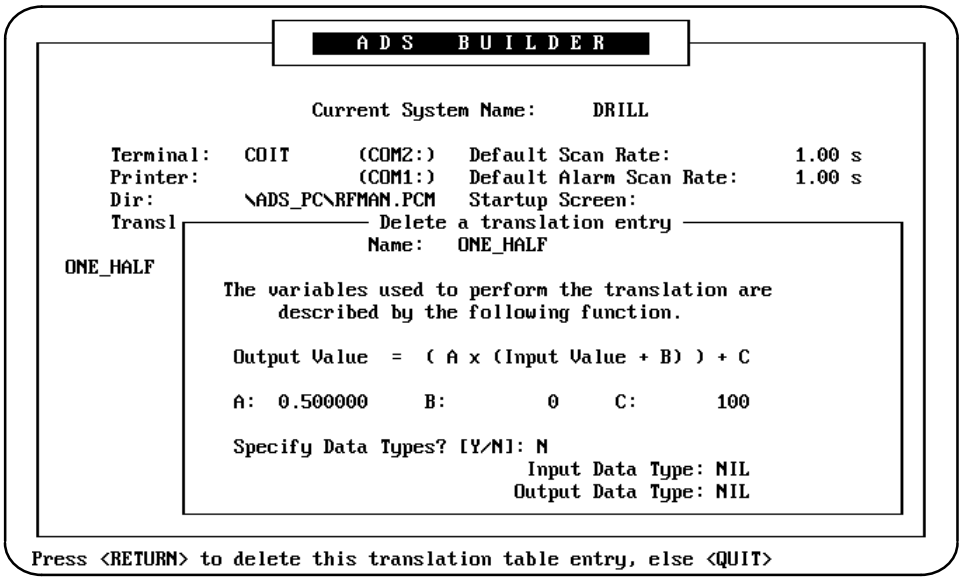
Note

You should exercise caution to not delete a translation table entry referenced by a dynamic object on any screen or report in the system.

To initiate a translation table entry deletion, you must first select the Delete a translation menu option, either by cursoring to the Delete a translation option and then pressing the [Enter] key, or by pressing the [D] key.

The ADS Builder will prompt you for the name of the translation table entry to be deleted. As indicated above, only existing translation table entries which are not referenced by any other object in the system should be deleted.

For example, assume that you want to delete the translation table entry ONE_HALF. Type the desired translation table entry name, ONE_HALF into the prompt field. When the [Enter] key is pressed, the form for the specified translation table entry is displayed on the screen along with a prompt on the status line asking you to either confirm the delete or Quit the operation.



If you press the [Enter] key at this point, the translation table entry will be deleted from the system. Upon deletion of the translation table entry, you are returned to the menu page with an informative message displayed on the status line indicating that the deletion was completed.

If you press the <Quit> key indicating that the translation table entry deletion should be canceled you will be returned to the menu page (no message will be displayed to indicate that the deletion was canceled). If you specify a translation table entry which does not currently exist, you will be returned to the menu page with the message

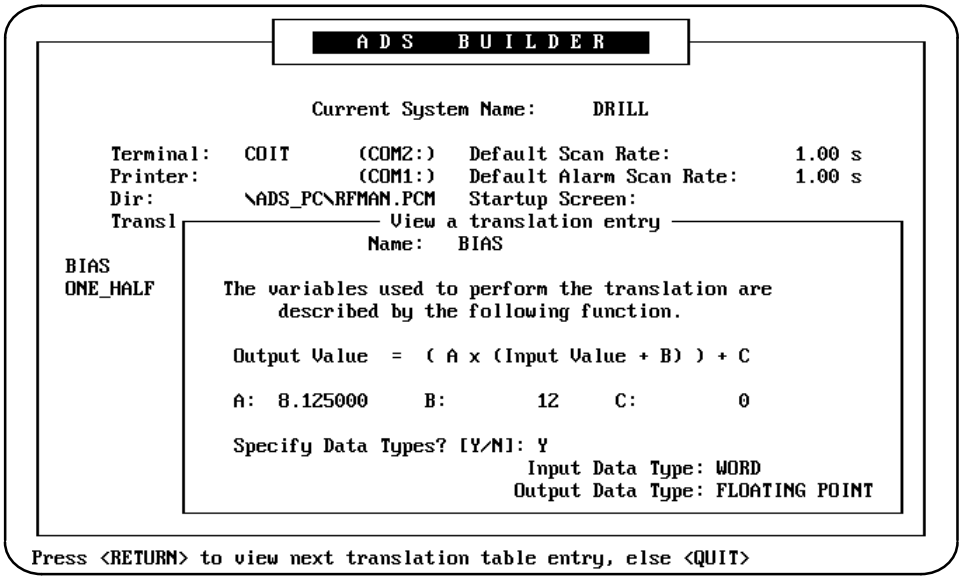
Invalid translation entry specified

displayed on the status line.

View Current Entries

The ADS Builder provides a way for you to view all the existing translation table entries in a system one by one, in alphabetical order. To initiate the viewing of a system's translation table entries, you must first select the View current entries menu option, either by cursoring to the View current entries option and then pressing the [Enter] key, or by pressing the [V] key.

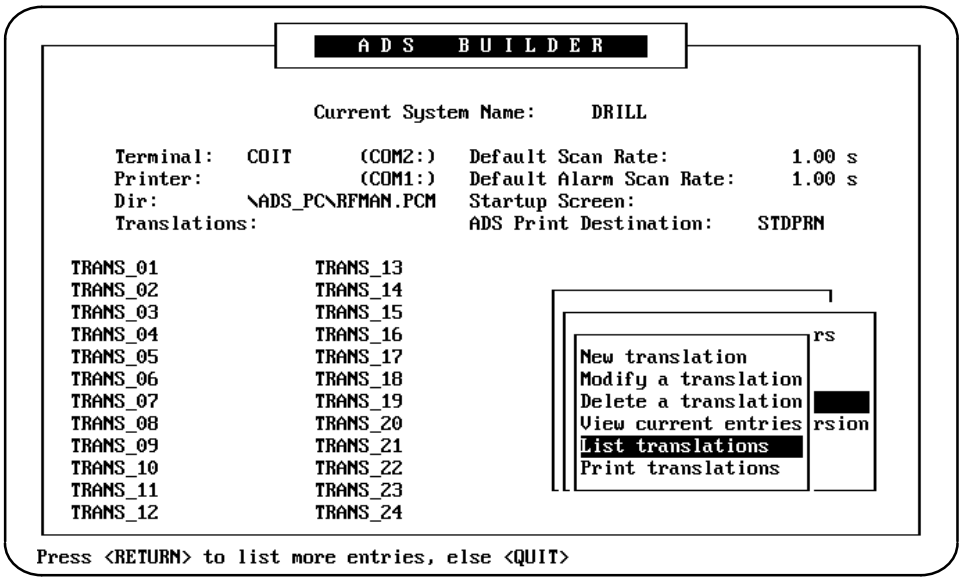
As an example of Viewing Current Entries, notice that two translation table entries are currently defined in the system: BIAS and ONE_HALF. When the [Enter] key is pressed, the form for the first translation table entry (BIAS) in the list is displayed along with a prompt on the status line giving you the choice of either viewing the next translation table entry in the list or quitting the view function.



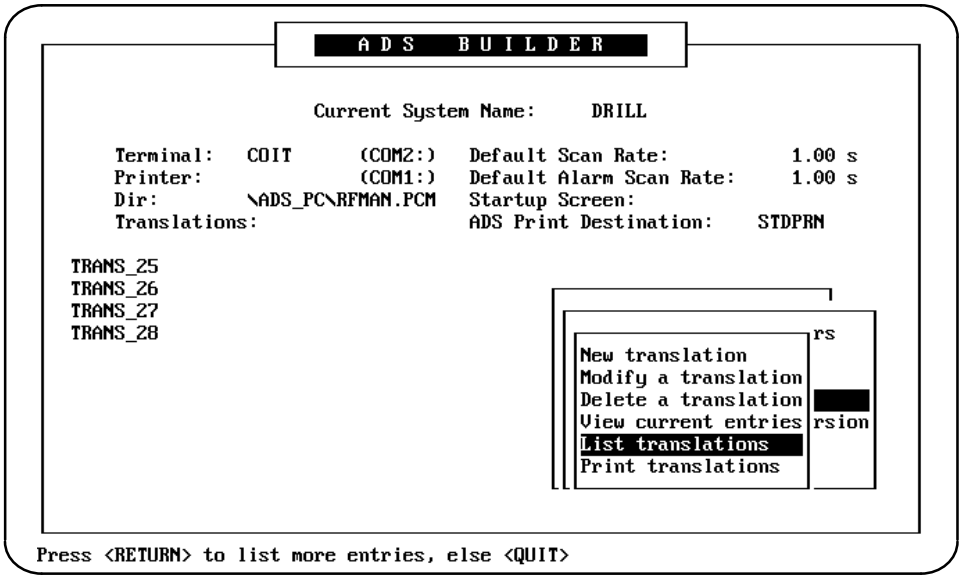
Pressing the [Enter] key at this point will display the next translation table entry in the list (ONE_HALF). Pressing the [Enter] key again will return you to the menu page since ONE_HALF is the last translation table entry in the list.

List Translations

On the left-hand side of the screen a list of translation table entry names is maintained in alphabetical order. The ADS Builder allows you to page through the total list of translation table entry names. To initiate the listing of a system's translation table entry names, first select the List translations menu option, either by cursoring to the List translations option and then pressing the [Enter] key, or by pressing the [L] key. In the example below, twenty-eight translation table entries are currently defined in the system. When the [Enter] key is pressed the first (in alphabetical order) group of translation table entry names is displayed along with a prompt on the status line giving you the choice of listing the next group or of quitting the list function.



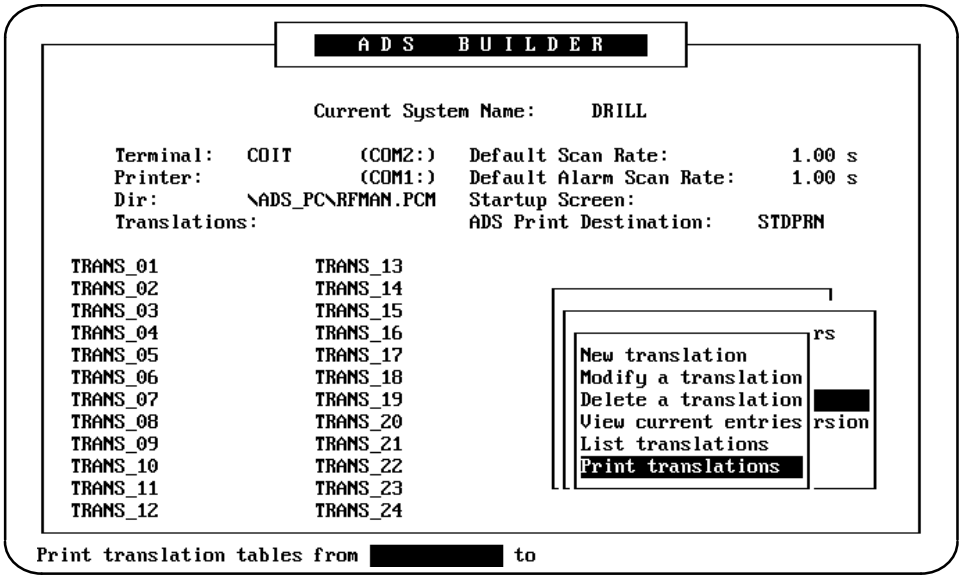
Pressing the [Enter] key at this point will display the remaining translation table entries.



Pressing the <Quit> key exits the list operation. The translation table entry names currently displayed on the screen will remain displayed.

Print Translations

The Print translation option allows the details of the defined translation tables to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module and Spooler are installed. To initiate a print of the defined translation table entries, select the Print translations option by either cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

Print translation tables from ################ to ################

Depending upon the response entered into the from and to fields, several different listings can be generated. The listing options are as shown below.

```
from = "<id1>"   to = "<id2>"   --> print out data sources id1 to id2
from = "<id1>"   to = ""        --> print out data source id1
from = ""        to = "<id2>"   --> print out data source id2
from = "*"       to = "<id2>"   --> print out all data sources up to id2
from = "<id1>"   to = "*"       --> print out all data sources from il1
from = "*"       to = ""        --> print out all data sources
from = ""        to = "*"       --> print out all data sources
from = "*"       to = "*"       --> print out all data sources
```

Pressing the <Quit> key cancels the print operation. After selection of the required range of translation table entries to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see Load / Save Operations, Chapter 9).

Translation table information is formatted as shown in the following examples:

```
          TRANSLATION LISTING
          -------------------

Translation : Times_10          Variables  A :        10
                                           B :         0
                                           C :         0

Input Data Type  : NIL          Output Data Type :  NIL

Translation : WORD_FLOAT        Variables  A :  0.100000
                                           B :         0
                                           C :         0

Input Data Type  : WORD         Output Data Type : FLOAT
```

Note

A data type of NIL for both the input data type and the output data type indicates that no data type conversion is to be performed.

Error Messages for Translation Tables

Error messages and their causes for Translation Tables are listed below.

ENTRY ERROR :: 'A' value cannot be zero

A scaler value ('A' term) of 0 is not permitted.

ENTRY ERROR :: No Translation entry name

A name must be specified.

ENTRY ERROR :: Translation name is not unique

ENTRY ERROR :: Translation name used in EUC table

ENTRY ERROR :: Translation name used in lookup table

A translation table entry name must be unique from any other translation table, engineering units conversion table, and lookup table entry name.

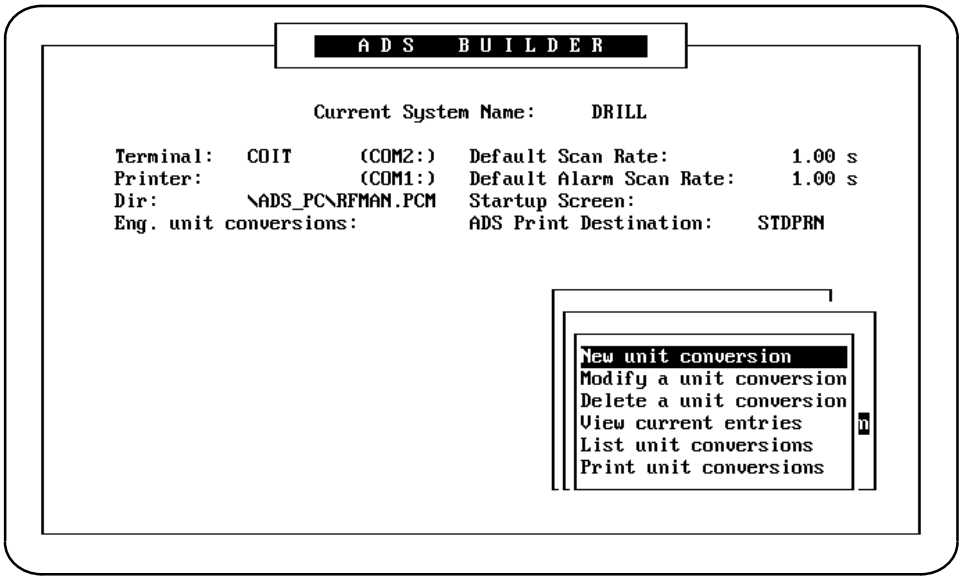
Section 5: Engineering Units Conversion Table

Engineering units conversion table entries may be defined to perform value conversion to engineering units with optional data type conversion on the input value. Where a data type conversion is not specified, the input data type remains unchanged following the engineering units conversion. Truncation of the converted value will be performed if necessary to maintain the data type. There is no predefined limit on the number of engineering unit conversion table entries which may be defined for a given system; you are constrained only by the amount of memory available on the ADC module.

Your engineering unit conversion table entries can either be defined here before referencing them with a PLC data source, alarm source or with a dynamic object (see Screen Operations, Chapter 4), or they can be created from within the PLC data source or alarm source creation menu or from within the Screen Painter when creating a dynamic object.

In order to access the Engineering units conversion submenu, first cursor to the appropriate menu selection (Engineering unit conversion). When the [Enter] key is pressed, the Engineering units conversion table submenu is accessed. Another menu window is opened on the screen, giving the additional options of

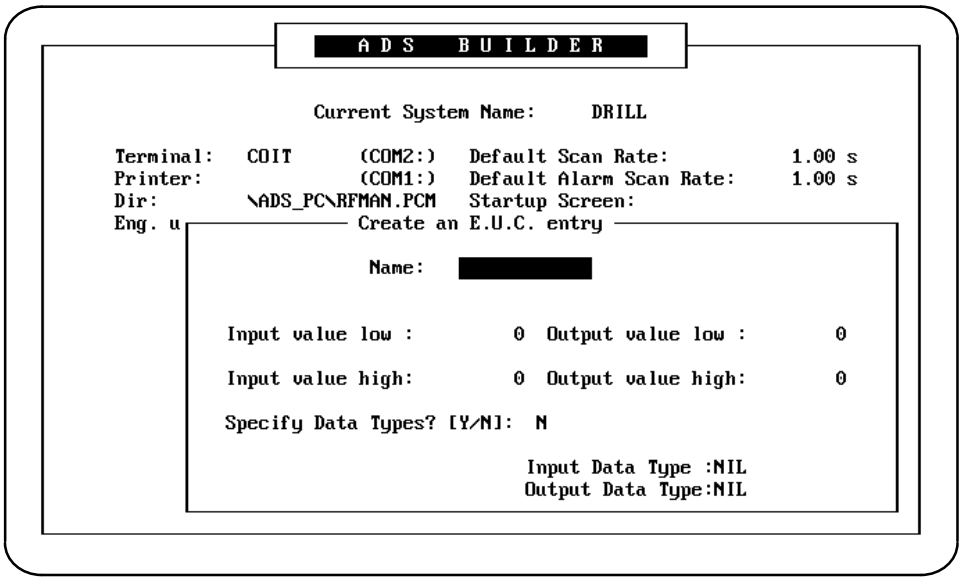
- *New unit conversion;*
- *Modify a unit conversion;*
- *Delete a unit conversion;*
- *View current entries;*
- *List unit conversions;*
- *Print unit conversions.*



Each of these options is described in the following pages. Note that the status information formerly displayed along the left hand side of the screen has been replaced with a heading *Eng. unit conversions.* As engineering units conversion table entries are created, a list of those entries will be maintained in this area.

New Unit Conversion

When the *New unit conversion* option is selected, a data entry window is opened containing eight fields which you can fill in. These fields are: *Name*, the two input value fields *Input value high* and *Input value low*, the two output value fields *Output value high* and *Output value low*, *Specify Data Types*, *Input Data Type* and *Output Data Type*. A discussion of each field follows.



Name

Every engineering units conversion table entry must be given a name. This name must be unique with regards to engineering units conversion table, translation table and lookup table entry names, but does not need to be unique from all other names in the ADS system. For example, a PLC data source might be named PRESSURE and an engineering units conversion table entry might also be named PRESSURE. A name may be from one to twelve alphanumeric and underscore characters, and is NOT case sensitive.

For example, assume that you want to create an engineering units conversion table entry with the name PERCENT. Type the name PERCENT into the *Name* field. To complete the entry press the [Enter] key. Note that after you press the [Enter] key to complete the name entry that the *Input value high* field is selected next.

Engineering Units Conversion Equation

The *Input value high* and *Input value low* fields define the upper and lower bound, respectively, which the input value is expected to be within. At runtime, should the input value be outside these limits, the value will be altered to the appropriate low or high boundary.

Likewise, the *Output value high* and *Output value low* fields define the upper and lower bound, respectively, within which the output value will range.

The actual equation applied to provide the engineering units conversion is as follows:

$$Xo = \frac{(X_i - I_1)(O_u - O_i}{I_u - I_1} + O_1$$

where

X_o = Output value

X_i = Input value

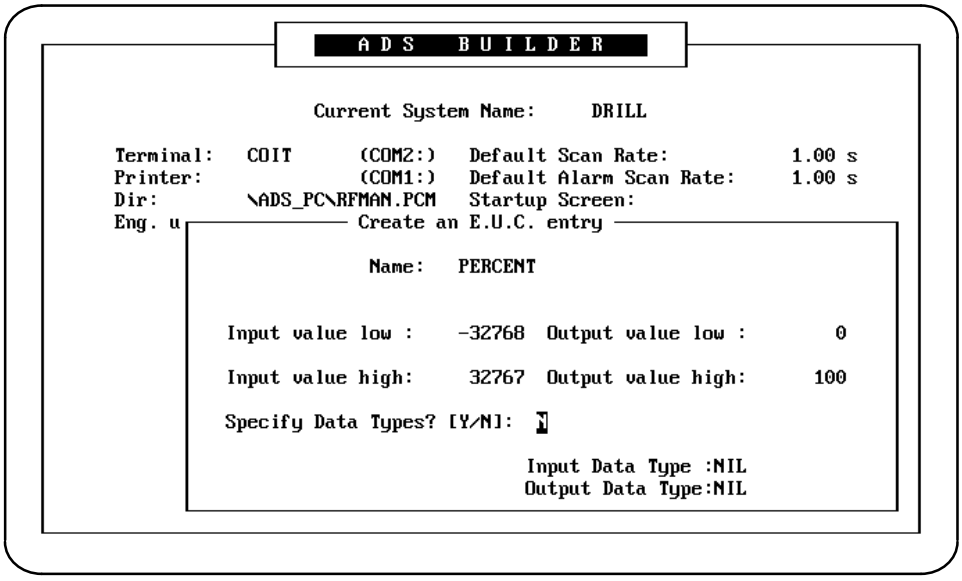
I_l = Input value low

I_u = Input value high

O_l = Output value low

O_u = Output value high

As an example of creating an engineering units conversion table entry, assume that you want to scale an input value in the range [–32768 .. 32767] to the range [0 .. 100]. You would type in 32767 for the *input value high* field, –32768 for the *input value low* field, 100 for the *output value high* field and 0 for the *output value low* field, pressing the [Enter] key to complete each entry. The following example screen shows all the equation values entered in their respective fields.



Specify Data Types

The *Specify Data Types* flag indicates whether or not data type conversion is to occur PRIOR to the engineering units conversion being performed.

For example, if an engineering units conversion is performed on an input value of a SIGNED WORD data type, the calculated output value will be truncated to a SIGNED WORD value as well (e.g., a result of 34.64 will become 34). If, on the other hand, the input data type is first converted to FLOAT, the result will retain its decimal precision.

To indicate that a data type conversion is to be specified, enter ”Y” in the Specify Data Types field. If ”N” is entered into the field, the next two fields (input and output data types) will be skipped.

Input Data Type

If the Specify Data Types flag has been set to Y, the *Input data type* field is used to indicate the data type of the value passed to the engineering units conversion table entry. Valid data types are:

Table 3-17. Input Data Types Supported for EUC Tables

Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.9 to +9999999999.99 †

† Only 7 digits of precision.

If the Specify Data Types flag has been set to "N", the Input Data Type field will be set to NIL.

Output Data Type

If the Specify Data Types flag has been set to "Y", the *Output data typ* field is used to indicate the data type that the input value is to be converted to prior to the engineering units conversion equation being applied. This data type becomes the output data type of the engineering units conversion table entry. Valid data types are:

Table 3-18. Output Data Types Supported for EUC Tables

Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.9 to +9999999999.99 †

† Only 7 digits of precision.

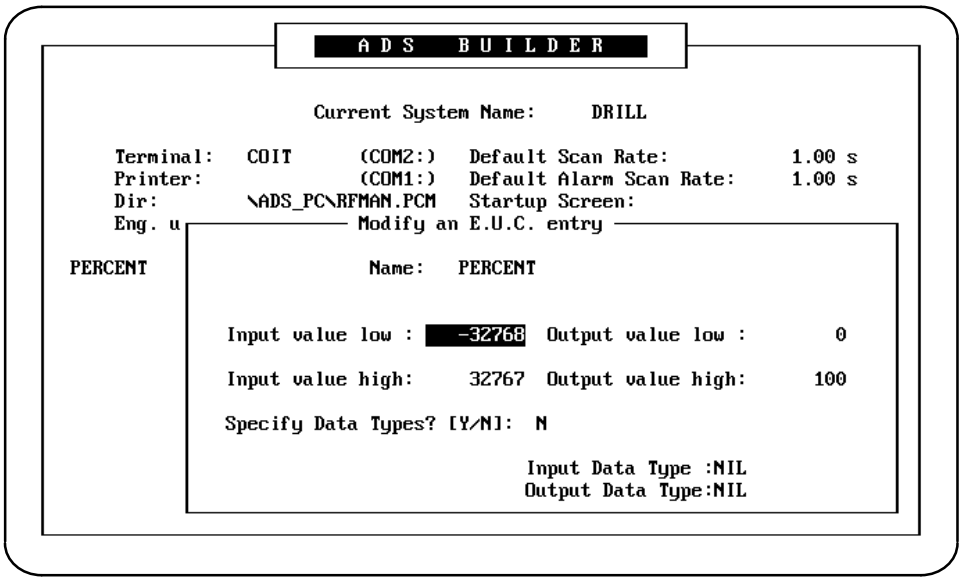
If the Specify Data Types flag has been set to "N", the Output Data Type field will be set to NIL.

Modify a Unit Conversion

An existing engineering units conversion table entry may be modified in much the same manner in which it was originally created. All information about the entry may be changed except its name. Changing the name of an engineering units conversion table entry requires you to first delete it and then recreate it with the new name.

To initiate an engineering units conversion table entry modification, you must first select the Modify a unit conversion menu option, either by cursoring to the option and then pressing the [Enter] key, or by pressing the [M] key. The ADS Builder will prompt you for the name of the engineering units conversion table entry to be modified. Only existing entries may be modified; the New unit conversion menu option must be used in order to create a new engineering units conversion table entry.

In this example, assume that you wish to modify the engineering units conversion table entry PERCENT. Type the entry name (PERCENT) into the prompt field. When you press the [Enter] key the form for the specified engineering units conversion table entry is displayed with the ”Input value high” field initially selected.



You can now proceed to change any of the fields except the Name field. Pressing the [Enter] key with the last field selected or pressing the <Save> key from any field will complete the modification. You are returned to the menu page with an informative message displayed on the status line indicating that the modification was completed.

If you want to cancel the modification, disregarding any changes that have been made, press the <Quit> key. If this is done, an informative message is displayed on the status line indicating that no changes were made to the engineering units conversion table entry.

If you should specify an engineering units conversion table entry which does not currently exist, you will be returned to the menu page with the message

`Invalid conversion entry specified`

displayed on the status line.

Delete a Unit Conversion

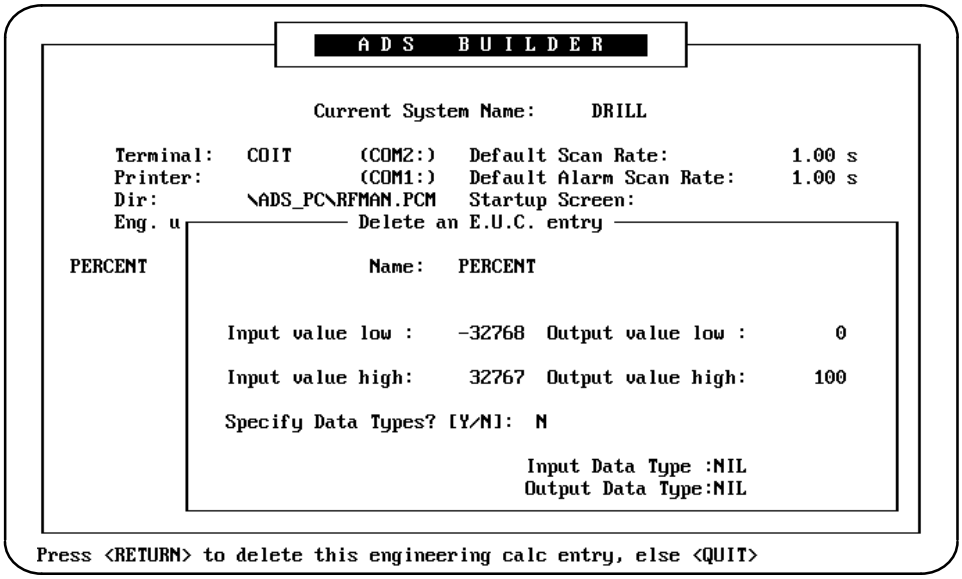
An engineering units conversion table entry may be (irrecoverably) removed from a system by deleting it.

Note

You should be careful to not delete an engineering units conversion table entry referenced by a dynamic object on any screen or report in the system.

To initiate an engineering units conversion table entry deletion, you must first select the *Delete a unit* conversion menu option, either by cursoring to the option and then pressing the [Enter] key, or by pressing the [D] key. The ADS Builder will prompt you for the name of the entry to be deleted. As indicated above, only existing engineering units conversion table entries which are not referenced by any other object in the system should be deleted.

For example, assume that you want to delete the engineering units conversion table entry PERCENT. Type the desired name, PERCENT, into the prompt field. When the [Enter] key is pressed, the form for the specified entry is displayed on the screen along with a prompt on the status line asking you to either confirm the delete or quit the operation.



If you press the [Enter] key at this point, the entry will be deleted from the system. When the engineering units conversion table entry is deleted, you are returned to the menu page with an informative message displayed on the status line indicating that the deletion was completed.

If you press the <Quit> key indicating that the engineering units conversion table entry deletion should be canceled you will be returned to the menu page (no message will be displayed to indicate that the deletion was canceled). If you specify an engineering units conversion table entry that does not currently exist, you will be returned to the menu page with the message

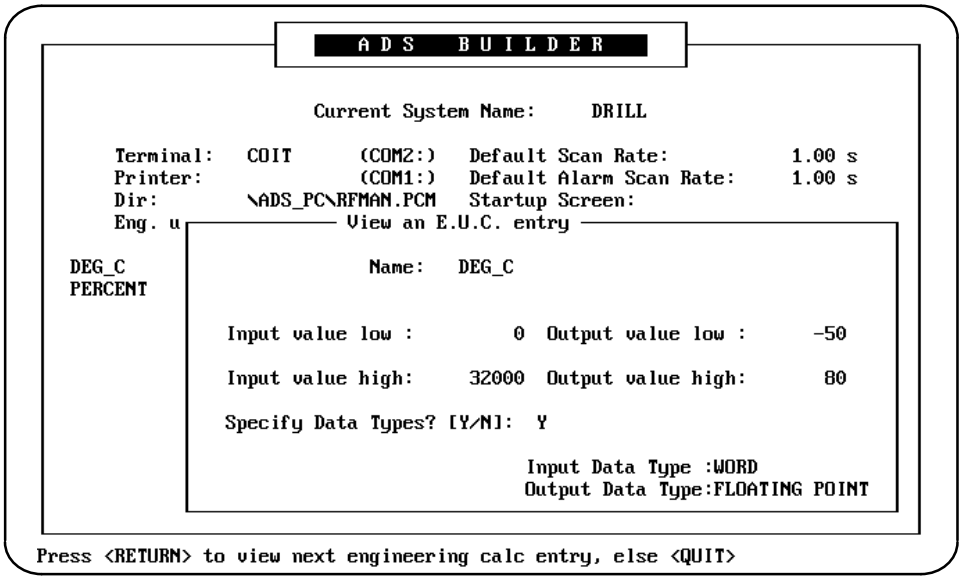
Invalid conversion entry specified

displayed on the status line.

View Current Entries

The ADS Builder provides a way for you to view all the existing engineering units conversion table entries in a system one by one, in alphabetical order. To initiate the viewing of a systems engineering units conversion table entries, you must first select the *View current entries* menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [V] key.

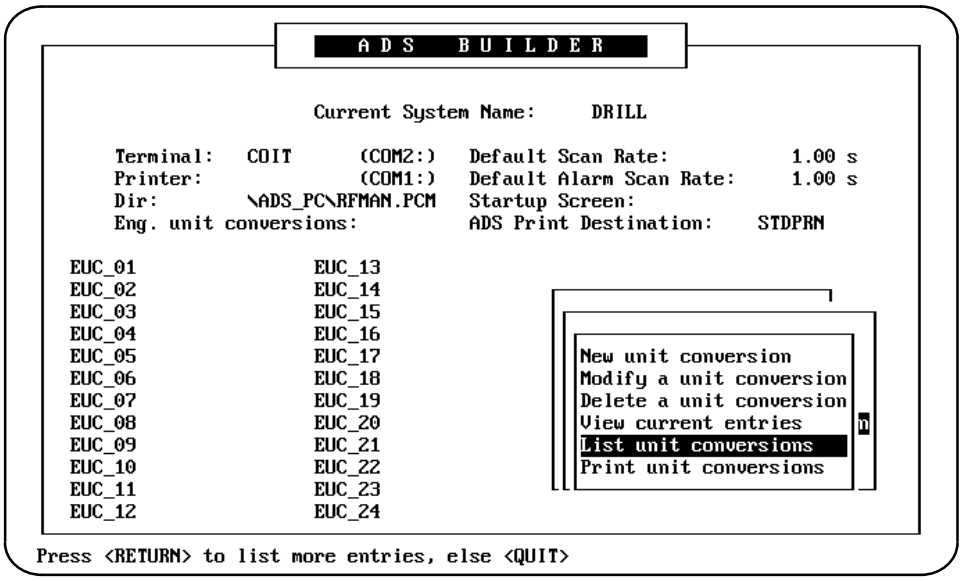
In the example shown below, two engineering units conversion table entries are currently defined in the system: DEG_C and PERCENT. When the [Enter] key is pressed, the form for the first entry is displayed along with a prompt on the status line giving the choice of viewing the next entry in the list or of quitting the view function.



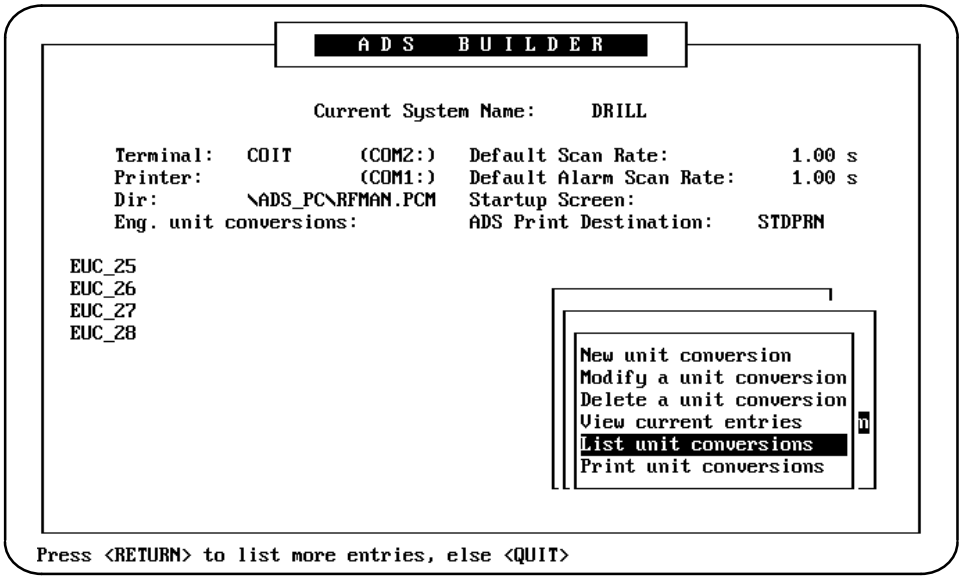
Pressing the [Enter] key at this point will display the next entry in the list, PERCENT. Pressing the [Enter] key again will return you to the menu page since PERCENT is the last entry in the list.

List Unit Conversion

On the left-hand side of the screen a list of engineering units conversion table entries is maintained in alphabetical order. The ADS Builder lets you page through the total list of entry names. To initiate the listing of a system's engineering units conversion table names, first select the *List unit conversions* menu option, either by cursoring to the option and then pressing either the [Enter] or [L] key. In the example below, twenty-eight entries are currently defined in the system. When the [Enter] key is pressed, the first (in alphabetical order) group of entry names is displayed along with a prompt on the status line giving you the choice of listing the next group or of quitting the list function.



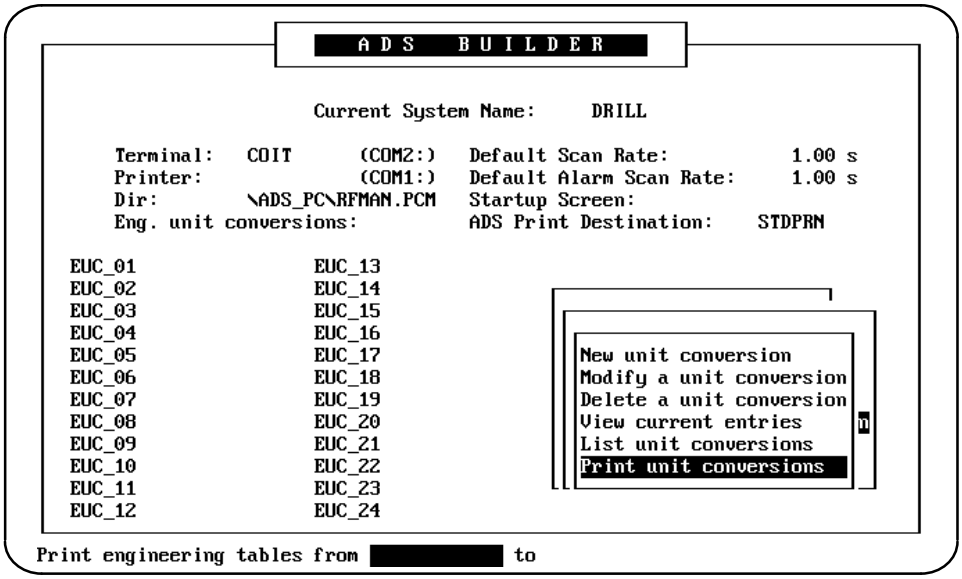
Pressing the [Enter] key at this point will display the remaining entries.



Pressing the <Quit> key exits the list operation. The engineering units conversion table entry names currently displayed on the screen will remain displayed.

Print Unit Conversions

The Print unit conversions option allows the details of the defined engineering units conversion table entries to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if both the ADS Print Module and the Spooler are installed. To initiate a print of the defined engineering units conversion table entries, select the *Print unit conversions* option either by cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

Print unit conversions from ############ to ############

Depending upon the response entered into the from and to fields, several different listings can be generated. The listing options are shown below (note that engineering units conversion table entries are handled in alphabetical order).

```
from  = "<euc1>"   to  = "<euc2>"   -->  print out EUC's between <euc1> to <euc2>
from  = "<euc1>"   to  = ""         -->  print out EUC <euc1>
from  = ""         to  = "<euc2>"   -->  print out EUC <euc2>
from  = "*"        to  = "<euc2>"   -->  print out all EUC's up to <euc2>
from  = "<euc1>"   to  = "*"        -->  print out all EUC's beginning with <euc1>
from  = "*"        to  = ""         -->  print out all EUC'S
from  = ""         to  = "*"        -->  print out all EUC'S
from  = "*"        to  = "*"        -->  print out all EUC'S
```

Pressing the <Quit> key cancels the print operation. After selection of the required range of engineering units conversion table entries to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see Load / Save Operations, Chapter 9).

Engineering units conversion table information is formatted as shown in the following examples:

```
            Engineering Unit Conversion Listing
            -----------------------------------

 Eng.Unit.Conv. :DEG_C                  Input value lo   :        0
                                        Input value hi   :    32000
                                        Output value lo  :        0
                                        Output value hi  :      160

                                        Input Data Type  :WORD
                                        Output Data Type :FLOATING POINT
-------------------------------------------------------------------------

 Eng.Unit.Conv. :PERCENT                Input value lo   :   -32768
                                        Input value hi   :    32767
                                        Output value lo  :        0
                                        Output value hi  :      100

                                        Input Data Type  :NIL
                                        Output Data Type :NIL
-------------------------------------------------------------------------
```

Note

A data type of NIL for both the input and the output data type indicates that no data type conversion is to be performed.

Error Messages for Engineering Units Conversion Table

Error messages and their causes for Engineering Units Conversion Tables are listed below.

ENTRY ERROR :: Engineering calculation name not unique

ENTRY ERROR :: Engineering calculation used in lookup table

ENTRY ERROR :: Engineering calculation used in Translation Table

An engineering units calculation table entry name must be unique from any other engineering units conversion table, translation table, and lookup table entry name.

ENTRY ERROR :: Input low cannot be larger than Input high

The input value high bound must be greater than or equal to the input value low bound.

ENTRY ERROR :: No Engineering calculation name

A name must be specified.

ENTRY ERROR :: Output low cannot be larger than output high

The output value high bound must be greater than or equal to the output value low bound.

Section 6: Lookup Table

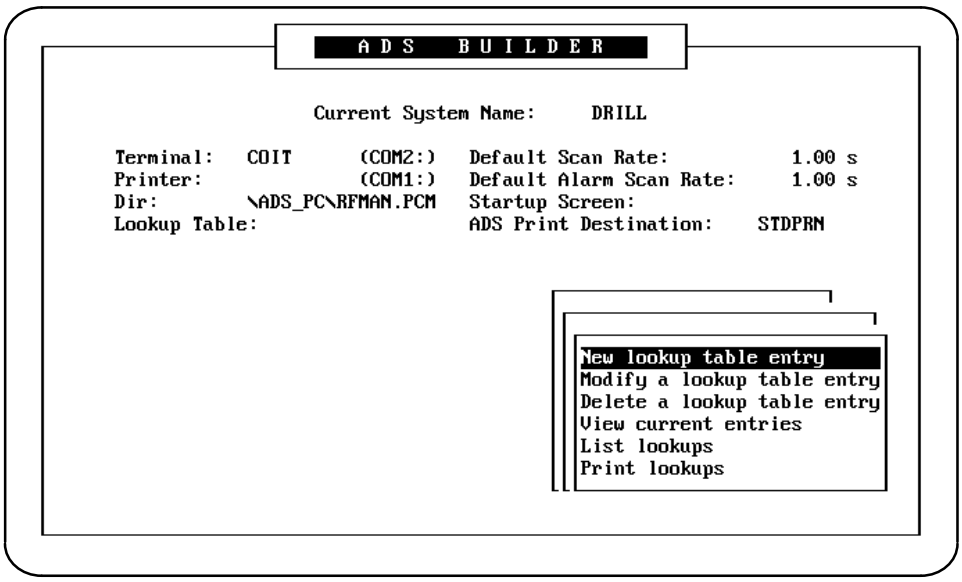
Lookup table entries are defined to provide a way to convert an input data value into a different output data value; a change in data type may take place as part of the conversion. A common conversion of this type is to produce an output text string based on a numeric input value. Lookup table entries are intended to provide an easily accessible method for the manipulation and / or conversion of data without the need to individually specify rules for every screen in the system. There is no predefined limit on the number of lookup table entries which may be defined for a given system; you are limited only by the amount of available memory on the ADC module.

Your lookup table entries can either be defined here before referencing them with a PLC data source, alarm source or with a dynamic object (see Screen Operations, Chapter 4), or they can be created from within the PLC data source or alarm source creation menu or from within the Screen painter when creating a dynamic object.

In order to access the *Lookup table* submenu, first cursor to the *Lookup table* selection on the menu. When the [Enter] key is pressed, the submenu for this option is accessed. Another menu window is opened on the screen, giving the additional options of

- *New lookup table entry;*
- *Modify a lookup table entry;*
- *Delete a lookup table entry;*
- *View current entries;*
- *List lookups;*
- *Print lookups.*

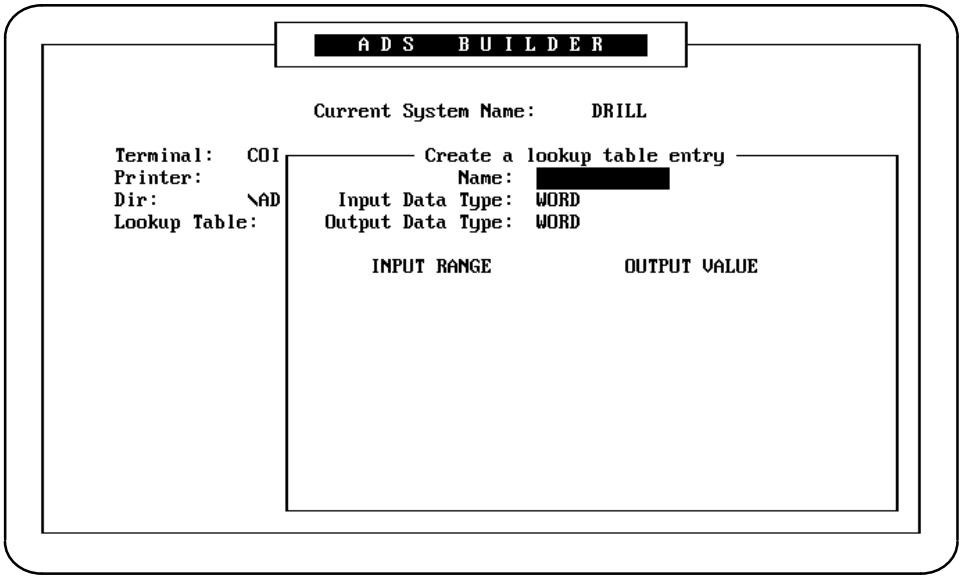
Each of these options is described in the pages which follow.



Notice that the status information formerly displayed along the left-hand side of the screen has been replaced with a heading *Lookup Table.* As lookup table entries are created, a list of those entries will be maintained in this area.

New Lookup Table Entry

When the *New lookup table entry* option is selected, a data entry window opens with five fields which may be set as required: *Name*, *Input data type*, *Output data type*, *Input range* and *Output value.*



Name

Every lookup table entry must be given a name. This name must be unique with regards to lookup table, translation table, and engineering units conversion table entry names, but does not need to be unique from all other names in the ADS system (for example, a PLC data source might be named TAG1 and a lookup table entry might also be named TAG1).

A name may be from one to twelve alphanumeric and underscore (_) characters, and is NOT case sensitive.

As an example of creating a lookup table entry name, assume that the name is to be MESSAGE. Type the desired name into the *Name* field. After the name has been entered, press the [Enter] key. When the [Enter] key is pressed, the entry is completed and the *Input Data Type* field is selected next.

Input Data Type

Every lookup table entry must be tagged as to what type of data it operates on. The input data types supported by the ADS system are specified in the table below.

Table 3-19. Input Data Types Supported for Lookup Tables

Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–-32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.99 to +9999999999.99 †

† Only 7 digits of precision.

When you cursor onto the *Input Data Type* field a window is opened on the screen showing what choices are available. By default, the system selects WORD for the data type. A data type must be selected that makes sense with regards to its intended use in the system being built. The ADS builder checks to ensure that the type of data specified is consistent with the values specified in the *Input Range* field and with any other object (e.g., PLC data source) it is later associated with.

For example, if a lookup table entry input data type of SIGNED WORD is specified, that entry could only operate on a PLC data source whose source data type was SIGNED WORD. After the *Input data type* is selected, press the [Enter] key to complete the selection. The *Output Data Type* field is selected next.

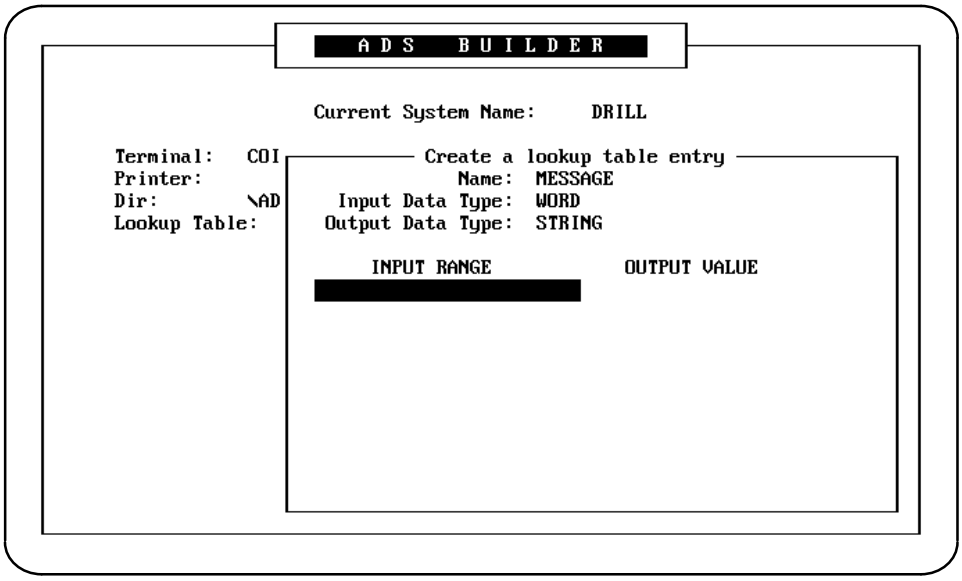
Output Data Type

Every lookup table entry must also be tagged as to what type of data it will return as a result of operating on the input value. The output data types supported by the ADS system are specified in the table below.

Table 3-20. Output Data Types Supported for Lookup Tables

Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.99 to +9999999999.99 †
String	-	1 to 19 ASCII characters

When you cursor onto the *Output Data Type* field a window is opened on the screen showing what choices are available. By default, the system selects WORD for the data type. A data type must be selected that makes sense regarding its intended use in the system being built. As with the Input data type, ADS builder checks to ensure that the data type specified is consistent with values specified in the *Output Value* field and with any other object it is later associated with. For example, assume that you want to associate various messages with specific unsigned word input values. Select the *String* data type by pressing the [–] key five times (or [ ] key three times). To complete the selection, press the [Enter] key. The first *Input Range* field is then selected.



Input Range

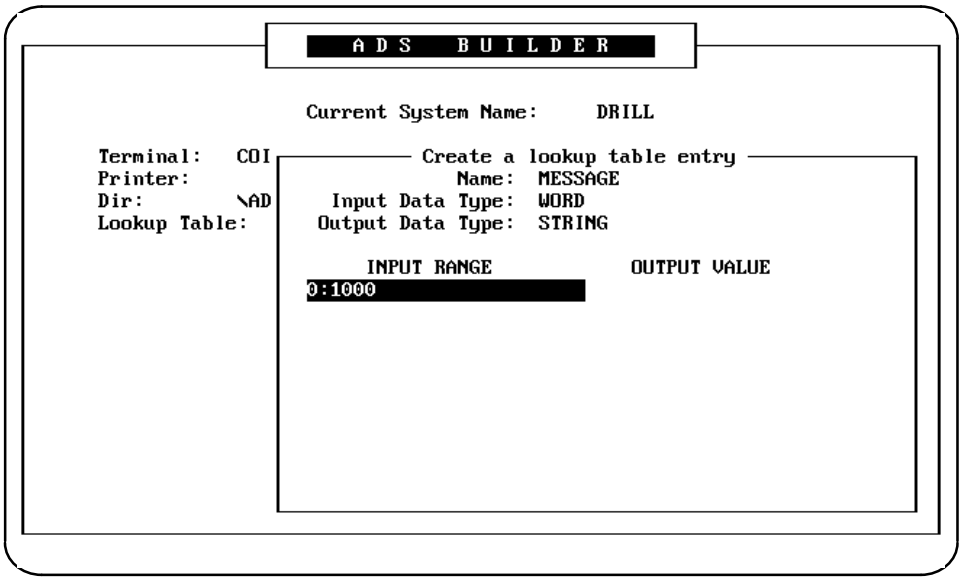
Input ranges, along with their associated output values, form the heart of the lookup table entry. When the system is running, the input value is checked against the specified ranges, sequencing from top to bottom, with the first range found that includes the value being selected. The output value associated with the selected range is then returned. Up to 10 input range / output value pairs may be specified. The format for specifying an input range is

<I1> {:<I2>}

where I1 must be defined and I2 Š I1.

As stated in the previous discussion, a given input range must be consistent with the lookup table entry's assigned input data type. This means, for instance, that only ON and OFF may be used as range designators for lookup table entries with an assigned input data type of STATE, and that only numbers in the range –32768 to +32767 may be used with an assigned input data type of SIGNED WORD.

As an example of specifying an input range, assume that you want to specify an output value for the input range 0:1000. Type the desired range into the *input range* field.

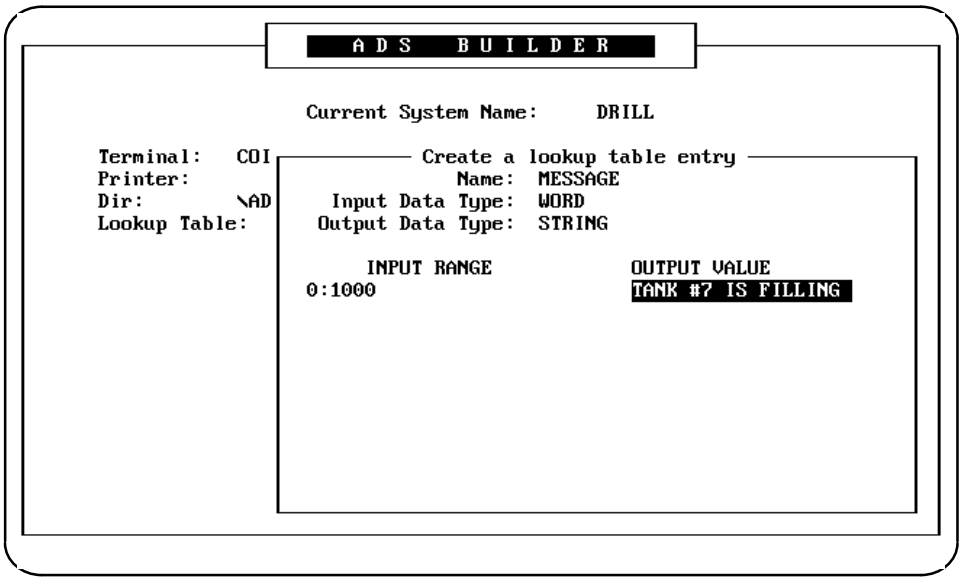


To complete the entry, press the [Enter] key. The associated *Output value* field is selected next.

Output Value

As stated above, output values are paired with a given input range, with a maximum of 10 input range / output value pairs being supported. The output value is a single value (only) which is returned as the result of the lookup. The output value must be consistent with the output data type.

Continuing our example, assume that whenever the associated range is satisfied the output value to be returned is the text string TANK #7 IS FILLING. Type the desired text string into the *output value* field.



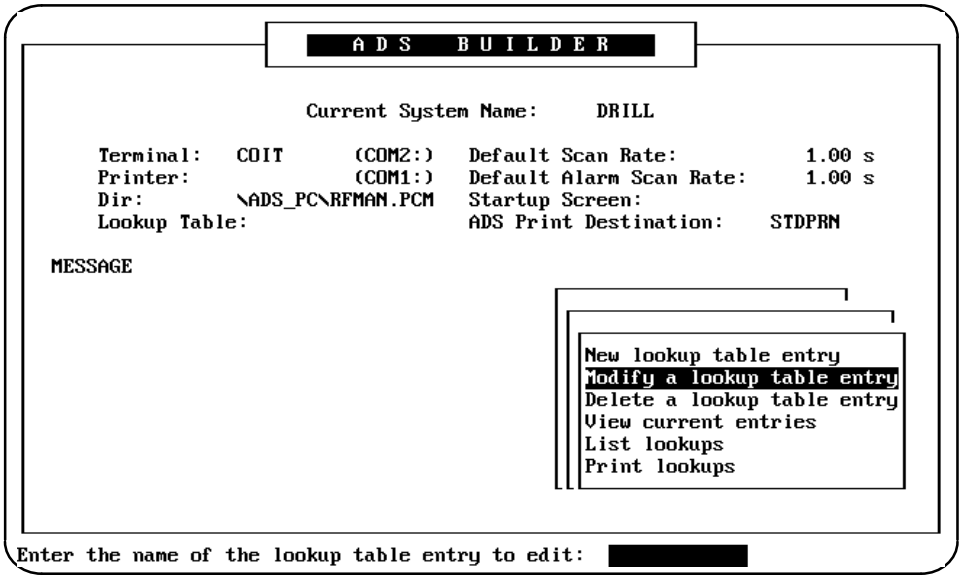
To complete the entry of the output value, press the [Enter] key. The second or next (as applicable) *input range* field is selected next.

When all the required information has been entered, press either the <Save> key from any field or the [Enter] key when on the tenth (bottommost) output value field to complete the creation of the lookup table entry. The ADS Builder then verifies that the information entered by the user is consistent. If no errors are found you will be returned to the menu screen, and an informative message will be displayed indicating that the lookup table entry has been added to the system. Also, the name of any lookup table entry (or entries) which had just been created is listed on the screen.

Modify a Lookup Table Entry

An existing lookup table entry may be modified in much the same manner in which it was originally created. All information concerning the lookup table entry may be changed except its name. Changing the name of a lookup table entry requires that you first delete the entry and then recreate it with the desired new name.

To initiate a lookup table entry modification, first select the Modify a lookup table entry menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [M] key.



The ADS Builder will prompt you for the name of the lookup table to be modified. Only existing lookup table entries may be modified; the New lookup table entry menu option must be used in order to create a new lookup table entry.

As an example of modifying a lookup table, assume that you want to modify the lookup table entry, MESSAGE. First, you must type the desired lookup table entry name (MESSAGE) into the prompt field. When the [Enter] key is pressed, the form for the specified lookup table entry is displayed with the Input Data Type field initially selected, which is the default data type, WORD.

You can now proceed to change any of the fields (except the Name field). Pressing the <Save> key from any field or the [Enter] key with the tenth output value field selected completes the modification. You are then returned to the menu page with an informative message displayed on the status line indicating the modification was completed.

If you want to cancel the modification, disregarding any changes which have been made, press the <Quit>. An informative message is displayed on the status line indicating that no changes were made to the lookup table entry.

If a lookup table entry is specified which does not currently exist, you will be returned to the menu page with the message

Invalid lookup table entry specified

displayed on the status line.

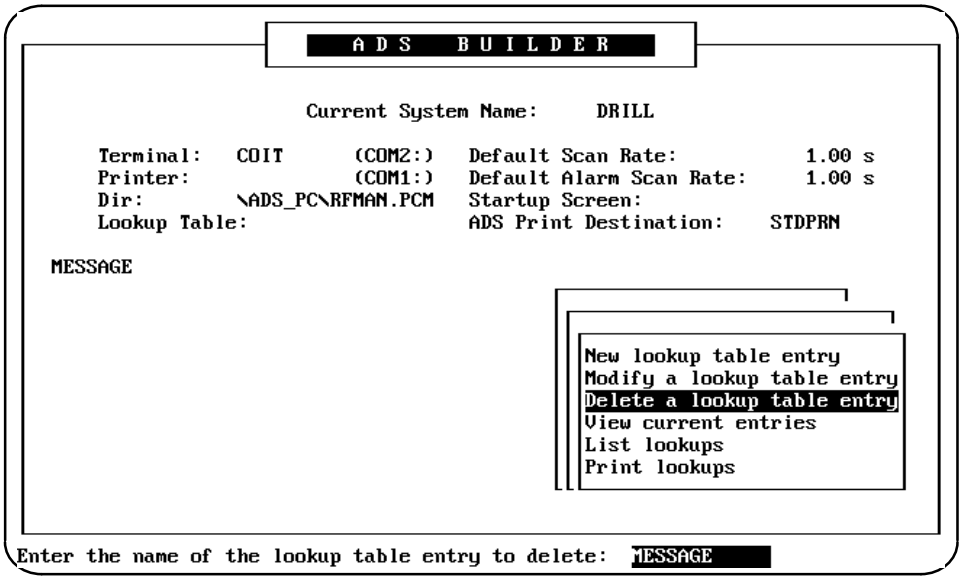
Delete a Lookup Table Entry

A lookup table entry may be (irrecoverably) removed from a system by deleting it.

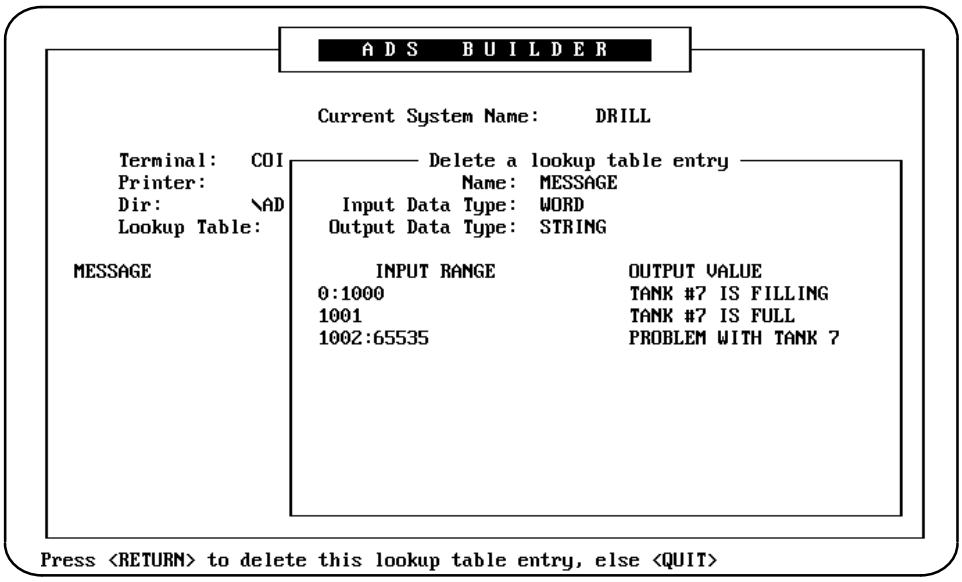
Note

You should be careful to not delete a lookup table entry referenced by a dynamic object on any screen in the system.

To initiate a lookup table entry deletion, first select the Delete a lookup table entry menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [D] key. The ADS Builder will prompt you for the name of the lookup table entry to be deleted. As noted above, only existing lookup table entries which are not referenced anywhere in the system may be deleted. In this example, assume that you want to delete the lookup table entry MESSAGE. Type the desired entry name (MESSAGE) into the prompt field.



When the [Enter] key is pressed, the form for the specified lookup table entry is displayed along with a prompt on the status line asking you to confirm the delete or <Quit>.



If the <Quit> key is pressed indicating that the lookup table entry deletion should be canceled, you will be returned to the menu page (no message will be displayed to indicate that the deletion was canceled). If a lookup table entry is specified which does not currently exist, you will be returned to the menu page with the message

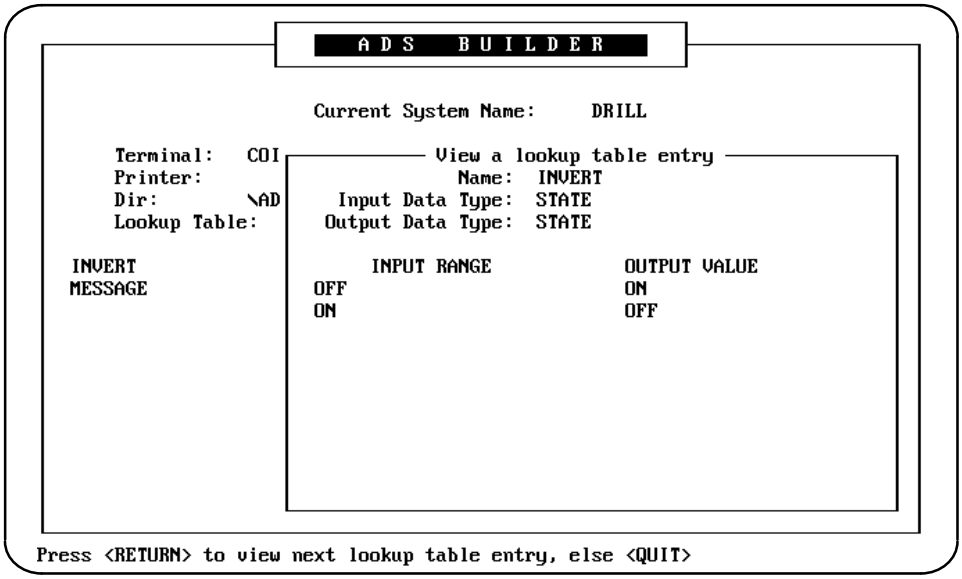
Invalid lookup table entry specified

displayed on the status line.

View Current Entries

The ADS Builder provides a method that allows you to view all the existing lookup table entries in a system one by one, in alphabetical order. To initiate the viewing of a system's lookup table entries, first select the View current entries menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [V] key.

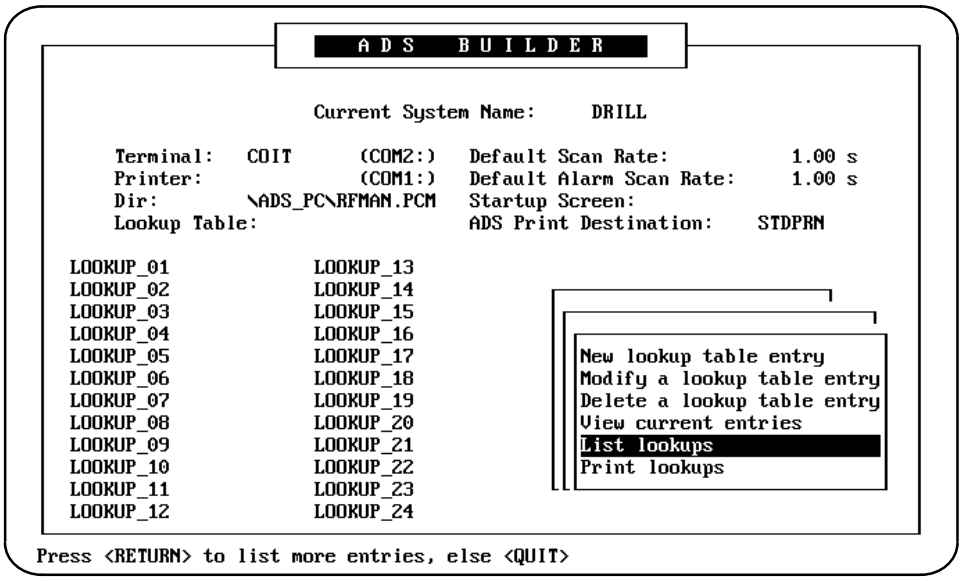
In the example shown below, two lookup table entries are currently defined in the system: INVERT and MESSAGE. When the [Enter] key is pressed, the form for the first lookup table entry is displayed along with a prompt on the status line giving the choice of viewing the next entry in the list or of quitting the view function.



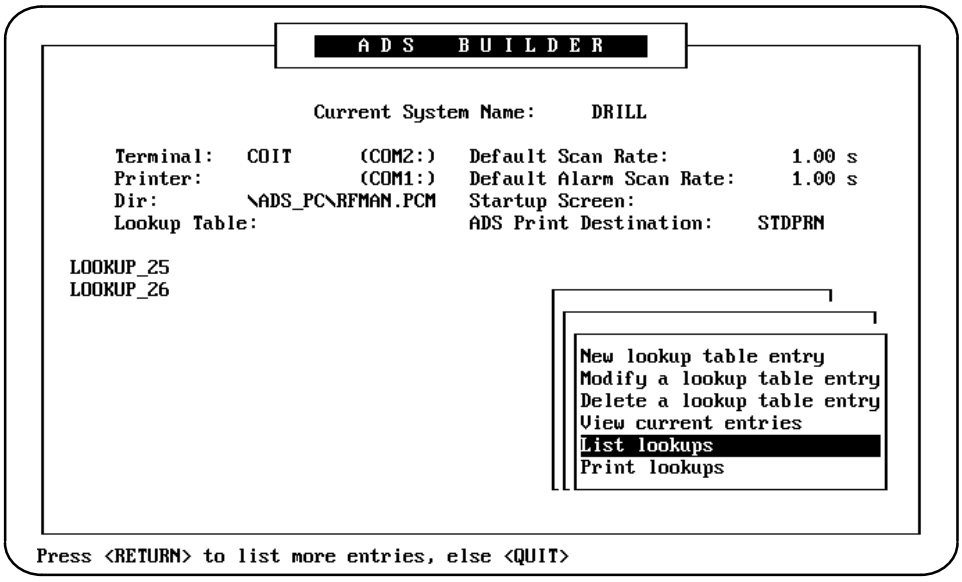
Pressing the [Enter] key at this point will display the next entry in the list, MESSAGE. Pressing the [Enter] key again will return you to the menu page since MESSAGE is the last lookup table entry in the list.

List Lookups

On the left-hand side of the screen a list of lookup table entry names is maintained in alphabetical order. You can page through the total list of entry names. To initiate the listing of a system's lookup table names, first select the List lookups menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [L] key.



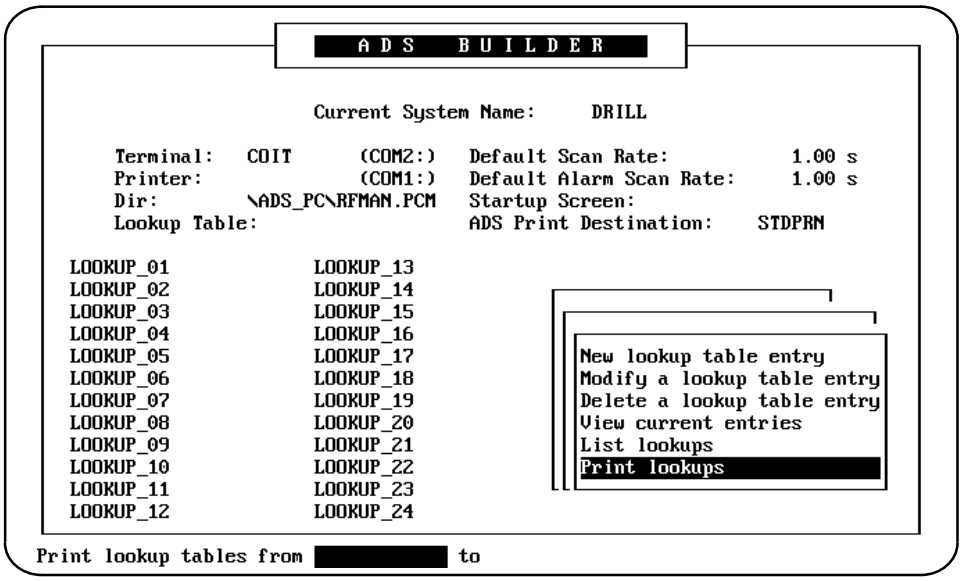
In this example sequence, twenty-six lookup table entries are currently defined in the system. When you press the [Enter] key the first (in alphabetical order) group of entry names is displayed along with a prompt on the status line giving the choice of listing the next group of names or of quitting the list function. Pressing the [Enter] key at this point will display the remaining group of lookup table entry names.



Pressing the <Quit> key exits the list operation. The lookup table entry names currently displayed on the screen will be left displayed.

Print Lookups

The Print lookups option allows the details of the defined lookup tables to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module and Spooler are installed. To initiate a print of the defined lookup tables, select the Print lookups option by either cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

Print lookup tables from ################ to ################

Depending upon the response entered into the from and to field, several different listings can be generated. The listing options are as shown below.

```
from = "<id1>"   to = "<id2>"   --> print out lookups id1 to id2
from = "<id1>"   to = ""        --> print out lookups id1
from = ""        to = "<id2>"   --> print out lookups id2
from = "*"       to = "<id2>"   --> print out all lookups up to id2
from = "<id1>"   to = "*"       --> print out all lookups from il1
from = "*"       to = ""        --> print out all lookups
from = ""        to = "*"       --> print out all lookups
from = "*"       to = "*"       --> print out all lookups
```

Pressing the <Quit> key aborts the print operation. After selection of the required range of lookup tables to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see Load / Save operations, Chapter 9).

Lookup table information is formatted as shown in the following examples:

```
          LOOKUP TABLE LISTING
          --------------------

Lookup Table : MESSAGE            Input Data Type : WORD
                                 Output Data Type : STRING

              Input Range                    Output Range
               0:1000                          TANK #7 IS FILLING
               1001:3000                       TANK #7 IS FULL
               3001:9999                       TANK #7 IS OVERFULL

Lookup Table : STATUS             Input Data Type : STATE
                                 Output Data Type : STRING

              Input Range                    Output Range
                ON                              SWITCH IS ON
                OFF                             SWITCH IS OFF

Lookup Table : WORD_TO_BIT        Input Data Type : WORD
                                 Output Data Type : STATE

              Input Range                    Output Range
                0:2000                          OFF
                2001:9999                       ON
```

Error Messages for Lookup Table

Error messages and their causes for Lookup tables are listed below.

ENTRY ERROR :: Input/Output values, line #n

The input range and / or output value for line number ”n” is invalid, or of the wrong form given the specified input or output data type, respectively.

ENTRY ERROR :: Lookup table entry is not unique

ENTRY ERROR :: Lookup table entry used in EUC table

ENTRY ERROR :: Lookup table entry used in Translation table

A lookup table entry name must be unique from any other lookup table, translation table or engineering units conversion table entry name.

ENTRY ERROR :: No Lookup table entry name

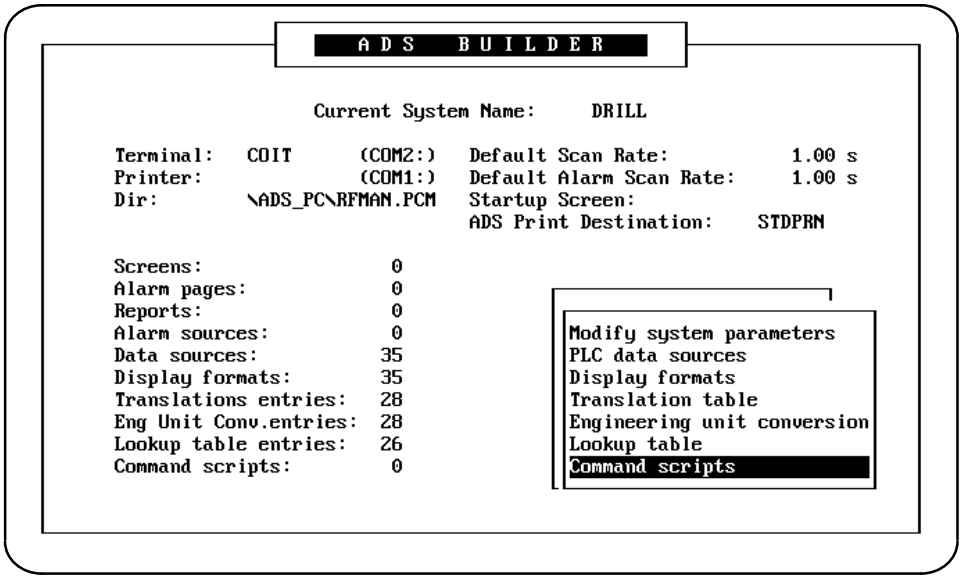
A name must be specified.

Section 7: Command Scripts

Command scripts are named sequences of run-time commands which may be invoked by pressing a key, value change, etc. One command script may call another command script, allowing you to create very complex sets of commands to be executed. There is no predefined limit on the number of command scripts which may be defined for a given system; you are constrained only by the amount of available memory on the ADC module.

> When a command script is executed, each command is executed in the order they were entered into the script. If a command fails to execute, or if you cancel a command while it is being executed, the execution of the entire script will terminate at that point. Any remaining commands will not be executed.

To access the *Command scripts* submenu, first cursor to the Command scripts menu selection.



To access the command scripts submenu, press the [Enter] key. Another menu window is opened on the screen, giving the additional options of

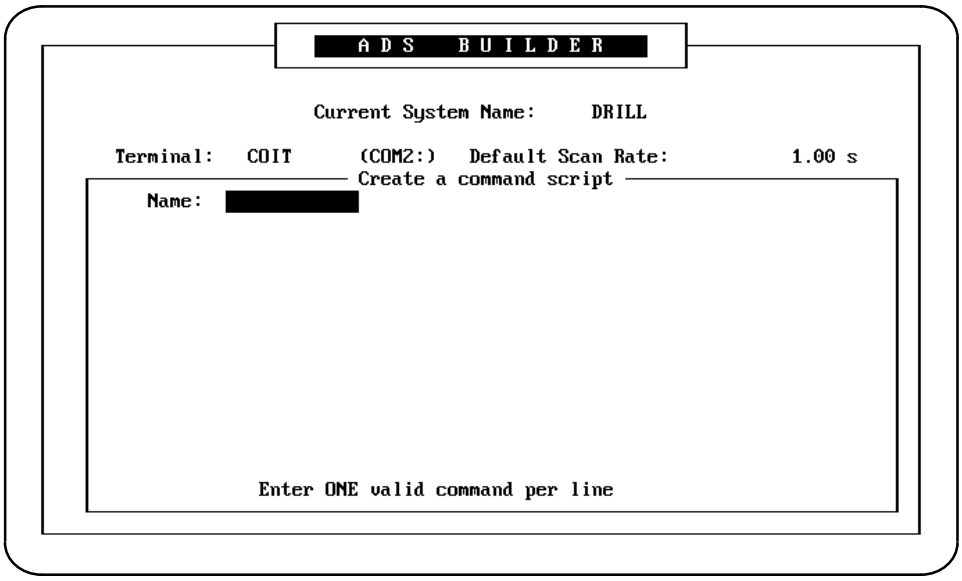
- *New script;*
- *Modify a script;*
- *Delete a script;*
- *View current scripts;*
- *List command scripts;*
- *Print command scripts.*

Each of these options is described on the pages which follow.

Note that the status information formerly displayed along the left hand side of the screen has been replaced with a heading *Command Scripts*. As command scripts are created, a list of those scripts will be maintained in this area.

New Script

When the *New script* option is selected, a data entry window is opened containing two fields which may be set as required: *Name* and *Command.*



Name

Every command script must be given a name. This name must be unique with regards to command script names, but does not need to be unique from all other names in the ADS system (for example, the system itself might be named DRILL and a command script might also be named DRILL). A name may be from one to twelve alphanumeric and underscore (_) characters, and is NOT case sensitive.

As an example of naming a command script, assume that you want to create a command script with the name INITIALIZE. To do this, type the desired name into the *Name* field. To complete the entry press the [Enter] key. The first *Command* field is selected next.

Commands

Up to ten commands may be defined for a single command script. The tables below define the commands which are valid for use in a command script.

Table 3-21. Get PLC Data

Action	Description
PLCGETB(loc[1])	Get a STATE value from location loc.
PLCGETBY(loc[1])	Get a BYTE value from location loc.
PLCGETW(loc[1])	Get an UNSIGNED WORD value from location loc.
PLCGETI(loc[1])	Get a SIGNED WORD value from location loc.
PLCGETL(loc[1])	Get an UNSIGNED LONGWORD value from location loc.
PLCGETS(loc[1])	Get a SIGNED LONGWORD value from location loc.
PLCGETF(loc[1])	Get a FLOATING POINT value from location loc.

[1] The syntax for specifying the loc reference is the same as for specifying a PLC data source location (refer to PLC Data Sources for details), *except* that the references must be consecutive within the same PLC memory type. For example, PLCGETW(R1) and PLCGETW(R1[1,9]) are valid, but PLCGETW(R1[1];R2[5-9]) and PLCGETW(R1[0-14];Q1) are not.

The PLCGET commands are used to access infrequently viewed data from the PLC, and display it on the operator message / prompt line.

Examples of valid Get PLC Data commands are:
PLCGETB(I1) - Get STATE value located at I1.
PLCGETW(R1) - Get WORD value located at R1.

Table 3-22. Set PLC Data

Action	Description
PLCSETB(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to STATE value v (or prompt if no v).
PLCSETBY(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to UNSIGNED BYTE value v (or prompt if no v).
PLCSETW(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to UNSIGNED WORD value v (or prompt if no v).
PLCSETI(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to SIGNED WORD value v (or prompt if no v).
PLCSETL(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to UNSIGNED LONGWORD value v (or prompt if no v).
PLCSETS(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to SIGNED LONGWORD value v (or prompt if no v).
PLCSETF(l[1],v[2],p[3],c[4],mn[5],mx[5])	Set location 1 to FLOATING POINT value v (or prompt if no v).

[1] The syntax for specifying the loc reference is the same as for specifying a PLC data source location (refer to PLC Data Sources for details), *except* that the references must be consecutive within the same PLC memory type. For example, PLCGETW(R1) and PLCGETW(R1[1,9]) are valid, but PLCSETW(R1[1];R2[5-9]) and PLCSETW(R1[0-14];Q1) are not.

[2] If no value parameter is specified a prompt will appear on the terminal's display line asking you to input a value. STATE values are specified as 0 for OFF and 1 for ON.

[3] An optional 1-19 character prompt may be specified; any alphanumeric character plus ":".

[4] An additional calculation may be optionally specified; the additional calculation may be either a translation table entry, a lookup table entry or an engineering units conversion table entry.

[5] Min / Max bounding of the user's entry for value v may be optionally specified.

The PLCSET commands are used to change values in the PLC. Two forms of each command are supported. A value may be specified as part of the command, requiring no further input from the operator. Alternatively, if no value is specified as part of the command, a prompt will be displayed on the operator message / prompt line requesting that the operator provide a value prior to executing the set.

Examples of valid Set PLC Data commands are:

PLCSETB(Q1) - Prompt operator for STATE value to write to Q1.
PLCSETL(R1,457) - Write LONGWORD value 457 to R1.
PLCSETS(R100,,Enter Setpoint:,, -50, 10000) - Prompt operator using custom prompt "Enter Setpoint:" for SIGNED WORD value to write to R100; the user's response should be constrained to the range [-50...10,000].

Note

When specifying an additional calculation as part of a PLCSET command, note that the user supplied value will be reverse scaled through the additional calculation. The data type specified as part of the PLCSET command must match the type of value to be entered by the operator. The additional calculation is specified normally, as if the value is "flowing" **from** the PLC through the additional calculation. For example, assume that %R1 in the PLC contains a scaled fixed point value nnnn which actually represents a value with two digits to the right of the decimal point, nn.nn. A translation entry would be defined specifying an input data type of WORD, an output data type of FLOATING POINT, and an "A" scalar term of 0.01. A PLCSETF command would have to be specified in order to utilize the translation. The operator would be required to enter a floating point value; it would then be multiplied by 100, converted to WORD and then sent to the PLC.

Caution

If a PLCSET command is specified that defines a subset of bits wihin a reference, e.g.PLCSETB(R1[4]), the referenced PLC location is first read, the indicated bit(s) operationperformed, and then the value is written back to the PLC. The read and write operations may occur after different PLC logic scans. If the PLC logic program changes the value between the read and write operations, the non-referenced bits of the reference will not be protected as expected.

Table 3-23. Screen Commands

Action	Description
SCREEN(n[1])	Remove all screens and go to screen n.
PSHSCN(n[1],r,c)	Overlay screen n at optionally specified row and column positions r and c.
POPSCN(n[2])	Remove last screen overlaid, or all down to and including n.
REMSCN(n[2])	Remove last screen overlaid, or *only* n.

[1] If n = 0 a prompt will appear on the terminal's display line asking you to specify the screen / alarm page to be selected.

[2] If n = 0 only the most recently pushed screen / alarm page will be removed from the terminal display.

Four commands are provided to allow you to manipulate the screens on your terminal display when your system is executed.

The SCREEN command is used to remove all the screens currently displayed on the terminal, and display a single screen in their place. The screen to be displayed may be specified as part of the command, and is identified by a screen number (1-999). Alternatively, indicating a screen number of 0 will cause the operator to be prompted on the operator message / prompt line to enter the number of the screen to display.

The PSHSCN command overlays the specified screen number on top of those screens already displayed. Again, specifying a screen number of 0 will cause the operator to be

prompted for a screen number. If the indicated screen is already on the display, but is not the topmost screen, it will be "moved" to the top of the display. As an option, a (row, column) location may be specified for the pushed screen, overriding the positioning coordinates specified as part of the screen definition.

Similar to the PSHSCN command, the POPSCN command is used to remove a screen, or screens, from the display without affecting those screens displayed underneath. Specifying a screen number of 1-999 indicates that that screen, and all others displayed on top of it, should be removed from the display. A screen number of 0 indicates that only the topmost screen on the display is to be removed.

Similar to the POPSCN command, the REMSCN command is used to remove a single screen from the display. Screens on top of, and underneath, the removed screen are unaffected. Again, a screen number of 0 indicates that only the topmost screen on the display is to be removed.

Examples of valid Screen Commands are:

SCREEN(7) - Replace currently displayed screen(s) with Screen 7.
PSHSCN(4) - Push Screen 4 onto the currently displayed screen(s).
PSHSCN(12,10,6) -Push Screen 12 onto the currently displayed screen(s), positioning it at row 10, column 6 of the physical terminal screen.
POPSCN(0) - Pop the topmost screen from the display.
POPSCN(16) - Pop all screens down to and including 16 from the display.
REMSCN(8) - Remove screen 8 from the display.

Table 3-24. Alarm Page Commands

Action	Description
ALARM(n[3])	Remove all alarm pages and overlay n.
PSHALM(n[1])	Overlay alarm page n.
POPALM(n[2])	Remove last alarm page overlaid, or all down to and including n.
REMALM(n[2])	Remove last alarm page overlaid, or *only* n.
CLRALM()	Remove all currently displayed alarm pages.

[1] If n = 0 a prompt will appear on the terminal's display line asking you to specify the screen / alarm page to be selected.

[2] If n = 0 only the most recently pushed screen / alarm page will be removed from the terminal display.

[3] If n = 0 all alarm pages will be removed from the screen and no new alarm page will be displayed.

Five commands are provided to allow you to manipulate the alarm pages on your terminal display when your system is executed.

The ALARM command is used to remove all the alarm pages currently displayed on the terminal (screens are unaffected), and overlay a single alarm page in their place. The alarm page to be displayed may be specified as part of the command, and is identified by alarm page number (1-999). Alternatively, indicating an alarm page number of 0 will cause the operator to be prompted on the operator message / prompt line to enter the number of the alarm page to overlay.

The PSHALM command overlays the specified alarm page number on top of those screens and alarm pages already displayed. Again, specifying an alarm page number of 0 will cause the operator to be prompted for an alarm page number. If the indicated alarm page is already on the display, but is not the topmost alarm page or is covered by a screen, it will be "moved" to the top of the display.

Similar to the PSHALM command, the POPALM command is utilized to remove an alarm page, or pages, from the display without affecting those screens and alarm pages displayed underneath. Specifying an alarm page number of 1-999 indicates that that alarm page, and all others displayed on top of it, should be removed from the display. An alarm page number of 0 indicates that only the topmost alarm page on the display is to be removed.

Similar to the POPALM command, the REMALM command is used to remove a single alarm page from the display. Screens and alarm pages on top of, and underneath, the removed alarm page are unaffected. Again, an alarm page number of 0 indicates that only the topmost alarm page on the display is to be removed.

The CLRALM command is provided to allow you to remove all alarm pages from the display.

Examples of valid Alarm Page Commands are:
ALARM(7) - Replace currently displayed alarm page(s) with alarm page 7.
PSHALM(14) - Push alarm page 14 onto the current display.
POPALM(10) - Pop the topmost alarm page from the display.
POPALM(4) - Pop all alarm pages down to and including alarm page 4 from the display.
REMALM(52) - Remove alarm page 52 from the display.
CLRALM( ) - Remove all alarm pages from the display.

Table 3-25. Alarm Source Related Commands

Action	Description
ACTION_OFF()	Disable actions associated with alarms.
ACTION_ON()	Enable actions associated with alarms.
ACK_ALARM()	Acknowledges all alarms in system.
ACK_ALARM(<page number>)	Acknowledges all alarms on a page.
ACK_ALARM(<alarm source>)	Acknowledges a particular alarm.

The ACTION_OFF and ACTION_ON commands are used to control the execution of alarm source actions. Among other things, alarm source actions can push screens and alarm pages onto the display. When viewing certain screens, such as the PLC or I/O fault table screens in the fault option module, you may want to inhibit actions which will alter the terminal display; the ACTION_OFF command provides this capability. The alarm sources are still scanned, printed, logged to alarm pages, etc.; only their associated actions are inhibited. The ACTION_ON command re-enables alarm source actions.

The three variants of the ACK_ALARM command provide an alternative method for acknowledging alarms in a system. Depending on the variant used, you can acknowledge all alarms in the entire system, acknowledge only those alarms logged on a particular alarm page, or acknowledge only those alarms resulting from a specified alarm source.

Examples of valid Alarm Source Related Commands are:

ACTION_OFF( ); PLC_FAULT ( ); ACTION_ON ( ) - Disable alarm source actions, display the PLC fault table screen, re-enable alarm source actions upon exiting the fault table screen.

ACK_ALARM( ) - Acknowledge all alarms across all alarm pages.

ACK_ALARM(3) - Acknowledge all alarms on alarm page 3.

ACK_ALARM(LOW_TEMP) - Acknowledge all alarms generated by alarm source LOW_TEMP across all alarm pages.

Table 3-26. Option Module Access Commands

Action	Description
PLC_FAULT(f,b)	Display the PLC Fault table screen with optionally specified foreground and background colors f and b.
IO_FAULT(f,b)	Display the I / O Fault table screen with optionally specified foreground and background colors f and b.
SETUP_LOOP(f,b)	Display the PID Loop Setup screen with optionally specified foreground and background colors f and b.
CONFIGURE_LOOP(f,b)	Display the PID Loop Configure screen with optionally specified foreground and background colors f and b.
MONITOR_LOOP(f,b)	Display the PID Loop Monitor screen with optionally specified foreground and background colors f and b.
TUNE_LOOP(f,b)	Display the PID Loop Tuning screen with optionally specified foreground and background colors f and b.

Note

Foreground and background colors are specified as BLACK, RED, GREEN, YELLOW, BLUE, MAGENTA, CYAN, or WHITE.

The PLC_FAULT and IO_FAULT commands are used to access the PLC fault table and the I / O fault table screens, respectively, in the fault table option module. An optional (foreground, background) color specification may be provided as part of the command.

The SETUP_LOOP, CONFIGURE_LOOP, MONITOR_LOOP and TUNE_LOOP commands are used to access the setup, configuration, monitor and tuning screens, respectively, in the PID option module. An optional (foreground, background) color specification may be provided as part of the command.

Examples of valid Option Module Access Commands are:

PLC_FAULT ( ) - Push the PLC fault table screen onto the display.

MONITOR_LOOP (WHITE, BLUE) - Push the PID loop monitoring screen onto the display, using WHITE as the foreground color and BLUE as the background color.

Table 3-27. Dynamic Object Related Commands

Action	Description
ATTACH(n,o,d,c)	Attach dynamic object o (on screen n) to (optionally) PLC data source d using (optionally) new calculation c.
DYN_EDIT(n,o,v)	Enter edit mode for dynamic object o on screen n using video highlight v to indicate editing mode.
SCN_EDIT(n,v)	Enter edit mode for all editable dynamic objects on screen n using video highlight v to indicate editing mode for object.
WAIT_DATA(n,o)	Pause until data next scanned for dynamic object o on screen n.

Note

The screen referenced by an ATTACH, DYN_EDIT, SCN_EDIT or WAIT_DATA command MUST have already been displayed PRIOR to executing one of these commands; otherwise, the command will fail to execute.

Note

Valid video highlighting settings include REVERSE, BOLD, UNDERLINE, BLACK, RED, GREEN, YELLOW, BLUE, MAGENTA, CYAN, OR WHITE; BLINK should not be used.

The ATTACH command is used primarily to dynamically alter which PLC data source is referenced by a particular dynamic object on a particular screen. Optionally, a new translation table entry may be specified in addition to, or instead of the PLC data source, to use a different scaling factor.

If a dynamic object has been made available for editing, the DYN_EDIT command may be used to invoke the actual edit. You can reference a dynamic object on the topmost screen displayed, or on any other screen, however you should take care to make sure the screen is actually displayed. Typically, reverse video is chosen for the video specification, although any video attribute can be chosen. If no video specification is given, normal video is the default.

The SCN_EDIT command functions as a special type of compound DYN_EDIT command. It invokes the actual edit of each dynamic object made available for edit on the screen, one at a time, in the alphabetic order of the dynamic objects' names.

The WAIT_DATA command is used to cause a pause before the next command in sequence is executed. Its primary use is with the DYN_EDIT and SCN_EDIT commands. For example, assume that when function key F1 is pressed on screen 1 that you want to push screen 53 onto the display and immediately begin editing dynamic object SETPOINT (which is on screen 53 in our example). If the command sequence

```
PSHSCN(53)
 DYN_EDIT(53,SETPOINT,REVERSE)
```

is used, the edit of dynamic object SETPOINT will begin before valid data has been scanned for it; the value you see will be undefined. Placing a WAIT_DATA command immediately prior to the DYN_EDIT command will give you the desired result.

```
PSHSCN(53)
WAIT_DATA(53,SETPOINT)
DYN_EDIT(53,SETPOINT,REVERSE)
```

Note that this situation occurs only when the screen push occurs immediately before the edit in the command sequence. Invoking an edit of a screen that is already displayed will not require use of the WAIT_DATA command.

Example of valid Dynamic Object Related Commands are:

ATTACH (347, SETPOINT, MACHINE_1) - Use PLC data source MACHINE_1 to animate dynamic object SETPOINT on screen 347, retaining any scaling already in effect.

ATTACH (347, SETPOINT, MACHINE_1, DEG_C) - Use PLC data source MACHINE_1 to animate dynamic object SETPOINT on screen 347, utilizing the new scaling defined by translation table entry DEG_C.

ATTACH (347, SETPOINT, , DEG_C - Apply a new scaling factor defined by translation table entry DEG_C to dynamic object SETPOINT, on screen 347, retaining the PLC data source currently animating the dynamic object.

DYN_EDIT (347, SETPOINT, REVERSE) - Perform a field edit on dynamic object SETPOINT on screen 347, using reverse video to denote that the edit has been enabled.

WAIT_DATA (53, NOPARTS) - Pause execution of the current command sequence until data is scanned for dynamic object NOPARTS on screen 53.

Table 3-28. Miscellaneous Commands

Action	Description
LOGTTM(x)	Log message x to message line on screen.
LOGMES(x)	Log message x to attached printer and to message line on screen.
REPORT(n)	Output report n to the attached printer.
HELP(n)	Overlay help screen indexed by n.
TTDUMP()	Output the terminal's screen to the attached printer.
REFRSH()	Clear and rewrite the screen.
PORTW(p,t)	Output text string to port.
EXIT()	Exit the ADS system.

The LOGTTM command is used to log a 1-19 character text string to the operator message / prompt line on the screen. Similar to LOGTTM, the LOGMES command is used to log a 1-19 character text string to both the operator message / prompt line and to the attached printer device.

The REPORT command is used to output a report to the attached printer device.

The HELP command is used to access a help file produced in conjunction with the operator interface system.

The TTDUMP command is used to output an ASCII version of the current terminal display to the attached printer device.

The REFRSH() command is used to completely repaint the terminal display. This command is needed only when there has been a problem with the terminal, such as loss of power to the terminal (terminal only; not the PLC), disconnected cable, etc.

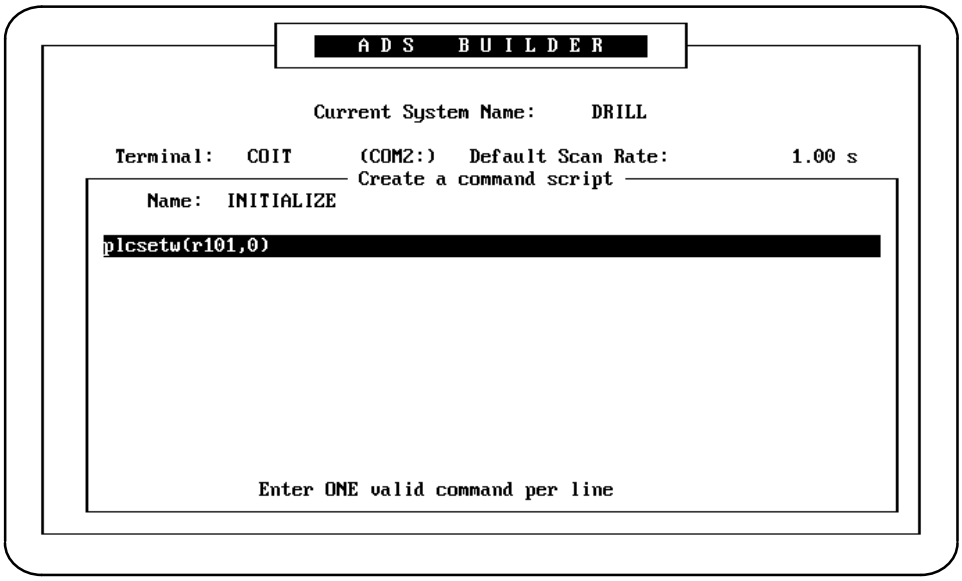
The PORT command is used to output a text string to a specified port on the ADC module. Both printable and non-printable characters can be specified. Printable characters are enclosed in quotes; non printable characters are specified one at a time by putting their decimal ASCII (see Appendix B for a list of ASCII codes) code value in brackets (you would also use brackets to specify a double quote character). A total of 19 characters can be specified. For example,

```
PORTW(1,"ABC"[13]"***"[13][10][0])
```

This command can be used for such things as sending an initialization sequence to an attached printer. The EXIT command is used to terminate the execution of the ADS operator interface system.

In addition, other command scripts may be entered as a valid command. This causes the command script to execute the named script. In this way a potentially unlimited number of commands may be executed as a result of a single trigger. The <object list> key can be used to obtain a list of existing command scripts or to create a new one.

As an example of defining a command script, assume that you want to specify a command to set the value of (unsigned WORD) PLC register R101 to 0. To do this, type the appropriate command into the selected command field which is highlighted by reverse video.



To complete the command entry press the [Enter] key. The second *Command* field is selected next.

When all the required information has been entered, press the <Save> key from any field or the [Enter] key when on the tenth (bottommost) command field to complete the creation of the command script. The ADS system then verifies that the information is valid. If no errors are found you will be returned to the menu screen, along with an informative message being displayed indicating that the command script has been added to the system. Also, the name of the command script you have just created is listed on the screen.

Modify a Script

An existing command script may be modified in much the same manner in which it was originally created. All information concerning the command script may be changed except its name. Changing the name of a command script requires you to first delete the script and then recreate it with the desired new name.

To initiate a command script modification, first select the *Modify a script* menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [M] key.

The ADS system will prompt you for the name of the command script to be modified. Only existing command scripts may be modified; the *New script* menu option must be used in order to create a new script.

As an example of modifying a command script, assume that you wish to modify the command script INITIALIZE. First, you must type the desired command script name (INITIALIZE) into the prompt field. When you press the [Enter] key the form for the specified command script is displayed with the first Command field initially selected.

You can now proceed to change any of the fields (except the Name field). Pressing the <Save> key from any field or the [Enter] key with the tenth command field selected completes the modification. You are returned to the menu page with an informative message displayed on the status line indicating that the modification was completed.

If you want to cancel the modification, disregarding any changes which have been made, press the <Quit> key. An informative message is displayed on the status line indicating that no changes were made to the command script.

If a command script is specified which does not currently exist, you will be returned to the menu page with the message

```
Invalid command script specified
```

displayed on the status line.

Delete a Script

A command script may be (irrecoverably) removed from a system by deleting it.

Note

You should be careful to not delete a command script referenced by a function key on any screen, any display format action, or any alarm source action.

To initiate a command script deletion, first select the Delete a script menu option, either by cursoring to the Delete a script option and then pressing the [Enter] key, or by pressing the [D] key.

The ADS system will prompt you for the name of the command script to be deleted. As indicated above, only existing command scripts which are not referenced by any object in the system may be deleted.

For example, if you wish to delete the command script INITIALIZE, type the command script name (INITIALIZE) into the prompt field. When you press the [Enter] key the form for the specified command script is displayed on the screen along with a prompt on the status line asking you to confirm the delete.

Pressing the [Enter] key at this point, will cause the command script to be deleted from the system. Upon deletion of the command script, you are returned to the menu page with an informative message displayed on the status line indicating that the deletion was completed.

If you press the <Quit> key indicating that the command script deletion should be canceled, you will be returned to the menu page (no message will be displayed to indicate that the deletion was canceled). If you specify a command script which does not currently exist, you will be returned to the menu page with the message

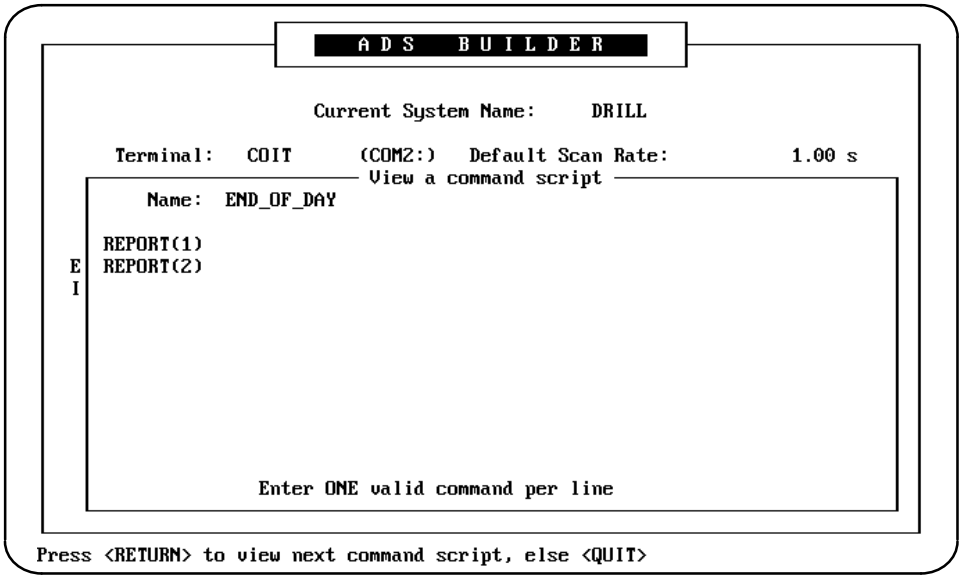
`Invalid command script specified`

displayed on the status line.

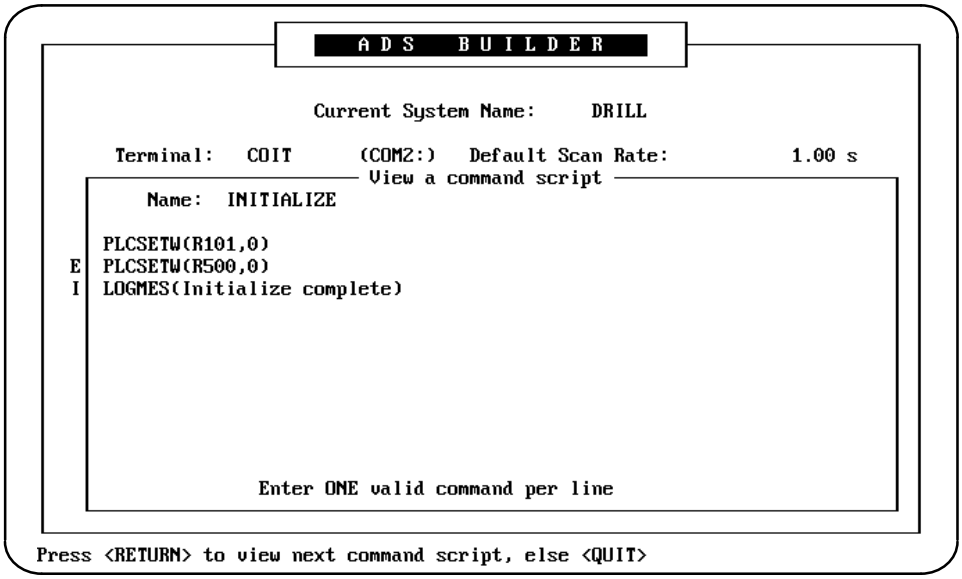
View Current Scripts

The ADS system allows you to view all the existing command scripts in a system one by one, in alphabetical order. To initiate the viewing of a system's command scripts, first select the View current scripts menu option, either by cursoring to the View current scripts option and pressing the [Enter] key, or by pressing the [V] key.

In the following example, two command scripts are currently defined in the system: END_OF_DAY and INITIALIZE. When the [Enter] key is pressed, the form for the first command script that is listed is displayed along with a prompt on the status line giving you the choice of viewing the next script in the list or of quitting the view function.



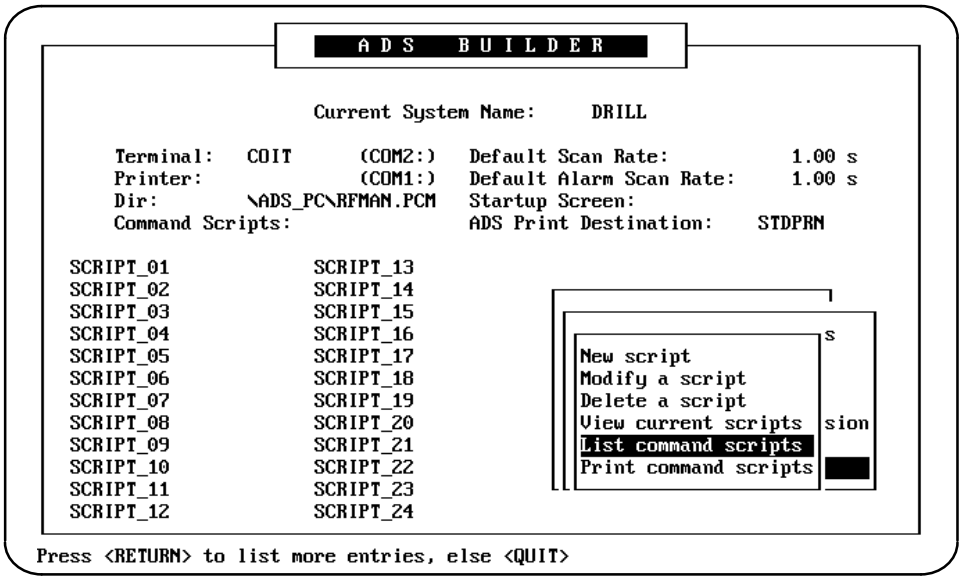
Pressing the [Enter] key at this point will display the next command script in the list, INITIALIZE.



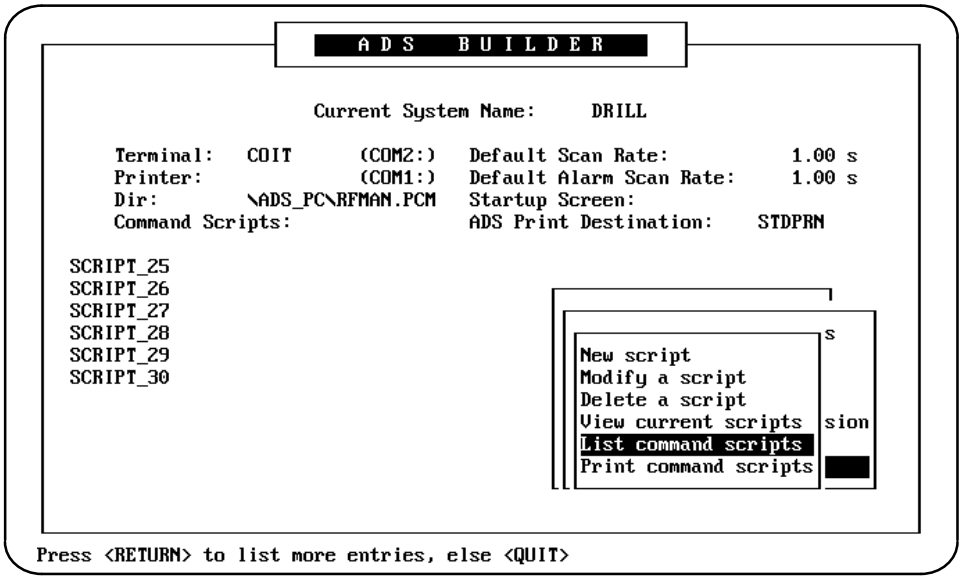
Pressing the [Enter] key again will return you to the menu page since INITIALIZE is the last command script in the list.

List Command Scripts

A list of command script names is maintained in alphabetical order on the left side of the screen . You can page through the total list of command script names. To initiate listing of a system's command script names, first select the List command scripts menu option, either by cursoring to that option and pressing the [Enter] key, or by pressing the [L] key. In this example, thirty command scripts are currently defined in the system. When the [Enter] key is pressed, the first group of command script names is displayed (listed alphabetically) along with a prompt on the status line giving you the choice of listing the next group of command script names or quitting the list function.

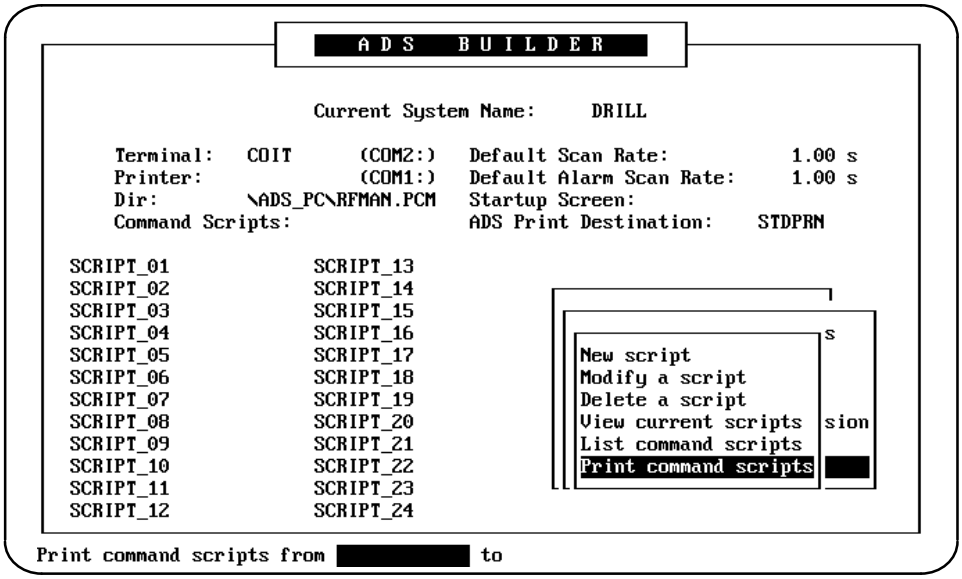


When the [Enter] key is again pressed, the remaining group of command script names will be displayed and you will be returned to the menu page since all command scripts have been listed. Pressing the <Quit> key exits the list operation. The command script names currently displayed on the screen will remain displayed.



Print Command Scripts

The Print command scripts option allows the details of the defined command scripts to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module and Spooler are installed. To initiate a print of the defined command scripts, select the Print command scripts option by either cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

Print command scripts from ################ to ################

Depending upon the response entered into the from and to field, several different listings can be generated. The listing options are as shown below.

```
from = "<id1>"   to = "<id2>"   --> print out command scripts id1 to id2
from = "<id1>"   to = ""        --> print out command scripts id1
from = ""        to = "<id2>"   --> print out command scripts id2
from = "*"       to = "<id2>"   --> print out all command scripts up to id2
from = "<id1>"   to = "*"       --> print out all command scripts from il1
from = "*"       to = ""        --> print out all command scripts
from = ""        to = "*"       --> print out all command scripts
from = "*"       to = "*"       --> print out all command scripts
```

Pressing the <Quit> key aborts the print operation. After selection of the required range of command scripts to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see Load / Save Operations, Chapter 9).

Command script information is formatted as shown in the following examples:

```
          Command Script Listing
          ----------------------

Command Script : RUN_FAULT            ACTION_OFF()
                                      CLRALM()
                                      PLC_FAULT()
                                      ACTION_ON()

Command Script : SETQ                 PLCSETW(Q65,65635)
                                      PLCSETW(Q81,65535)
                                      PLCSETW(Q97,21)

Command Script : SETTER               PLCSETB(Q1,1)
                                      PLCSETB(Q2,0)
                                      PLCSETB(Q3,1)
                                      PLCSETB(Q4,0)
                                      PLCSETB(Q5,1)
                                      PLCSETB(I1,0)
                                      PLCSETB(I2,1)
                                      PLCSETB(I3,0)
                                      PLCSETB(I4,1)
                                      PLCSETB(I5,0)

Command Script : ZEROS                PLCSETW(M457,0)
                                      PLCSETW(T241,0)
                                      PLCSETL(R70,0)
```

Error Messages for Command Scripts

Error messages and their causes for Command Scripts are listed below.

ENTRY ERROR :: Command script name not unique

Two command scripts cannot have the same name.

ENTRY ERROR :: No Command script name

A name must be specified.

Invalid entry #n - Alarm page p not located

Alarm page number ”p” that was referenced in an ACK_ALARM command on line ”n” does not exist.

Invalid entry #n - Alarm XXXX not located

Alarm source ”XXXX” that was referenced in an ACK_ALARM command on line ”n” does not exist.

Invalid entry #n - At least 3 parameters are required for ATTACH

The ATTACH command on line number ”n” contains less than the three required parameters.

Invalid entry #n - Cannot find screen number p

Screen number ”p” referenced in the command on line number ”n” does not exist.

Invalid entry #n - Failed to find XXXX

The dynamic object ”XXXX” referenced in the command on line number ”n” could not be found on the indicated screen.

Invalid entry #n - Failed to match input data type for XXXX

The input data type for additional calculation ”XXXX” specified in the ATTACH command on line number ”n” does not match what is required by the referenced dynamic object.

Invalid entry #n - Failed to match output data type for XXXX

The output data type of additional calculation ”XXXX” must match the data type specified as part of the PLCSET command.

Invalid entry #n - Invalid background color has been specified

Invalid entry #n - Invalid foreground color has been specified

An invalid foreground / background color specification was made for the command on line number ”n”.

Invalid entry #n - Invalid item XXXX

The command XXXX specified for line number ”n” is unknown.

Invalid entry #n - Log message is too long

The LOGTTM or LOGMES command on line number ”n” contains a message string longer than the maximum 19 characters supported.

Invalid entry #n - MAX must be greater than or equal to MIN

The maximum bound specified in a PLCSET command on line number ”n” must be greater than or equal to the minimum.

Invalid entry #n - Missing ”)”

A valid command always terminates with a right parenthesis, but none was found on the line ”n”.

Invalid entry #n - Must have both MAX and MIN

The PLCSET command on line number ”n” specified only one of the two bounds for min / max value bounding; if one is specified, both must be.

Invalid entry #n - New data type does not match existing dynamic object

The data type of the PLC data source specified in the ATTACH command on line number ”n” does not match what is required by the referenced dynamic object.

Invalid entry #n - Object XXXX is not editable

Dynamic object ”XXXX” referenced in the DYN_EDIT command on line number ”n” was not defined to be available for edit when it was created.

Invalid entry #n - Only one parameter is allowed for GET

Too many parameters were specified for one of the PL CGET commands.

Invalid entry #n - Too many bits for data type

The PLC location specified in the command on line ”n” requires more storage space (bits) than provided for by the data type specified as part of the command.

Invalid entry #n - XXXX is not a valid attribute

The video attribute ”XXXX” specified in the DYN_EDIT or SCN_EDIT command on line number ”n” is invalid.

Chapter 4 Screen Operations

This chapter describes the **Screen Operations** submenu.

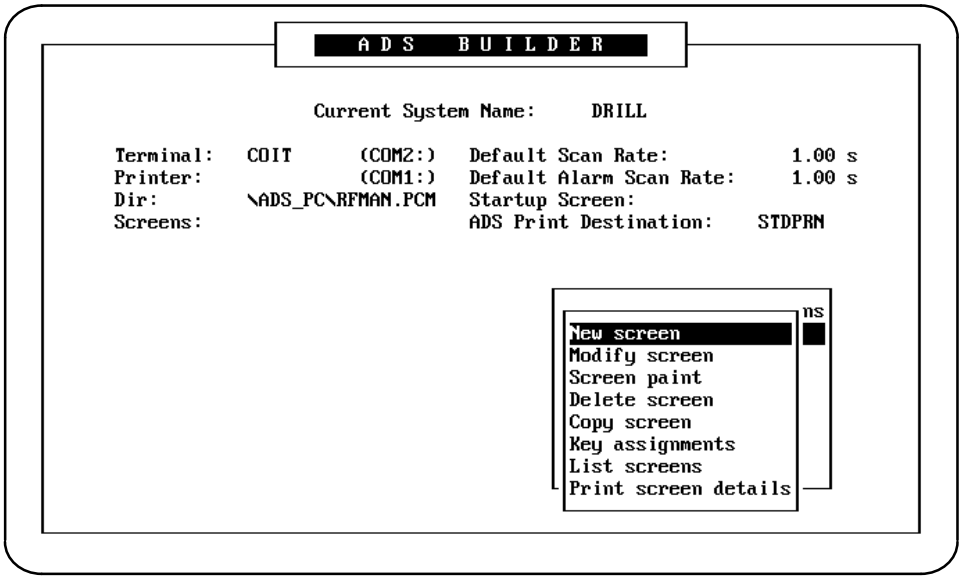
When the *Screen operations* submenu is selected from the main menu screen, the following screen is displayed. Notice that another menu window is opened on the screen, giving the additional options of

- *New screen*
- *Modify screen*
- *Screen paint*
- *Delete screen*
- *Copy screen*
- *Key assignments*
- *List screens*
- *Print screen details*

If the terminal defined for the current system (the terminal defined on the Modify System Parameters data entry form) supports touch points on the screen (for instance, the GE Fanuc Touch Mini OIT), an additional option is automatically added to the screen operations menu:

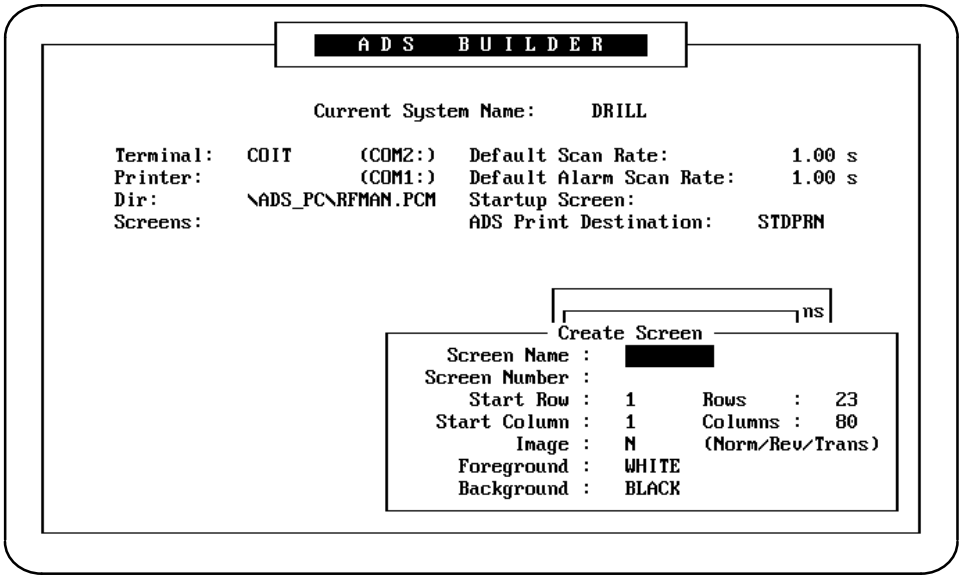
- *Touch screen assignments*

Each of the above options is described in this chapter. Note that not all screens will be shown for each option since the general format for each one is similar. Each of the options from each submenu will be described in the text. Any unique screens or screens showing a particular operation for the first time will also be shown.



New Screen

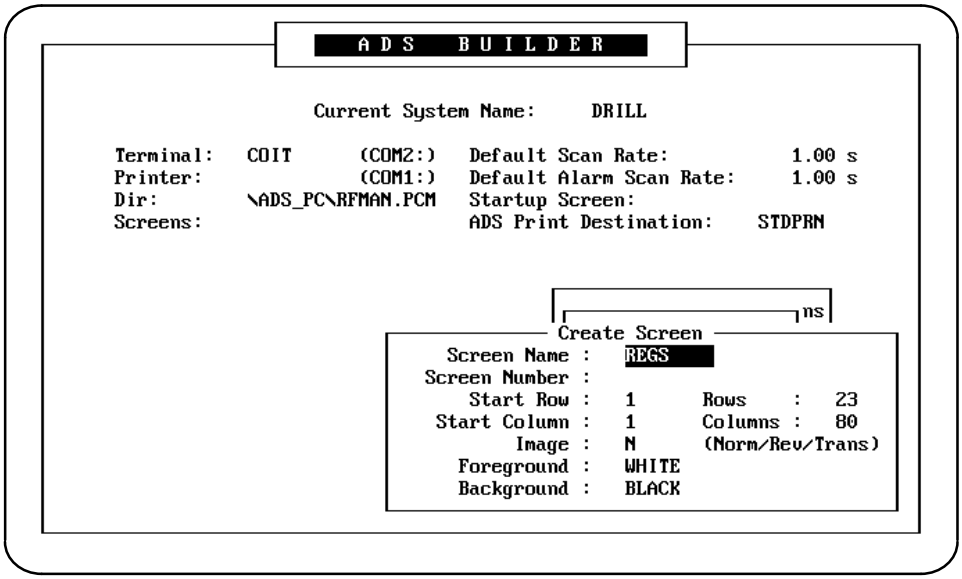
When the *New screen* option is selected, a data entry window is opened containing nine fields: *Screen Name, Screen Number, Start Row, Rows, Start Column, Columns, Image, Foreground* and *Background.*



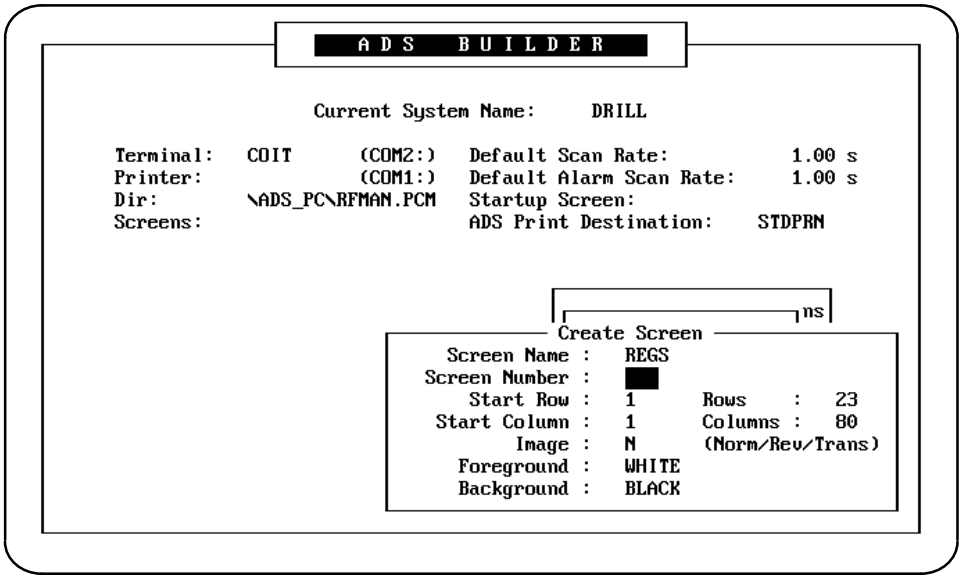
Screen Name

The screen name is used to assign a descriptive tag to a screen. Unlike other components of a system, the screen name is NOT used to uniquely identify the various screens. Instead, the screen number (see below) serves that function. As a result, the ADS system does NOT enforce uniqueness between screen names. A name may be from one to eight alphanumeric and underscore (_) characters, and is NOT case sensitive.

Assume that you want to create a screen with the name REGS. Type the desired name (in this example REGS) into the *Screen Name* field as shown on the following screen.



To complete the Screen Name entry press the [Enter] key. Note that in addition to completing this entry, the *Screen Number* field is selected next.



Screen Number

The screen number is used to uniquely identify screens within a single system. Screen numbers may range from 1 to 999, inclusive, providing for an absolute maximum of 999 screens in a single system. Screen numbers need not be assigned consecutively, nor do they need to be defined in a specific numeric order.

For example, assume that you want to assign 50 as the screen number. Type the value 50 into the *Screen Number* field. To complete the entry press the [Enter] key. Note that the *Start Row* field is selected next.

Start Row, Rows, Start Column and Columns

The size of a screen can be controlled by specifying the screen's starting coordinates (row, column) to fit the physical screen on your terminal and by specifying the total number of rows and columns covered by the screen. The screen should be defined to fit within the physical size of you terminal's screen since there is no provision for panning across a larger virtual screen. By default, the ADS Builder sets these values to exactly match the size of the terminal defined on the Modify System Parameters data entry form. You may alter any of these values by typing the new desired values into the appropriate fields. The default values are displayed in the appropriate fields when the New screen option is selected. The values for this example are: start on row 1 with 23 rows, and start at column 1 with 80 columns. The values you use will depend on the terminal type specified on the Modify System Parameters data entry form.

The Start Row and Start Column control the position at which the screen is placed when it is displayed at run time. For instance, if a small window is required to be displayed at run time that indicates the status of certain points in the PLC, it may be desired to place it on the far right hand side of the terminal. In this case, the Start Row, Start Column values might be set to 15 and 60 respectively. This will cause the top left hand corner of the screen to be positioned at row 15, column 60. When using this feature, you should be careful to ensure that the Rows and Columns Value are such that the screen fits on your terminal at run time. In our example, a Rows value greater than 9 or a Column value greater than 20 would cause the screen to exceed the actual width of the terminal.

The defined location of the screen can be altered when the system is executed by using the PSHSCN command. This feature means that a screen can be moved to a different location on the terminal as required at run time.

Assume that you want to use the default values such that the new screen will be created full sized. The reverse video block is on Start Row. When you press the [Enter] key, it means that you have selected the default value for that field and the reverse video block moves to the next field, *Rows*. Pressing the [Enter] key again selects the *Start Column* field. Pressing the [Enter] key a fourth time completes the entry of the screen size and positioning fields. The *Image* field is selected next.

Image

You have the option of specifying that a screen be displayed in the normal foreground / background video or in the reverse background / foreground video. On monochrome terminals the background is normally black and any characters displayed are in the foreground color (either white, green, or amber) supported by the terminal.

By default, the ADS Builder will create a screen in normal video, designated by the letter N in the field. If you would rather have reverse video, the letter R must be typed into the Image field.

A third choice, *Transparent*, is also available. This choice will display the screen in the same manner as described above for normal (N), with the addition that screen text and data on screens underneath the screen are allowed to ”bleed through” any blank character positions on the screen. This allows for effects such as bar charts superimposed on trend graphs. To define a screen as transparent, type the letter T into the Image field.

For example, assume that you want the new screen to be created using normal video. To complete the entry, press the [Enter] key since normal video is the default choice and you do not need to change the entry. The *Foreground* field is selected next.

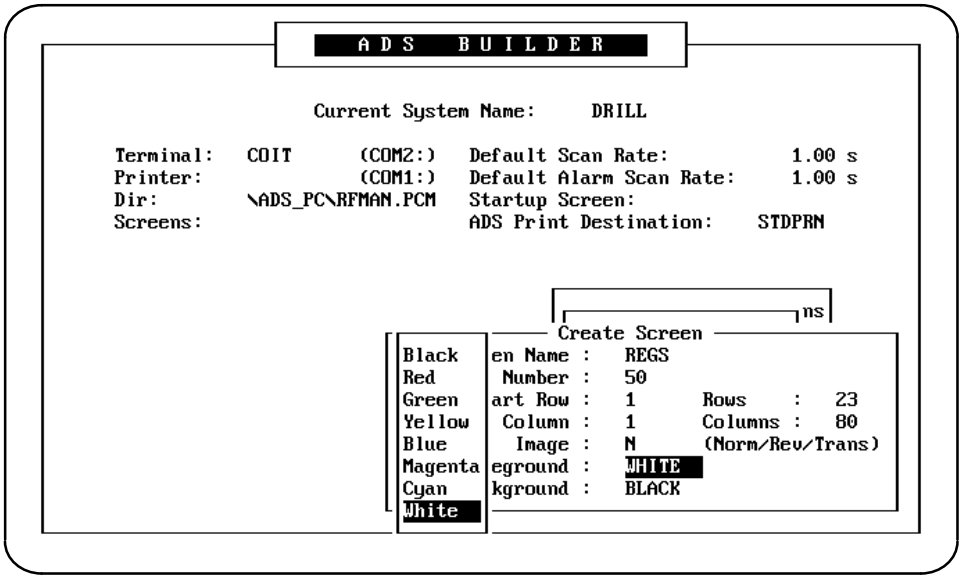
Foreground Color

Note

The *Foreground* and *Background* (see below) fields are supported only for the color terminals. Current supported color terminals are: color OIT (COIT), color computer running TERMF (CIBM), and the Nematron color touch OIT.

For all other terminals these fields are ignored regardless of what they might be set to. The *Foreground* field is used to select the default foreground color which will be used for the display of characters on the screen.

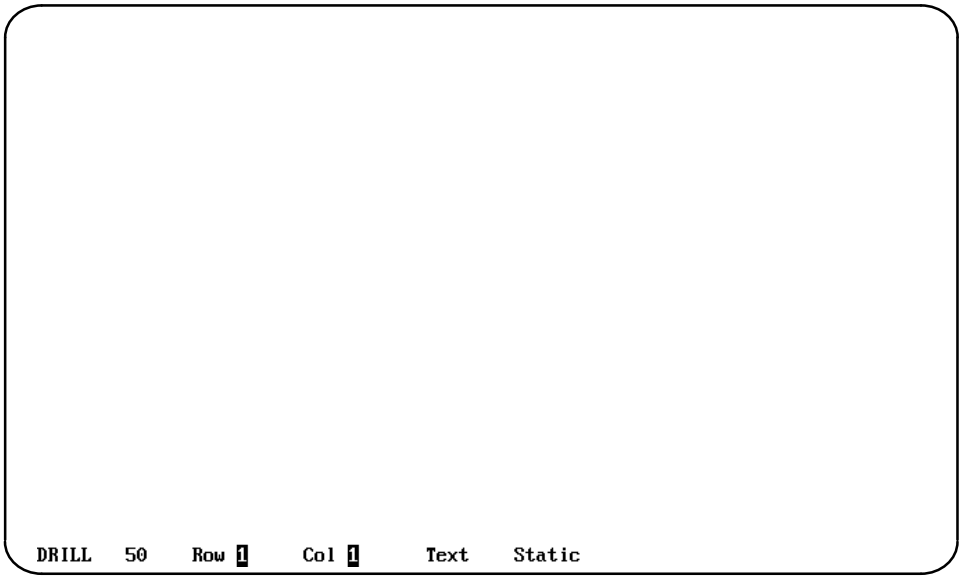
When you cursor onto the *Foreground* field a window is opened up on the screen showing what choices are available. Eight colors are supported: black, red, green, yellow, blue, magenta, cyan and white. By default, the ADS system selects WHITE as the foreground color. You must select a foreground color which is different from the selected background color.



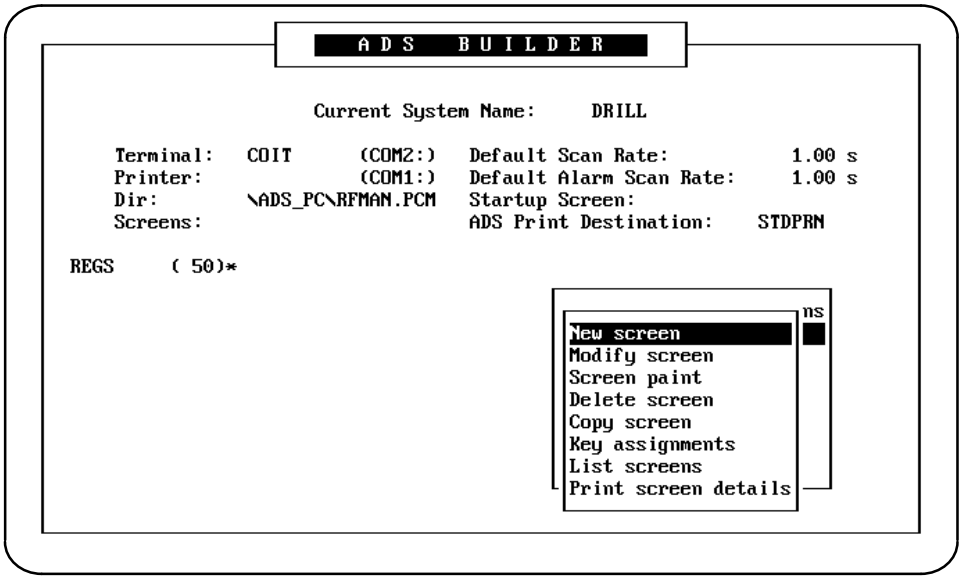
If you wish to accept the default selection of WHITE, press the [Enter] key. If you wish to select a different color move the cursor to that color, then press the [Enter] key. Also notice that the *Background* field is selected next (reverse video block is now on Background field)

Background Color

The *Background* field is used to select the background color for the screen. When you cursor onto the *Background* field a window is opened up on the screen showing what choices are available. Eight colors are supported: black, red, green, yellow, blue, magenta, cyan and white. By default, the system selects BLACK as the background color. The user must select a background color which is different from the selected foreground color. If you wish to accept the default selection of BLACK, press the [Enter] key. At this point the screen is created (initially blank) as shown below, and the ADS Builder automatically enters the screen /report editor (see Section 4, on Screen /Report Editing for details on editing a screen).



After you have completed the editing of the screen, select the <Save> key to exit the screen /report editor (the screen contents will be saved in the ADS Builder's working memory). You are then returned to the menu page with the status area updated to reflect the creation of the new screen. Note that an asterisk (*) is displayed to the right of the newly created screen number. This designates that the screen is currently loaded in the ADS Builder's memory.



Modify Screen

A screen's position and attribute information may be modified if you later determine that an incorrect setting was made at the time of creation (e.g., foreground color, row / column starting position, etc.). All information may be modified except the screen's number.

To initiate a screen modification first select the Modify screen menu option, either by cursoring to the Modify screen option and then pressing the [Enter] key, or by pressing the [M] key.

When you select this option, the ADS Builder will prompt you for the number of the screen to be modified. Only existing screens may be modified; the New screen menu option must be used in order to create a new screen.

As an example, assume that you want to modify screen 50 (REGS), which we created previously. Type the screen number (50) into the prompt field.

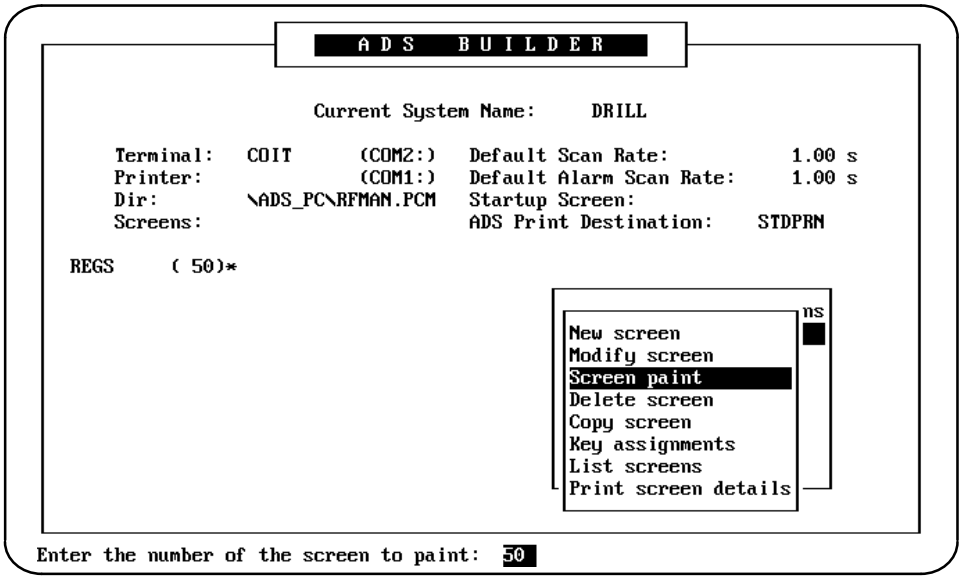
When you press the [Enter] key, the form for the screen is displayed with the *Screen Name* field initially selected. You may now proceed to change any field except the Screen Number field. After you have completed the modifications to the screen, press the <Save> key to complete the modification operation. You are then returned to the menu page.

Screen Paint

Screen painting refers to the information that you put on the screen. The actual contents of a screen may be changed by using the Screen Paint menu selection. To initiate a screen paint select the Screen Paint menu option, either by cursoring to the desired option and then pressing the [Enter] key, or by pressing the [S] key.

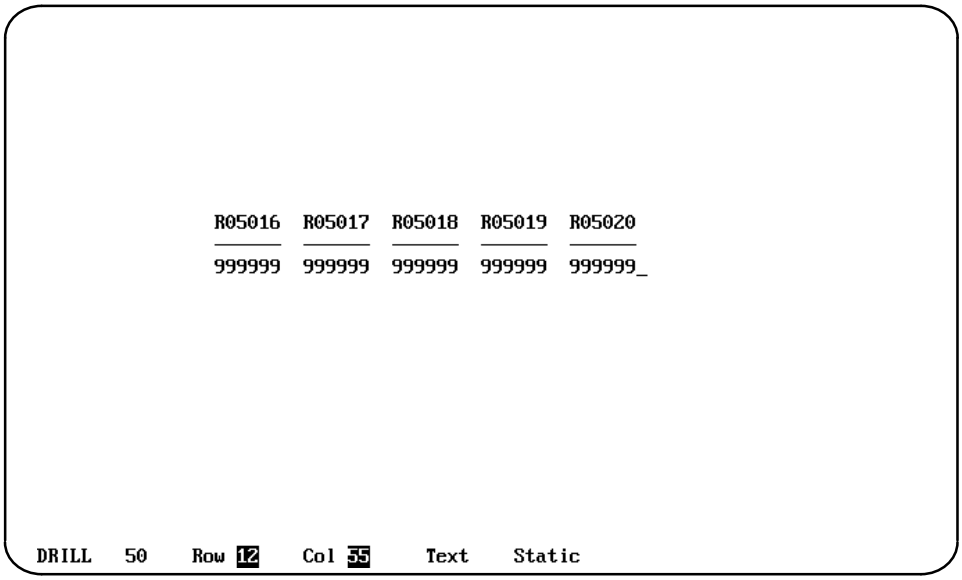
The ADS Builder will prompt you for the number of the screen to be painted. Only existing screens may be painted; the New screen menu option must be used in order to create a new screen.

As an example of painting a screen, assume that you wish to paint screen 50 (REGS). Type the screen number (50) into the prompt field.



When you press the [Enter] key the ADS Builder enters the screen / report editor (see Section 4, Screen / Report Editing for details on editing a screen). You may now make any desired modifications to the screen.

The following screen is an example of screen painting.



After you have completed the modifications to the screen, select the <Save> key to exit the screen / report editor (the contents of the screen will be saved in the ADS Builder's working memory). You are returned to the menu page. The <Quit> key may be used to exit the Screen Painter without saving the changes you have made.

Delete Screen

A screen may be (irrecoverably) removed from a system by deleting it. Any dynamic objects defined on the screen will also be lost, but not any referenced PLC data source, display format, translation table entry, lookup table entry or command script.

To initiate a screen deletion select the Delete screen menu option, either by cursoring to Delete screen on the menu and then pressing the [Enter] key, or by pressing the [D] key. The ADS Builder will prompt you for the number of the screen to be deleted.

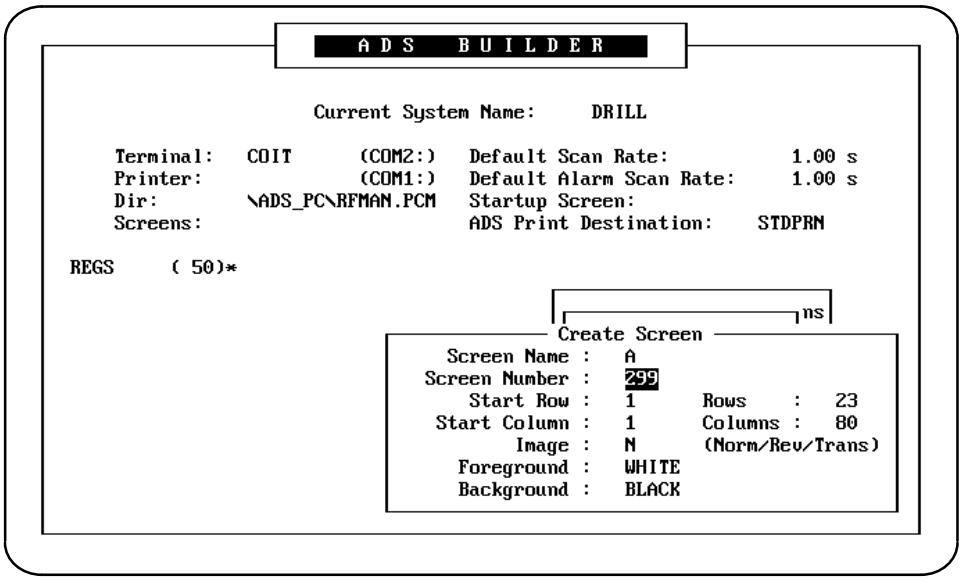
For example, assume that you want to delete screen 50 (REGS). Type the desired screen number into the prompt field. Pressing the [Enter] key completes the delete screen operation. You are returned to the menu page; the listing of existing screens on the left-hand side of the terminal display is updated to reflect the deletion you have just made.

Copy Screen

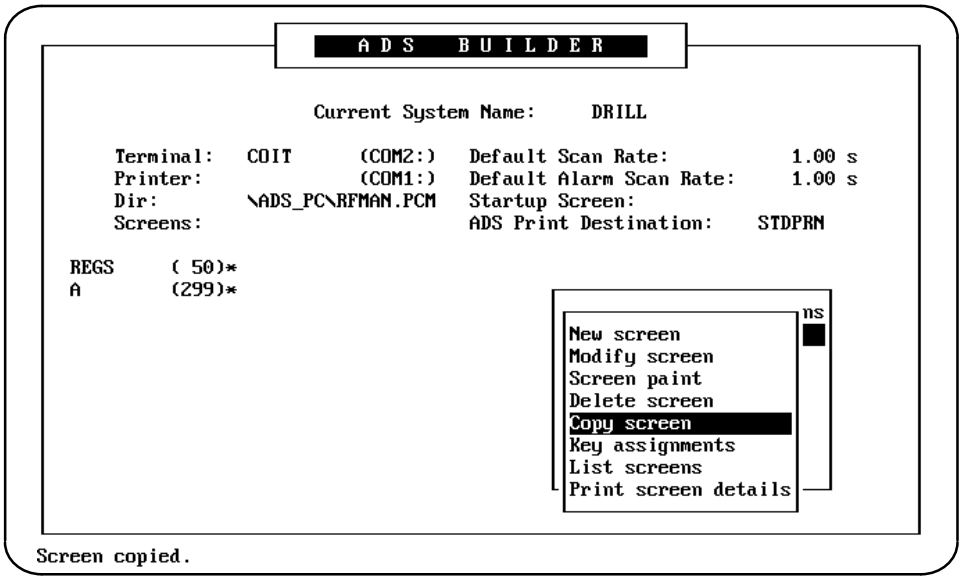
A new screen may be created by making a copy of an existing screen. The copy will include the screens' contents, its function key assignments, and its touch point assignments (if target terminal supports a touch screen). During the copy process you may alter the screen definitional information (screen name, screen size, color, etc.). A unique screen number must be assigned to the copied screen. To initiate a screen copy, select the Copy screen menu option, either by cursoring to the Copy screen option on the menu and then pressing the [Enter] key, or by pressing the [C] key.

The ADS Builder will prompt you for the number of the screen from which the copy will be made. For example, assume that you want to create a new screen which is a copy of existing screen 50 (REGS). Type the screen number into the prompt field. When you press the [Enter] key a data entry window is opened which is identical to the one used for creating a new screen.

Assume that you want the new screen to be numbered 299, and that it is to have the name A; otherwise, the screen definition data is to be exactly the same as for screen 50. At this point enter the screen name and number information into the creation form.



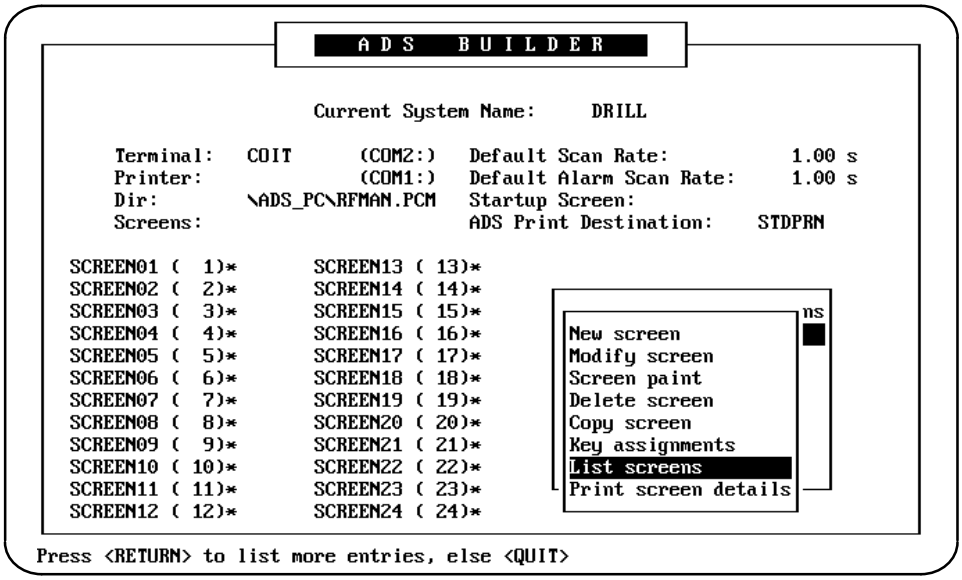
Pressing the <Save> key at this point completes the creation form entry. All fields not changed are copied from screen 50's creation form. You are returned to the menu page with an informative message displayed on the status line indicating that the copy operation is complete. Also, the listing of screen names is updated to reflect the addition of the new screen.



List Screens

On the left-hand side of the screen a list of screen names and their associated numbers are maintained in numeric (not alphabetic) order. The ADS Builder allows you to page through the total list of screens. To initiate the listing of current screens, select the List screens menu option, either by cursoring to the that option on the menu and then pressing the [Enter] key, or by pressing the [L] key.

In this example sequence, twenty-six screens currently exist in the system. When you press the [Enter] key the first group of screens is displayed along with a prompt on the status line giving you the choice of listing the next group of screens or of quitting the list function.



Pressing the [Enter] key at this point will list the remaining screens. When the <Quit> key is pressed, the listing of screens currently displayed will remain displayed.

Key Assignments

Every screen in a system (except alarm pages) has its own associated set of assignments for the fifteen function keys supported by ADS. These assignments are critical when a system is run by the ADS Executor since all user initiated actions are started by pressing function keys. When created, a screen's function keys have no default assignments; i.e., no action will occur when one of the keys is pressed if the system were executed at that point. It is possible to create a system which makes no use of the function keys; however, if this were the case you would not be able to affect what is displayed on the terminal.

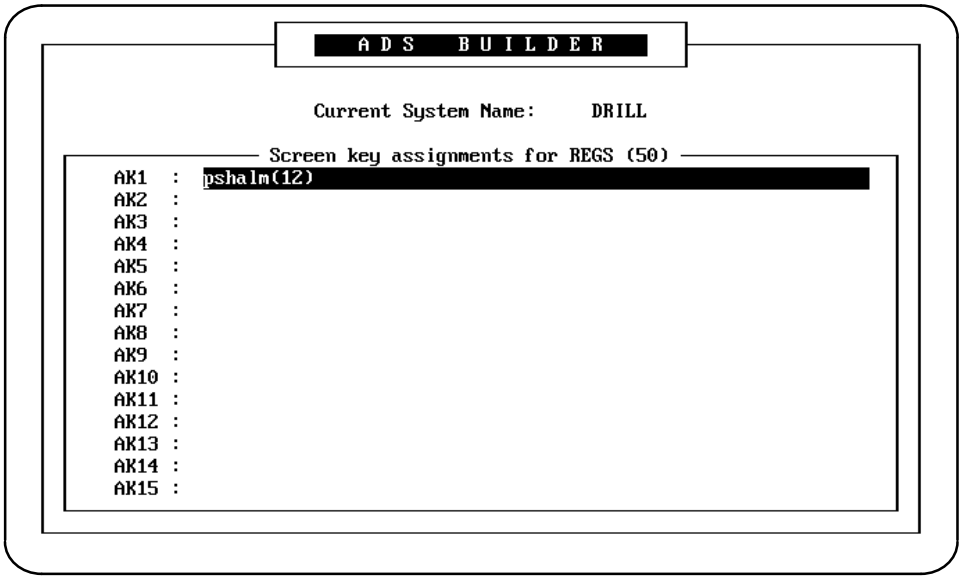
When assigning commands to function keys it is important to think about how the system will flow when executed. If one screen overlays (is pushed onto) another its function key assignments are then the current active set. Removing the overlaid screen (popping) restores the previous screen's function key assignments as the active set.

Each function key may be assigned to a command script, or to any of the individual commands which make up a command script (see the section on Command Scripts). Multiple commands and / or command scripts may be specified for each key through the function key assignment form (multiple commands must be separated by a space character or by a semicolon). The <object list> key can be used to obtain a list of existing command scripts or to create a new one.

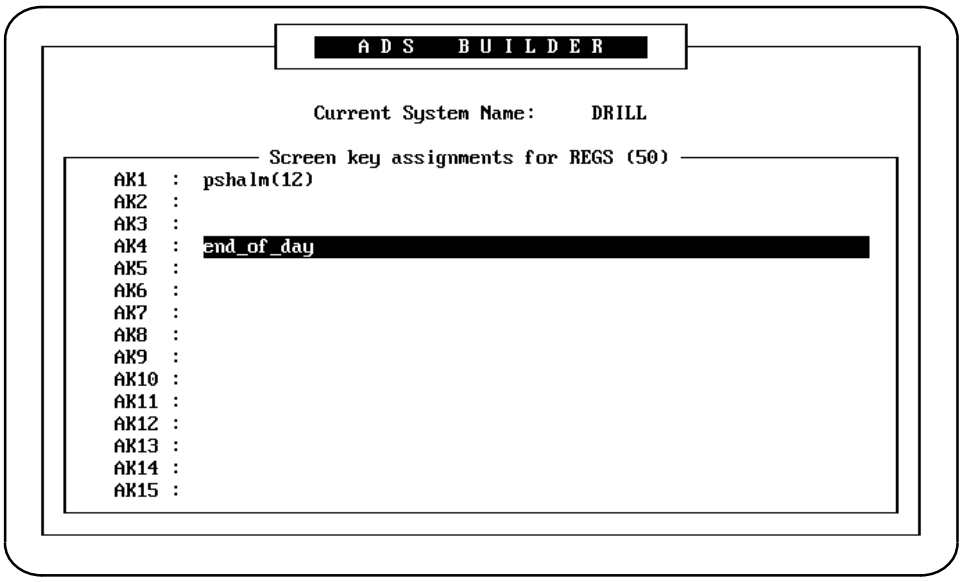
To initiate the editing of a screen's function key assignments select the Key Assignments menu option, either by cursoring to that option on the menu and then pressing the [Enter] key, or by pressing the [K] key. The ADS Builder will prompt you for the number of the screen for which the function keys are to be edited. Only function keys associated with an existing screen may be edited.

For example, assume that you want to edit the function keys associated with screen 50 (REGS). Type that screen number into the prompt field. When you press the [Enter] key the form for the specified screen's function key assignments is displayed. The data entry form consists of fifteen fields, one field for each of the fifteen function keys (AK1 through AK15).

Assume that you want to overlay alarm page 12 whenever function key AK1 is pressed. You would now type the required command into the key assignment field for AK1.



Also, you want to execute command script END_OF_DAY whenever function key AK4 is pressed. The [Enter] key is pressed three times which completes the assignment for AK1 and then selects AK4. Again, type the desired command script assignment into the field.



When you are finished editing the key definitions, press the <Save> key to complete the entry (alternatively, the [Enter] key may be pressed with the *AK15* field selected). You will be returned to the menu page with an informative message displayed on the status line indicating that the key assignments editing function is complete.

The edit of the key assignments table may be canceled with all modifications disregarded. This is done by pressing the <Quit> key. You will be returned to the menu page with an informative message displayed on the status line indicating that the key assignments were not updated.

Touch Screen Assignments

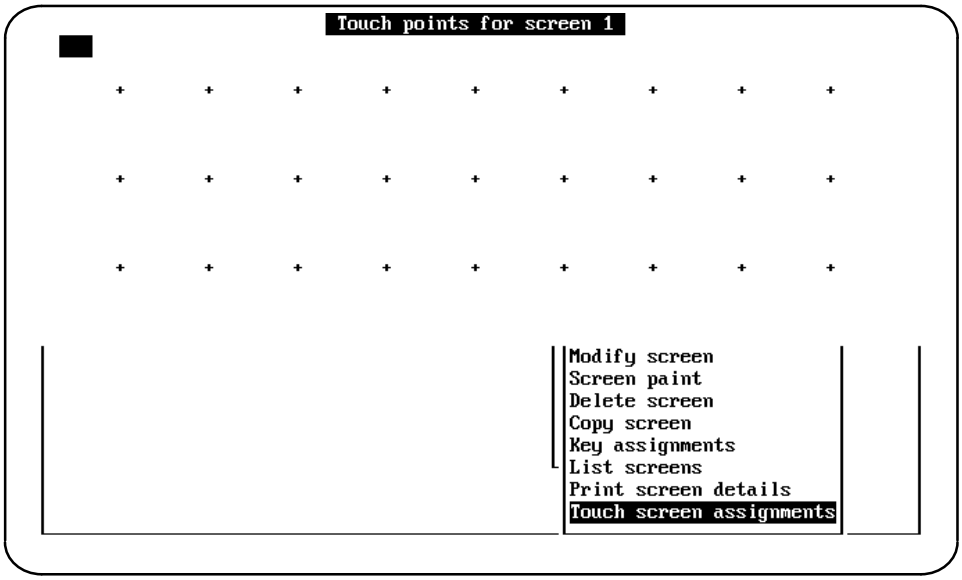
Note

This option will only appear if the terminal field on the Modify System Parameters data entry form is set to TMINI, TCOIT, or TMOIT

When a terminal that supports touch points is being used as the target terminal for an ADS system, it is necessary to setup touch point information for screens defined in ADS. Touch points are defined so that they allow any keyboard characters to be returned from a touch point. For instance, a touch point may be defined to return a ”1” or ”ENTER” keystroke; this allows screens to be defined which act as keypads. Touch points also may return a function key keystroke.

Terminals which support touch points divide the screen into a grid of rectangles; each rectangle acts as a touch point. A Touch Mini OIT, for example, divides the screen into a grid of 4 rows and 10 columns providing 40 touch points.

To define the information returned by touch points select the Touch Screen Assignments option, either by cursoring to that option on the menu and then pressing the [Enter] key, or by pressing the [T] key. You will be prompted to enter a screen number. Type the screen number into the prompt field and press the [Enter] key.



The first field on the touch point grid is displayed in reverse video. To move between touch points press the [Enter] key or [–] key to move to the next touch point, or [ ] key to move to the previous touch point. The values entered into the touch point fields represent the numeric key value to be returned when you actually touch the touch point.

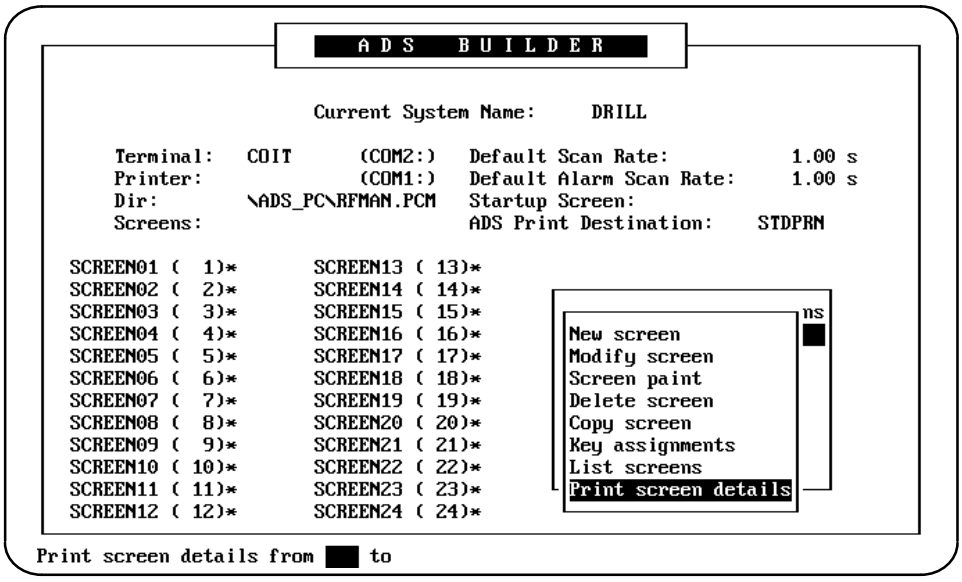
The values of the various keys on a Touch Mini OIT are defined in GFK-0361, the Mini Operator Interface Terminal User's Manual, page 5-28; in GEK-90817, the Series Six OIT User's Manual, Appendix A, pages A-1 through A-4; and Appendix B of the ADS User's Manual. (The same touch point values are used by the Nematron touch OIT terminals.) When all of the required values have been entered, press the <Save> key (or [Enter] key when positioned on the final field). If you should decide to abandon the changes, press the <Quit> key.

Note

Touch point assignments may also be made and viewed from within the Screen Painter.

Print Screen Details

The Print screen details option allows details of the defined screens to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module and Spooler are installed. To initiate a print of the defined screens, select the Print screen details option by either cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

```
Print screen details from ################ to ################
```

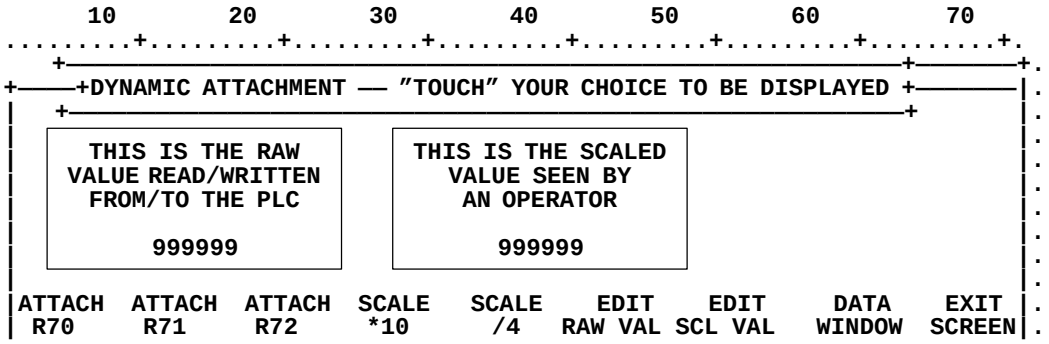
Depending upon the response entered into the from and to field, several different listings can be generated. The listing options are as shown below.

```
from  = "<id1>"   to  = "<id2>"   -->  print out screens id1 to id2
from  = "<id1>"   to  = ""        -->  print out screens id1
from  = ""        to  = "<id2>"   -->  print out screens id2
from  = "*"       to  = "<id2>"   -->  print out all screens up to id2
from  = "<id1>"   to  = "*"       -->  print out all screens from il1
from  = "*"       to  = ""        -->  print out all screens
from  = ""        to  = "*"       -->  print out all screens
from  = "*"       to  = "*"       -->  print out all screens
```

Pressing the <Quit> key aborts the print operation. After selection of the required range of screens to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see the Load / Save menu discussion in Chapter 9).

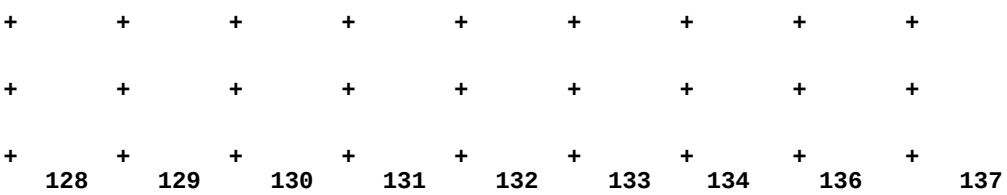
Screen detail information is formatted as shown in the following examples:

```
            SCREEN DETAILS LISTING
            ----------------------

    Screen Number : 5      ATTACH

                              Start Row : 3          End Row : 14
                           Start Column : 9       End Column : 80

                                 Image : NORMAL
                            Background : BLACK    Foreground : WHITE

        Dynamic Object : RAW_VALUE

                              Start Row : 9            End Row : 9
                           Start Column : 9         End Column : 14

                            Data Source : R70
                       Additional Calc. :
                            Data Format :
                          Display Value : Yes  ( Left_justify )

       Dynamic Object : SCALED_VALUE

                              Start Row : 9            End Row : 9
                           Start Column : 35        End Column : 40
                            Data Source : R70
                       Additional Calc. : TIMES_1
                            Data Format :
                          Display Value : Yes  ( Left_justify )
```




```
Key definitions —
      AK1  : ATTACH_R70
      AK2  : ATTACH_R71
      AK2  : ATTACH_R73
      AK4  : ATTACH(5,SCALED_VALUE,,TIMES_10)
      AK5  : ATTACH(5,SCALED_VALUE,,DIV_4)
      AK6  : PSHSCN(999) DYN_EDIT(5,RAW_VALUE,REVERSE)
      AK7  : PSHSCN(999) DYN_EDIT(5,SCALED_VALUE,REVERSE)
      AK8  :
      AK9  : PSHSCN(997)
      AK10 : POPSCN(5)
      AK11 :
      AK12 :
      AK13 :
      AK14 :
      AK15 :
```

Touch Point Definitions



Error Messages for Screen Operations

Error messages and their causes for Screen Operations are listed below.

ENTRY ERROR :: Invalid item XXXX (key AKn)

Command ”XXXX” referenced for function key number ”n” is invalid (undefined).

ENTRY ERROR :: Name not specified

A name must be specified.

ENTRY ERROR :: Row or column sizes are invalid for this terminal

The row / column specification for the screen would place all or part of the screen off the physical display.

ENTRY ERROR :: Screen number is not unique

Two screens cannot have the same number.

ENTRY ERROR :: Screen number may not be zero

A screen number must be specified.

Note

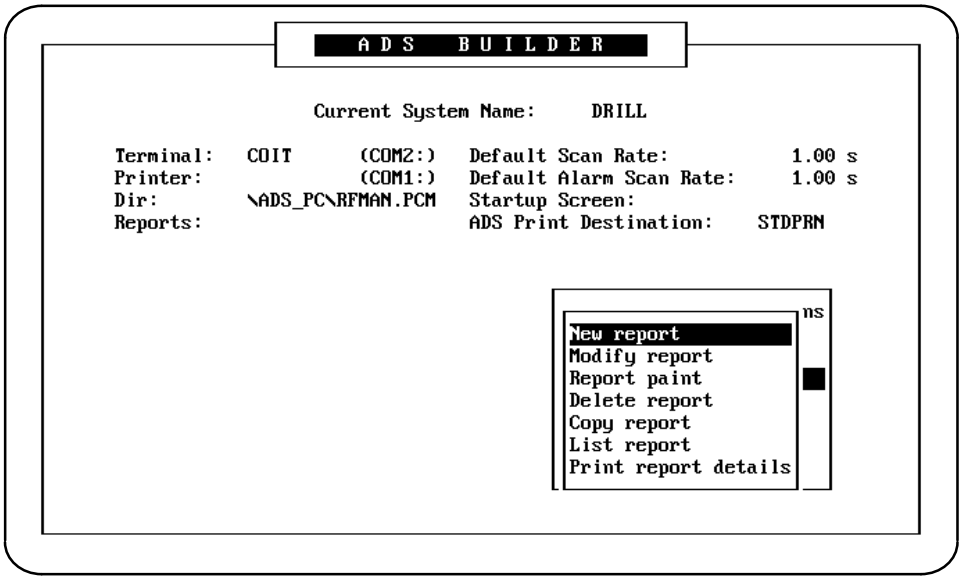
See Chapter 3, Section 7, ”Command Scripts”, for a list of error messages pertaining to specific commands.

Chapter 5 Report Operations

This chapter describes the **Report Operations** submenu. When the *Report operations* submenu is selected, the following screen is displayed. Another menu window is opened on the screen, giving the additional options of

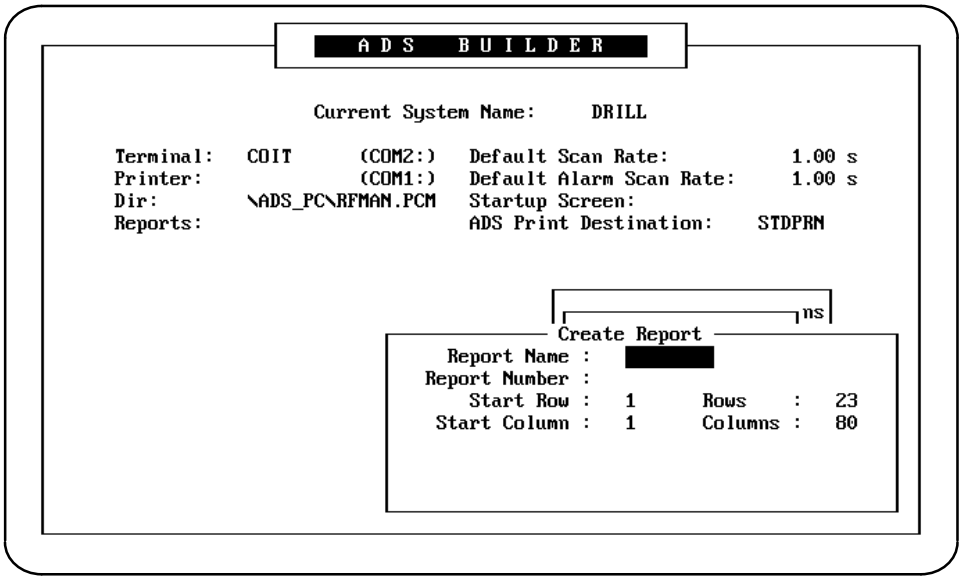
- *New report*
- *Modify report*
- *Report paint*
- *Delete report*
- *Copy report*
- *List report*
- *Print report details*

Each of these options is described on the following pages.



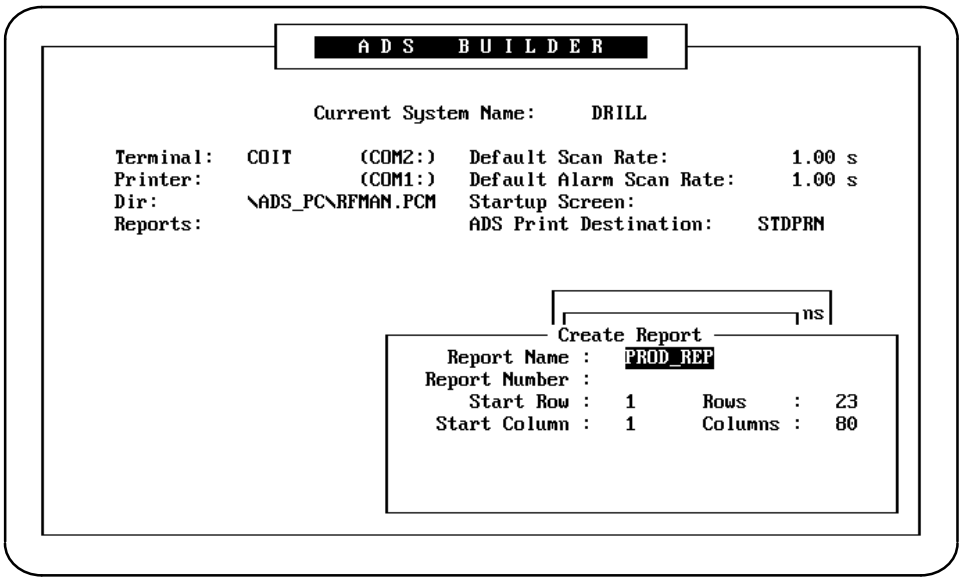
New Report

When the *New report* option is selected, a data entry window is opened containing six fields: *Report Name, Report Number, Start Row, Rows, Start Column* and *Columns.*



Report Name

The report name is used to assign a descriptive tag to a report. Unlike other components of an ADS system, the report name is NOT used to uniquely identify the various reports; the report number serves that function. Because of this, the ADS system does NOT enforce uniqueness between report names. A name may be from one to eight alphanumeric and underscore (_) characters, and is NOT case sensitive. As an example of creating a report name, assume that you want to create a report with the name PROD_REP. Type the name, PROD_REP, into the *Report Name* field.



To complete the entry press the [Enter] key. Also, at this point note that the *Report Number* field is selected next.

Report Number

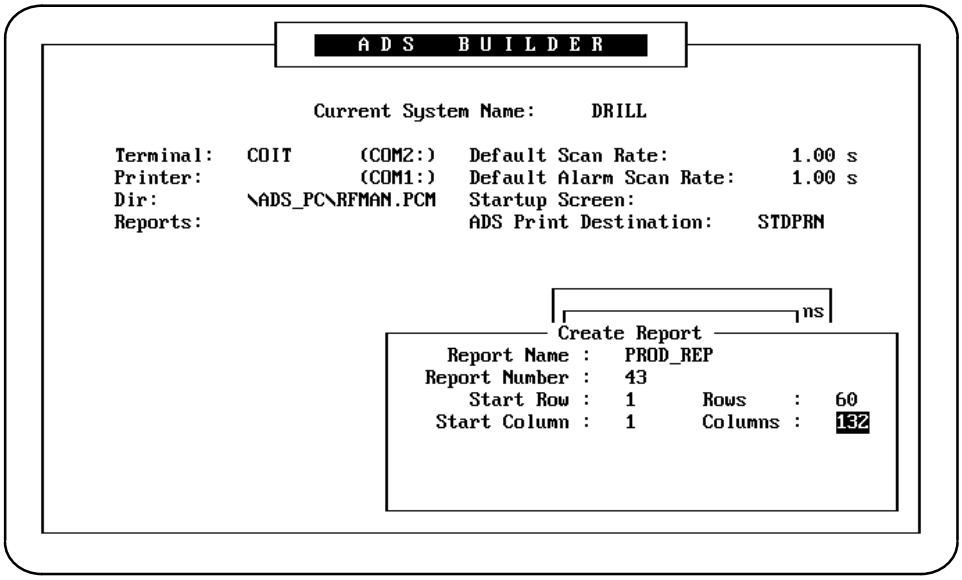
The report number is used to uniquely identify reports within a single system. Report numbers may range from 1 to 999, inclusive, providing for an absolute maximum of 999 reports in a single system. Report numbers do not need to be assigned consecutively, nor do they need to be defined in an increasing numeric order.

Continuing with our example, assume that you want to assign 43 as the report number. Type the number 43 into the *Report Number* field. To complete the entry press the [Enter] key. Note that the *Rows* field is selected next.

Start Row, Rows, Start Column and Columns

You can control the size of a report by specifying the number of rows and columns covered by the report. You must select the values which reflect the physical printer on which the report will be printed. If the report is defined to be wider than the width supported by your terminal, panning across the report is supported (unlike screens). Only the *Rows* and *Columns* fields may be altered by the user. A value from 1 to 99 inclusive may be chosen for the number of rows, and a value from 1 to 200 inclusive for the number of columns. The *Start Row* and *Start Column* fields may not be altered, but are displayed to indicate that the report always begins at the row 1, column 1 position.

Assume that you wish to define a report consisting of 60 rows and 132 columns. The number of rows is defined first by typing the number 60 into the Rows field. Pressing the [Enter] key completes the entry and selects the *Columns* field. Type the number of columns, 132 for this example, into the Column field.



Pressing the [Enter] key at this points completes the specification of the report. At this point the report is created (initially blank) and the ADS Builder enters the screen / report editor.

After you have completed editing the report, select the <Save> key to exit the screen / report editor (the contents of the screen will be saved in the ADS Builder's working memory). You are returned to the menu page with the status area updated to reflect the creation of the new report. Note that an asterisk (*) is displayed to the right of the report number you have just created. This designates that the report is currently loaded in the ADS Builder's memory. The <Quit> key can be used to exit the screen / report editor without saving the changes you have made.

Modify Report

A report's size information may be modified if it is later determined that an incorrect setting was made at the time of creation. All information may be modified except the report's number. To initiate a report modification select the Modify Report menu option, either by cursoring to that option and pressing the [Enter] key, or by pressing the [M] key.

The ADS Builder will prompt you for the number of the report to be modified. Only existing reports may be modified; the New Report menu option must be used in order to create a new report.

Assume that you want to modify report 43 (PROD_REP). Type 43, the report number, into the prompt field. When the [Enter] key is pressed, the form for the report is displayed with the *Report Name* field initially selected. You may now change any field except the Report Number field.

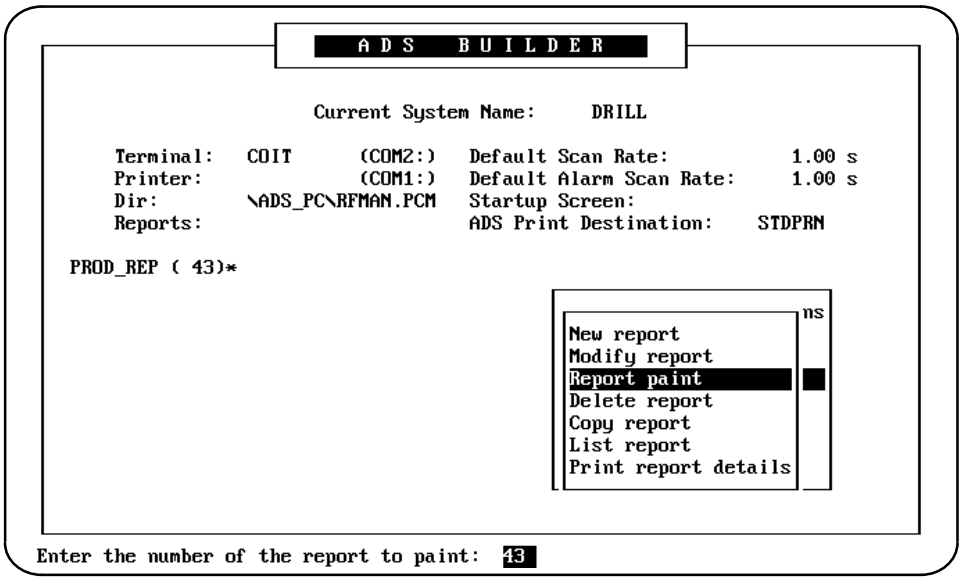
After you have completed the modifications to the report, pressing the <Save> key will exit the screen / report editor (the report's contents will be saved in the ADS Builder's working memory). You are then returned to the menu page.

Report Paint

The actual contents of a report may be changed through the Report paint menu selection. To initiate a report paint operation select the Report paint menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [R] key.

The ADS Builder will prompt you for the number of the report to be painted. Only existing reports may be painted; the New report menu option must be used in order to create a new report.

As an example of a report paint operation, assume that you wish to paint report 43 (PROD_REP). Type the report number into the prompt field. When you press the [Enter] key the ADS Builder enters the screen / report editor. You may make any needed modifications to the report.



After completing the modifications to the report, press the <Save> key to exit the screen / report editor (the report's contents will be saved in the ADS Builder's working memory). You are then returned to the menu page. The <Quit> key may be used to exit the Report Painter without saving the changes you have made.

Delete Report

A report may be (irrecoverably) removed from a system by deleting it. Any dynamic objects defined on the report will also be lost, but not any referenced PLC data source,

translation table entry or lookup table entry. To initiate a report deletion select the Delete Report menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [D] key.

The ADS Builder will prompt you for the number of the report to be deleted. For example, assume that you want to delete report 43 (PROD_REP). Type the report number into the prompt field. Pressing the [Enter] key completes the delete report operation. You are then returned to the menu page; the listing of existing reports on the left-hand side of the terminal display is updated to reflect the deletion.

Copy Report

A new report may be created by making a copy of an existing report. During the copy process you may alter the report definition information (report name and report size). A unique report number must be assigned to the copied screen. To initiate a report copy select the Copy Report menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [C] key.

The ADS Builder will prompt you for the number of the report from which the copy will be made. For example, assume that you want to create a new report which is a copy of existing report 43 (PROD_REP). Type the existing report number (43) into the prompt field. When you press the [Enter] key a data entry window is opened which is identical to that used for creating a new report.

Assume that you want the new report to be named ALPHA, and to be assigned report number 157. Type the new information into the appropriate fields. Pressing the <Save> key at this point completes the creation form entry. All fields not changed are copied from the creation form for report 43. You are then returned to the menu page with an informative message displayed on the status line indicating that the copy operation is complete. Also, the listing of report names is updated to reflect the addition of the new report.

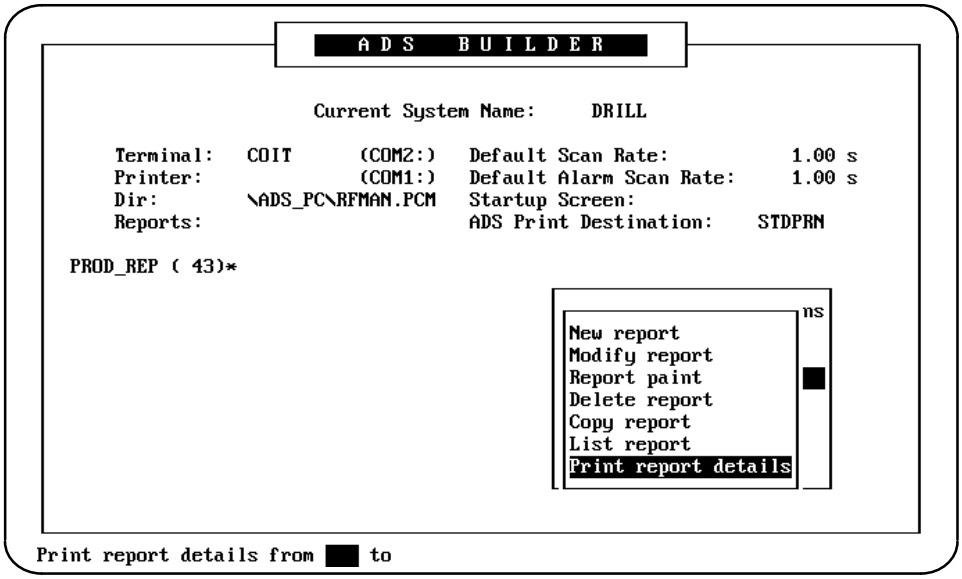
List Report

On the left-hand side of the report a list of up to twenty-two report names and their associated numbers are maintained in numeric (not alphabetic) order. The ADS Builder allows you to page through the total list of reports, in groups of up to twenty-two at a time. To initiate the listing of current reports select the List report menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [L] key.

Pressing the <Quit> key exits the list operation. The listing of reports currently displayed will remain displayed.

Print Report Details

The Print report details option allows details of the defined reports to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module and Spooler are installed. To initiate a print of the defined reports, select the Print report details option by either cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

Print report details from ################ to ################

Depending upon the response entered into the from and to field, several different listings can be generated. The listing options are as shown below.

```
from = "<id1>"   to = "<id2>"   --> print out reports id1 to id2
from = "<id1>"   to = ""        --> print out report id1
from = ""        to = "<id2>"   --> print out report id2
from = "*"       to = "<id2>"   --> print out all reports up to id2
from = "<id1>"   to = "*"       --> print out all reports from il1
from = "*"       to = ""        --> print out all reports
from = ""        to = "*"       --> print out all reports
from = "*"       to = "*"       --> print out all reports
```

Pressing the <Quit> key cancels the print operation. After selection of the required range of reports to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see the Load / Save menu discussion in Chapter 9).

Report detail information is formatted as shown in the following examples:

```
            REPORT DETAILS LISTING

  Report Number : 1       ENDOFDAY
                                 Rows : 5
                              Columns : 80

         Dynamic Object : DATE_DISPLAY

                             Start Row : 1           End Row :  1
                          Start Column : 61       End Column :  69

                           Data Source : TODAYS_DATE
                        Additional Calc. :
                           Data Format :
                         Display Value : Yes  ( )

         Dynamic Object : TIME_DISPLAY
                             Start Row : 1           End Row :  1
                          Start Column : 72       End Column :  79

                           Data Source : TIME_OF_DAY
                        Additional Calc. :
                           Data Format :
                         Display Value : Yes  ( )

         Dynamic Object : WIDGETS_MADE
                             Start Row : 4           End Row :  4
                          Start Column : 26       End Column :  30

                           Data Source : TTL_WIDGETS
                        Additional Calc. :
                           Data Format :
                         Display Value : Yes  ( Left_justify )

         Dynamic Object : WIDGETS_SCRP

                             Start Row : 4           End Row :  4
                          Start Column : 65       End Column :  69

                           Data Source : BAD_WIDGETS
                        Additional Calc. :
                           Data Format :
                         Display Value : Yes ( Left_justify )

        10        20        30        40        50        60        70
.........+.........+.........+.........+.........+.........+.........+....
END OF DAY PRODUCTION REPORT                          DD-MMM-YY  HH:MM:SS

     TOTAL WIDGETS MADE: 99999         TOTAL WIDGETS SCRAPPED: 99999
```

Error Messages for Report Operations

Error messages and their causes for Report Operations are listed below.

ENTRY ERROR :: Name not specified

A name must be specified.

ENTRY ERROR :: report number is not unique

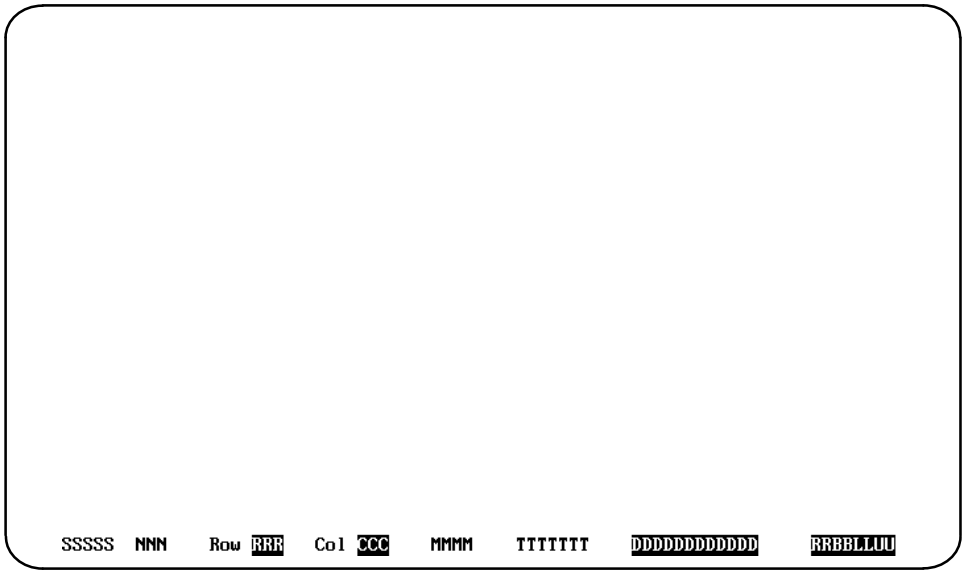
Two reports may not have the same number.

ENTRY ERROR :: report number may not be zero

A report number must be specified.

Chapter 6 Screen Painter and Report Painter

The screen / report editor is used when creating or printing a screen or report. This chapter describes the various editing commands you will use for manipulating static text. The following chapter, Dynamic Objects, explains how to animate data on screens and reports. A typical screen / report editing display is shown below.



The bottom line of the screen is a status line. The entries on that line are defined in the following table.

Item	Definition
SSSSS	is the name of the currently loaded system;
NNN	is the number assigned to the screen or report being edited;
RRR	is the row where the cursor is currently positioned;
CCC	is the column where the cursor is currently positioned;
MMMM	indicates whether the editor is in Text or Line mode;
TTTTTTT	indicates whether the cursor is currently positioned on Static text or on a Dynamic object;
DDDDDDDDDDD D	is blank unless the cursor is positioned on a dynamic object, whereby it displays the name of the dynamic object in reverse video, or unless you are currently defining a dynamic object whereby it displays the blinking text *-defining-*;
RR	is blank unless you have toggled the reverse video attribute, whereby it displays *Re*;
BB	is blank unless you have toggled the bold video attribute, whereby it displays *Bo*;
LL	is blank unless you have toggled the blink video attribute, whereby it displays *Bl* and
UU	is blank unless you have toggled the underline video attribute, whereby it displays *Ul.*

Each of these status indicators are displayed and described in more detail on the following pages.

Section 1: ADS Screen Painter Keyboard

Use of [ ] and < > Characters with Key Names

The [ ] and < > character pairs have special meaning in this document when used to indicatekeys. If a key name is enclosed in brackets ([ ]) the key is actually labeled with that name on the keyboard. If a key name is enclosed by angle brackets (< >) the key's location on the keyboard must be determined from the following table. When using this table be sure to use the column that matches your terminal type (based on terminal selection that you made on the menu program screen described in Chapter 1).

Table 6-1. Key Functions for System Building

Key Functions	Terminal		
	MOIT/COIT TMOIT/TCOIT	VT100	MIBM/CIBM† MPC/CPC/EIBM/VIBM‡
GOLD	F11	PF1	F11 or Insert
Help	F12	PF2	F12 or Home
Quit	F10	KP0	F10 or KP0
Save	GOLD F10	GOLD KP0	GOLD F10 or GOLD KP0
Object list	GOLD S	GOLD S	GOLD S
Refresh screen	^W	^W	^W
Clear field	^X	^X	^X
Beginning of line	GOLD ←	GOLD ←	GOLD ←
End of line	GOLD →	GOLD →	GOLD →
Top of screen	GOLD ↑	GOLD ↑	GOLD ↑
Bottom of screen	GOLD ↓	GOLD ↓	GOLD ↓
Video select	F1	KP1	F1 or KP1
Video clear	GOLD F1	GOLD KP1	GOLD F1 or GOLD KP1
Color	F4	KP4	F4 or KP4
Character set	GOLD F4	GOLD KP4	GOLD F4 or GOLD KP4
Double wide	GOLD W	GOLD W	GOLD W
Double size	GOLD D	GOLD D	GOLD D
Draw toggle	GOLD F5	GOLD KP5	GOLD F5 or GOLD KP5
Draw area	F5	KP5	F5 or KP5
Delete line	F14	PF4	F14 or End
Undelete line	GOLD F14	GOLD PF4	GOLD F14 or GOLD END
Select toggle	F3	KP3	F3 or KP3
Cut area	F6	KP6	F6 or KP6
Paste area	GOLD F6	GOLD KP6	GOLD F6 or GOLD KP6
Startdynamic / predefinedobject	GOLD F7	GOLD KP7	GOLD F7 or GOLD KP7
End dynamic object	F7	KP7	F7 or KP7
End predefined objects	GOLD F2	GOLD KP2	GOLD F2 or GOLD KP2
Delete dynamic object	GOLD F8	GOLD KP8	GOLD F8 or GOLD KP8
Modify dynamic object	F8	KP8	F8 or KP8
Copy dynamic object	F9	KP9	F9 or KP9
Paste dynamic object	GOLD F9	GOLD KP9	GOLD F9 or GOLD KP9
Touch screen grid	F13	PF3	F13 or Delete
Touch screen assignments	GOLD F13	GOLD PF3	GOLD F13 or GOLD Delete

† Num Lock must be set to OFF for 83-key keyboard.

‡ The MPC, CPC, EIBM and VIBM terminal tables are used for the PC-based Builder only.

1. For those keyboards which only support function keys F1 through F10, F11 through F15 may be generated by pressing SHIFT-F1 through SHIFT-F5.
2. Keys marked as ^x refer to the appropriate control key (Ctrl key held down while simultaneously pressing the appropriate key).
3. Keys marked as KPx refer to the appropriate numeric key on the numeric keypad (normally found on the right-hand side of the keyboard).
4. Keys marked as GOLD xxx refer to the two-key sequence of the GOLD key followed by the appropriate key.
5. F11, F12, F13, and F14 are not available for use with the PC-based Builder.

Section 2: Moving the Cursor

A number of keys are supported in the screen / report editor for positioning the cursor. Each of these keys is summarized in the table below.

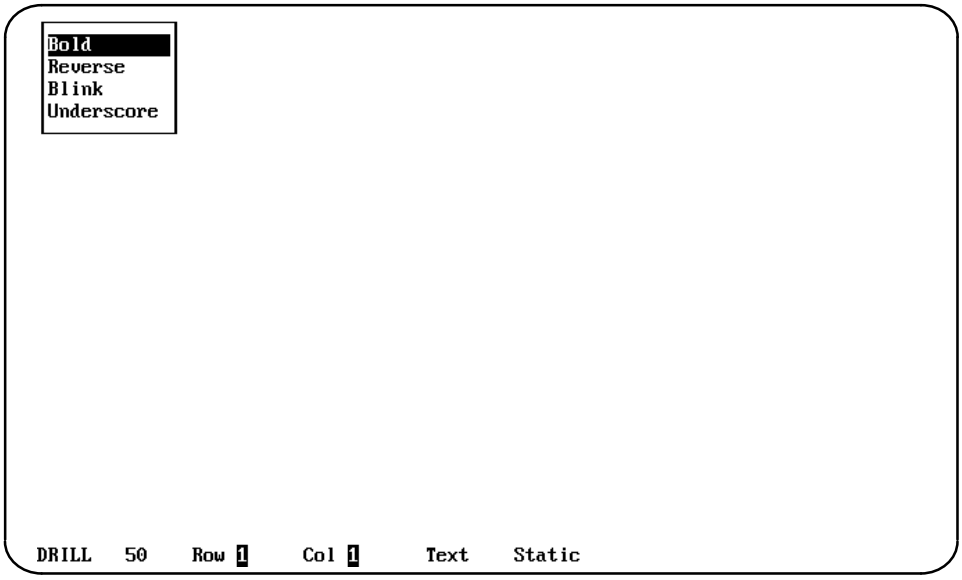
Table 6-2. Cursor Keys Supported by Screen/Report Editor

Key	Resulting Action
[↑]	Move cursor up one row within the current column
[↓]	Move cursor down one row within the current column
[←]	Move cursor left one column within the current row
[→]	Move cursor right one column within the current row
<GOLD> [↑]	Move cursor to topmost row within the current column
<GOLD> [↓]	Move cursor to bottommost row within the current column
<GOLD> [←]	Move cursor to leftmost column within the current row
<GOLD> [→]	Move cursor to rightmost column within the current row
[TAB]	Move cursor to next tab stop within the current row
[Enter]	Move cursor down one row and to leftmost column of the new row

The status area at the bottom of the screen will be updated to indicate the new cursor position. Note that the cursor does NOT wraparound when the end of a line is reached on a screen / report.

Section 3: Controlling the Screen Attributes

The <Video Select> key is used to display a window on the screen which allows the toggling of one of four different video attributes:

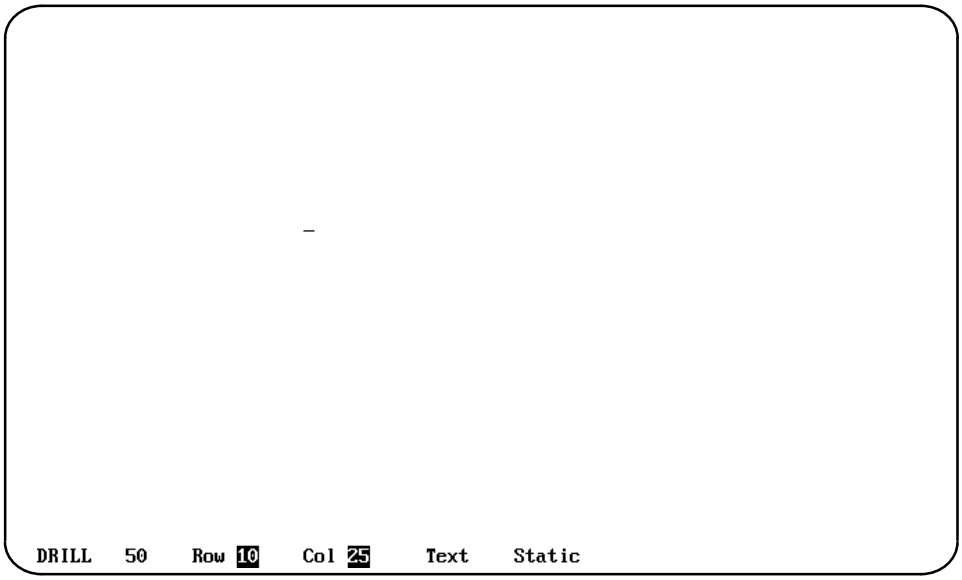


Use the [ ] and [–] keys to select the video attribute to be toggled. As video attributes are changed, the status line at the base of the screen is updated to indicate the current combination of selected video attributes. Note that not all attributes are available for some terminals.

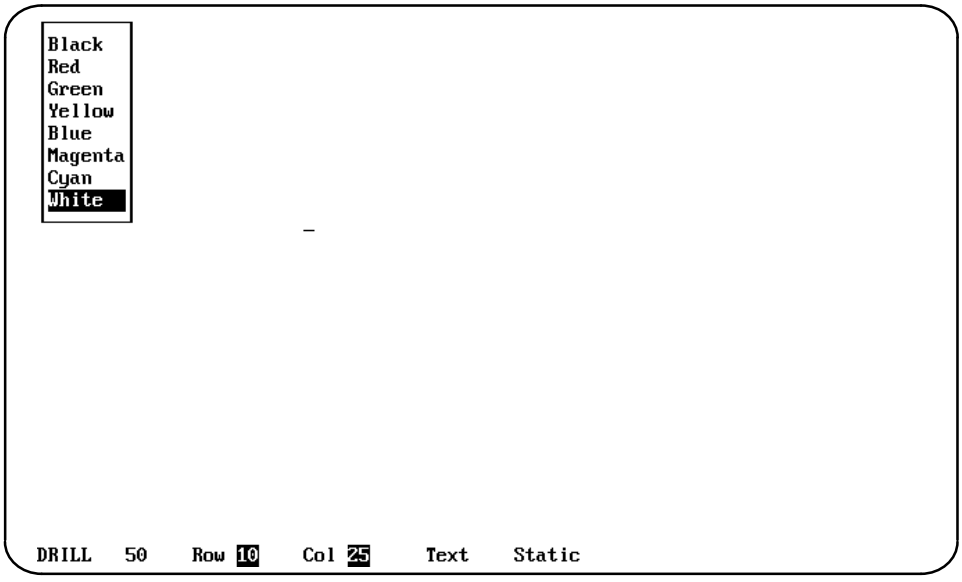
To clear all video attributes, use the <Clear Video> key. This turns off all of the video attributes currently in effect.

Section 4: Selecting Foreground Colors While Editing

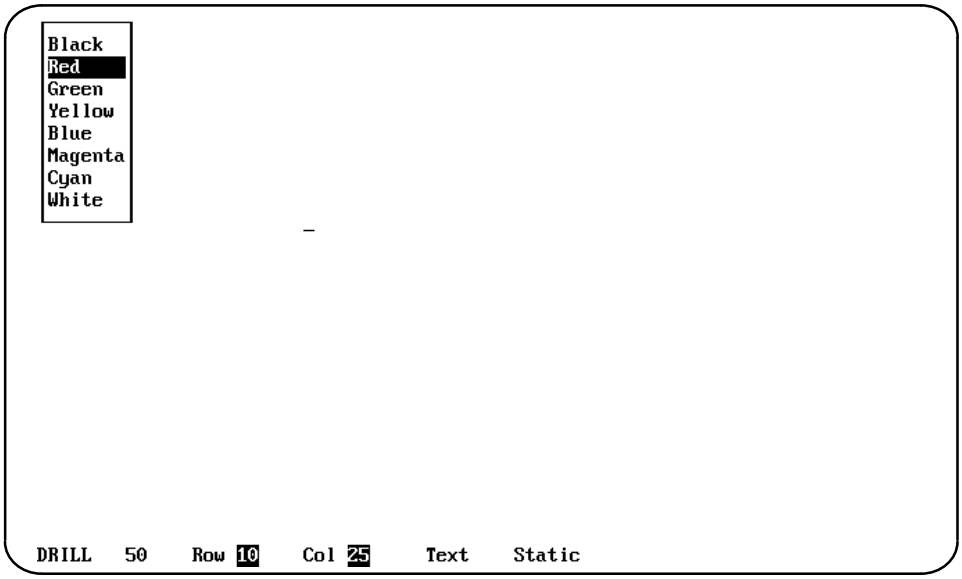
For those terminals which support color you can change the foreground color (the background color may not be changed) to be applied to any characters typed onto the screen. Assume that you want to change the foreground color to RED.



To initiate the color change, press the <Color> key. A window is opened up on the screen prompting you to select a foreground color. The default color selection highlighted is the currently selected foreground color (White in this example).

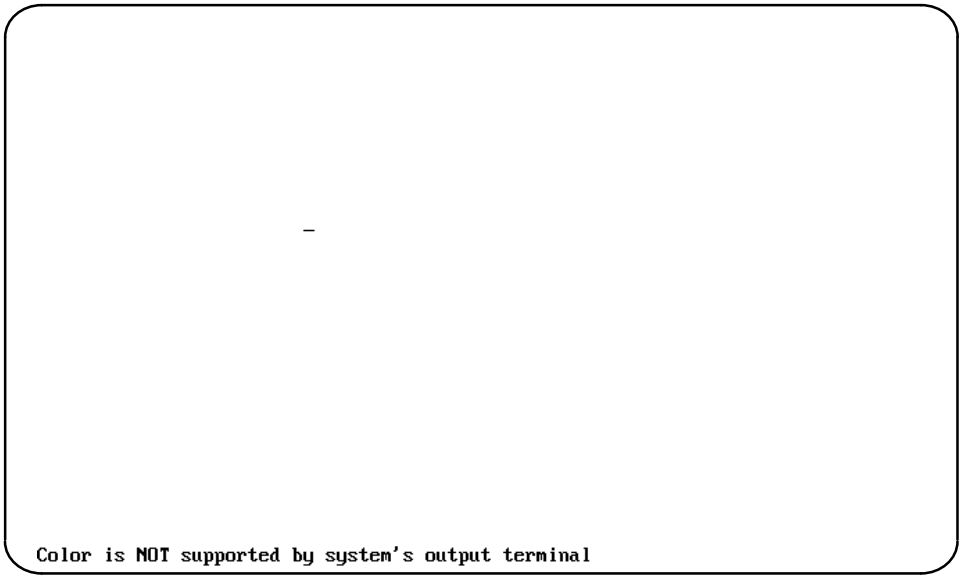


Press the [–] key twice, or the [ ] key six times, to select the desired choice of Red.



Pressing the [Enter] key completes the foreground color selection (alternatively, you could have just pressed the [R] key). Any characters typed in at this point will have the Red foreground color attribute applied to them.

If you should attempt to select a foreground color on a terminal which does not support color, an error message will be displayed on the prompt / message line. Since the prompt / message line uses the same physical screen line as the screen / report editor status line, the status line will be temporarily overlaid. Pressing any key with the error message displayed will return the status line to the display.



Section 5: Selecting the Character Set

There are up to four character sets which can be selected for screen / report editing. The normal set consists of the standard ASCII character set. An *Alternate* character set is also supported. The alternate character set gives access to the non-ASCII characters supported by a terminal. These non-ASCII characters are typically used to create lines or special symbols on the screen. You should consult your terminal user's manual for more details.

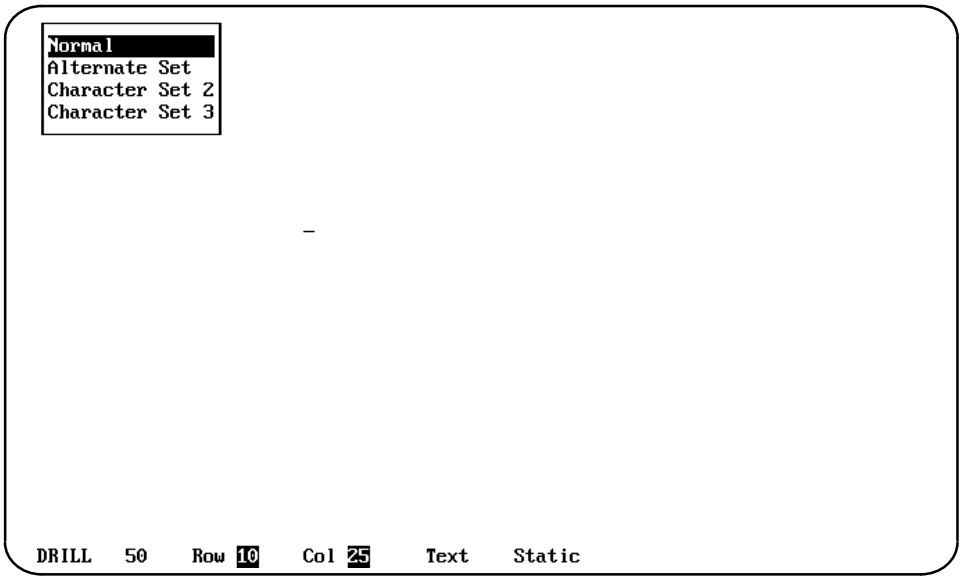
A third character set, *Character Set 2*, is currently supported only for the GE Fanuc Operator Interface Terminal (both monochrome and color) and the Nematron Touch Operator Interface Terminal (both monochrome and color). Character set 2 is an extension of the alternate character set; refer to GFK-0505, the Operator Interface Terminal User's Manual, or GEK-90817, the Series Six OIT User's Manual for more details.

A fourth character set, *Character Set 3*, is currently supported only for the GE Fanuc Operator Interface Terminal (both monochrome and color) and the Nematron Touch Operator Interface Terminal (both monochrome and color). Character set 3 is an extension of the alternate character set; refer to GFK-0505, the Operator Interface Terminal User's Manual, or GEK-90817, the Series Six OIT User's Manual for more details.

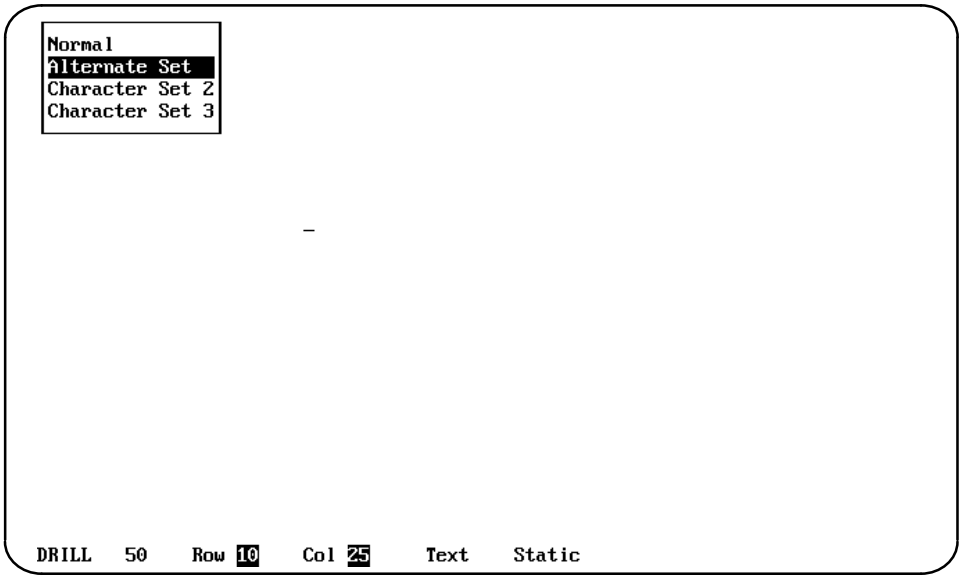
The table below describes the available character sets for each of the supported terminals.

Terminal	Character Set	Corresponding Character Set
COIT MOIT TCOIT TMOIT	Normal Alternate Set Character Set 2 Character Set 3	ASCII text Supplemental Standard Graphics Set Alternate Graphics set Supplemental Alternate Graphics set
VT100 LUDCO	Normal Alternate Set Character Set 2 Character Set 3	ASCII text Supplemental Standard Graphics Set Not supported Not supported
CIBM MIBM	Normal Alternate Set Character Set 2 Character Set 3	Supported / ASCII text Supplemental Standard Graphics Set Not supported Not supported
TIMINI MINI	Normal Alternate Set Character Set 2 Character Set 3	ASCII text Supplemental Standard Graphics Set Not supported Not supported

As an example of changing the character set, assume that you want to change the character set to the alternate character set. Press the <Character set> key to initiate the change. A window is opened up on the screen prompting you to select a character set. The default character set highlighted is the one currently selected (normal in this example).



Press the [–] key once, or the [ ] key three times, to select the choice of Alternate Set.



Press the [Enter] key to complete the selection. The non-ASCII characters making up the alternate character set will now be displayed when keys are pressed on the keyboard rather than the ASCII characters labeled on those keys.

Selecting Double Wide and Double High/Wide Characters

The ADS system allows individual lines in the screen that is currently displayed to be set to double wide or double high / wide. Double wide characters are characters which are double the width of normal characters; they occupy two columns for each character.

Double high / wide characters occupy two rows and two columns per character.

The CIBM, MIBM, CPC, and MPC terminal tables do not directly support either the double size or the double wide characters. They do perform an "emulation" of them, however, allowing you to build systems with them which will later be executed on a terminal which does support them.

Note

Double size and double wide text is required by the terminal hardware to start each character on an odd column number, with relation to the physical terminal device. This should be taken into account when overlaying a screen which contains double size or double wide text so that the odd column alignment is maintained.

Note

The double size and double wide lines are a terminal characteristic. This means that you should take care when overlaying screens where double size or double wide text is used. The topmost screen is the one whose line definitions control the physical display. If it contains double size or double wide text, and part of the lines containing that text on the physical display is provided by a screen underneath it, that screen's text will automatically be displayed as double size or double wide. Conversely, if single size text is overlaid on double size or double wide, it will revert to single size.

To change a line into double width, press the <Double Wide> key. The contents of the line are automatically set to double width characters with any necessary truncation (characters overflowing to next line) also being performed automatically.

To change a line into double high / wide, press the <Double High / Wide> key. The contents of the current line, and the previous line, are automatically set to double high / wide characters with any necessary truncation also being performed automatically. Note that the second line (that is, the line that contains the base of the double high characters) cannot be retrieved following the operation - its contents are lost.

Simulating Quad Size Characters

The GE Fanuc Operator Interface terminal (both monochrome and color) and the Nematron Touch Operator Interface terminal (both monochrome and color) support what is termed a "Quad Size" character set, where each character occupies four screen rows and four screen columns. The COIT, MOIT, TCOIT, and TMOIT terminal tables do NOT directly support the Quad Size character set. However, a system which contains screens simulating those characters may be found on your computer's hard disk in the \ADS_PC\DEMO.PCM folder, and is called QUAD.

Note

Some of the procedures described here are explained in detail later in this document.

The QUAD system contains several screens in which you will find the simulated Quad Size characters. Each character is surrounded by a rectangle (special symbols are labeled as to what they represent). The text inside the rectangle may be cut and then pasted on other screens (DO NOT forget to paste the character back on its screen after you cut it).

To use the QUAD system you should follow the steps outlined below. Note that to use it, you must start with it.

1. Create a new folder (using the MS-DOS "MD" command)\ADS_PC\<system>.PCM, where <system> is a valid system name you wish to use.
2. Execute the MS-DOS command

   ```
   COPY \ADS_PC\DEMO.PCM\QUAD*.* \ADS_PC\<system>.PCM\*.*
   ```

   to copy the QUAD system into your new folder.
3. Execute the PC-Builder, specifying "QUAD" as the system name and "\ADS_PC\<system>.PCM" as the path.
4. Change the name of the system from QUAD to <system> in the "Modify system parameters" form under "Configuration operations".
5. Save the system to disk.
6. Exit the Builder and execute the MS-DOS command

   ```
   DEL \ADS_PC\<system>.PCM\QUAD*.*
   ```

   to remove the QUAD system from your new folder.

You can now proceed to use the Builder as normal with your new system. You can cut and paste any of the Quad size character representations you need. When you have completed your system, you may delete the screens containing the Quad size character representations from it to free up the ADC memory they would otherwise consume.

Note

Though the GE Fanuc Mini OIT and Touch Mini OIT support a subset of the Quad Size characters described for the terminals above, the QUAD system may NOT be used to create a system to be executed on one of those terminals.

Section 6: Entering Static Text

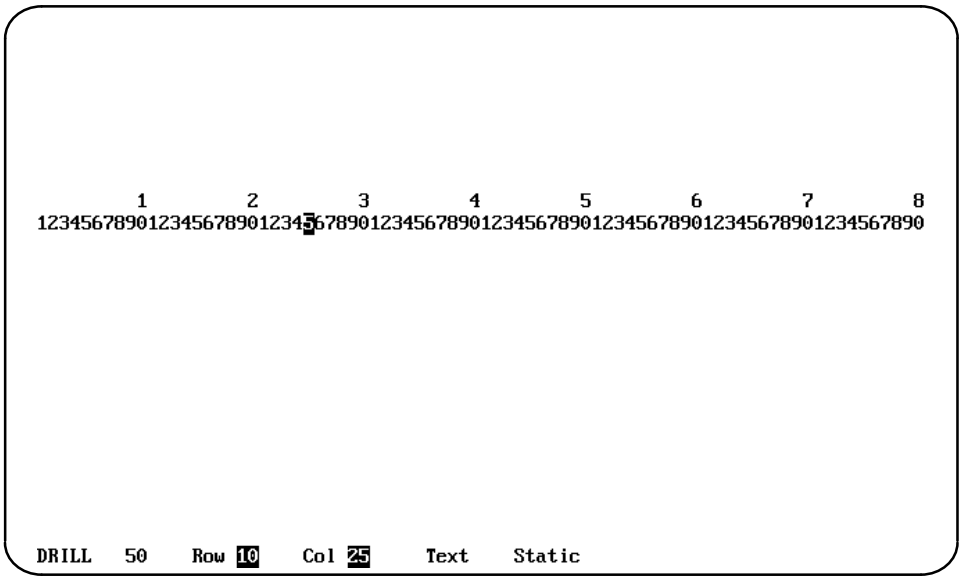
Static text is text that you can directly enter or change on a displayed screen as opposed to dynamic objects, which are displayed by the system as a result of an event occurring (dynamic objects are discussed further later in this section). Entering static text in the screen / report editor is easy; a few basic guidelines must be followed.

1. Text is always entered at the cursor position, with the current video attributes, color and character set applied to the text.
2. Text entry is always performed in replace, or overwrite, mode.
3. Wraparound does NOT occur at the right side of the screen or report.
4. Any existing text or lines may be overwritten, but static text may NOT overwrite an existing dynamic object (see Chapter 7 for a discussion of dynamic objects).

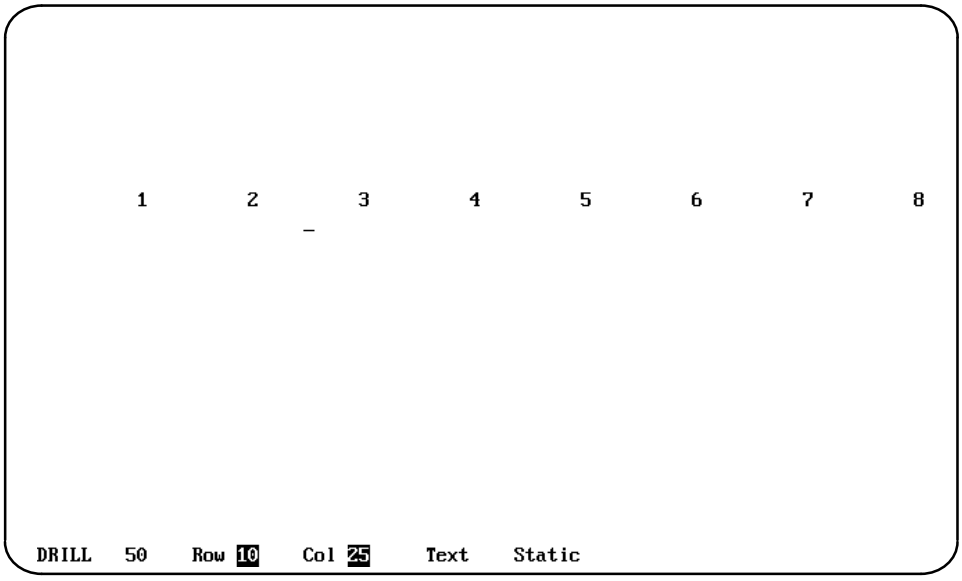
Section 7: Deleting and Undeleting Lines

The ability to delete and undelete a line is provided by the screen / report editor. Whatever line the cursor is positioned on, regardless of the column position, will be deleted whenever the <Delete line> key is pressed. The deleted line is saved in a buffer so that it can be restored later if desired. The line delete buffer is maintained (saved) across the editing of different screens and / or reports.

As an example of deleting a line, assume that you want to delete the line the cursor is currently on. Note that the cursor is not positioned at the beginning of the line; it can be on any position on a line.

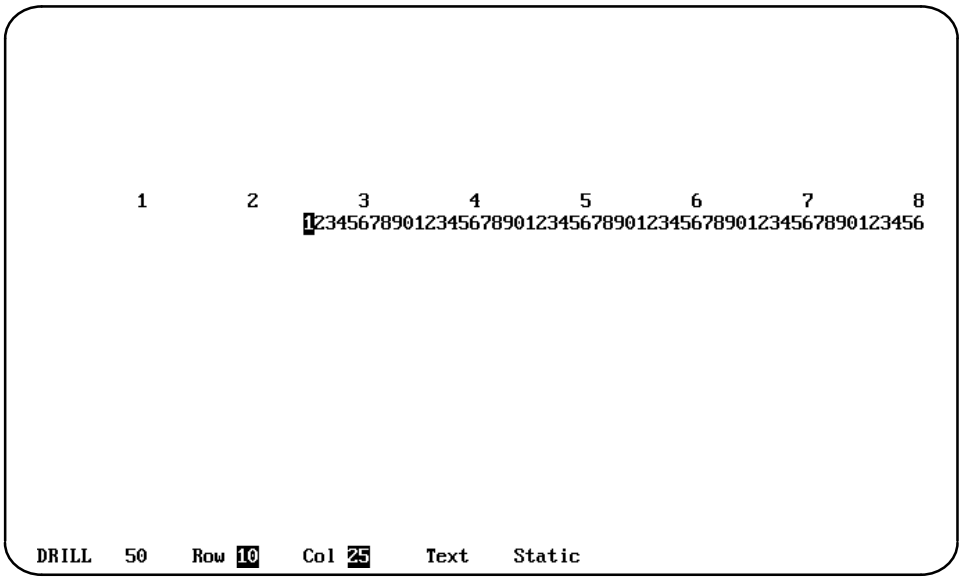


Pressing the <Delete line> key deletes the line. Note that the cursor position remains unchanged.



A line which has been previously deleted may be undeleted at the current cursor position. This means that the undelete will occur beginning at column 1 only if the cursor is positioned on column 1. This feature is particularly useful when you wish to shift the entire contents of a line to the right. Note that any characters which would lie beyond the right-hand side of the screen or report boundary as a result of the undelete are lost from the screen or report.

Continuing with the previous example, assume that you want to undelete the line you have just-deleted, but leave the cursor at its current position. Pressing the <Undelete line> key restores the previously deleted line beginning at column 25 (cursor location). As a result, the rightmost 24 characters of the previously deleted line are lost for this undelete.

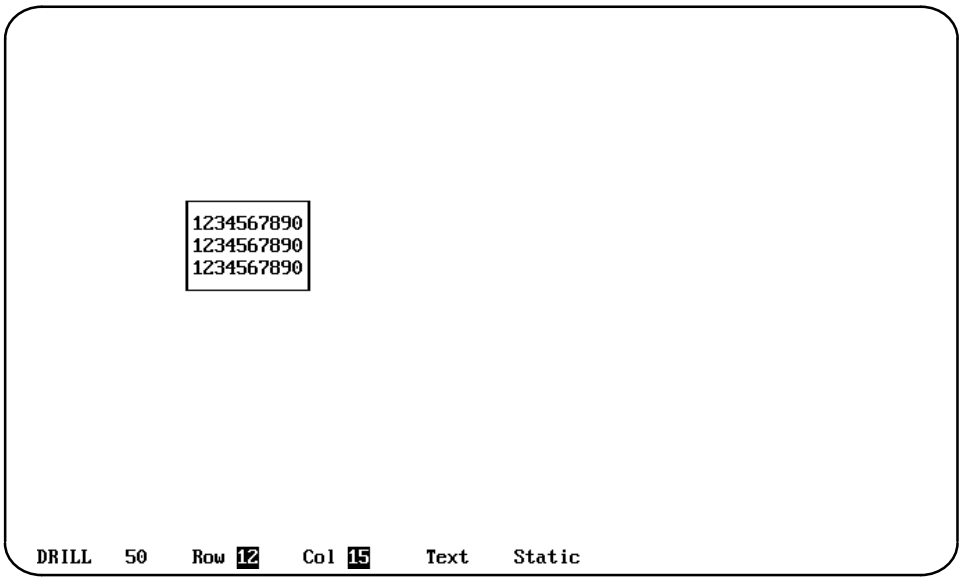


Section 8: Selecting a Region

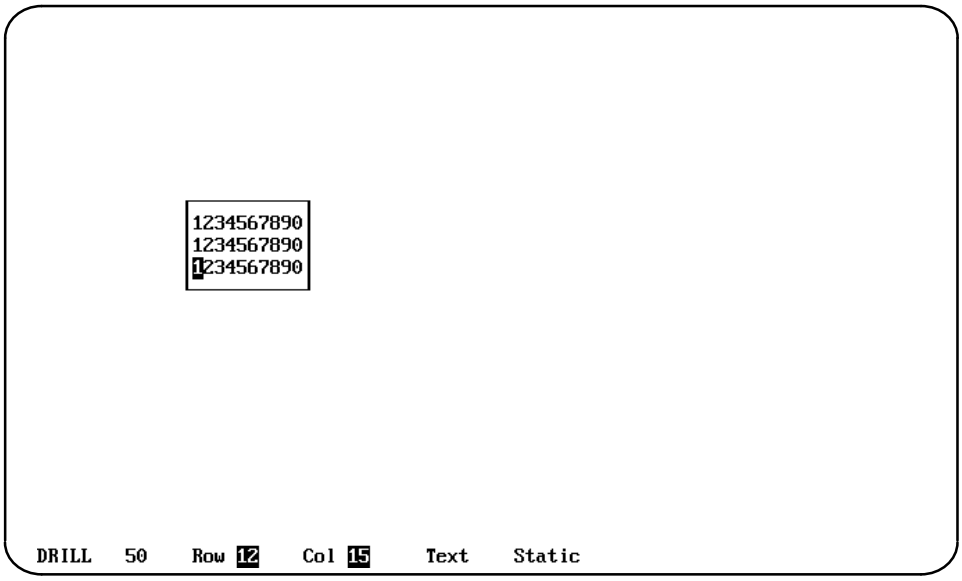
The <Select> key may be used to initiate the selection of a block of static text (dynamic objects may not be selected in this manner). Once selected, that block of text may be cut into a buffer, the display attributes of that block may be changed or a line may be drawn within the outer edge of the selected region.

Only rectangular regions may be selected; irregular shaped regions may not be selected. To begin a select operation, first place the cursor on one of the four corners of the rectangle. The region is then selected by moving the cursor key across the region to be selected. Movement of the cursor may be in any direction across the region.

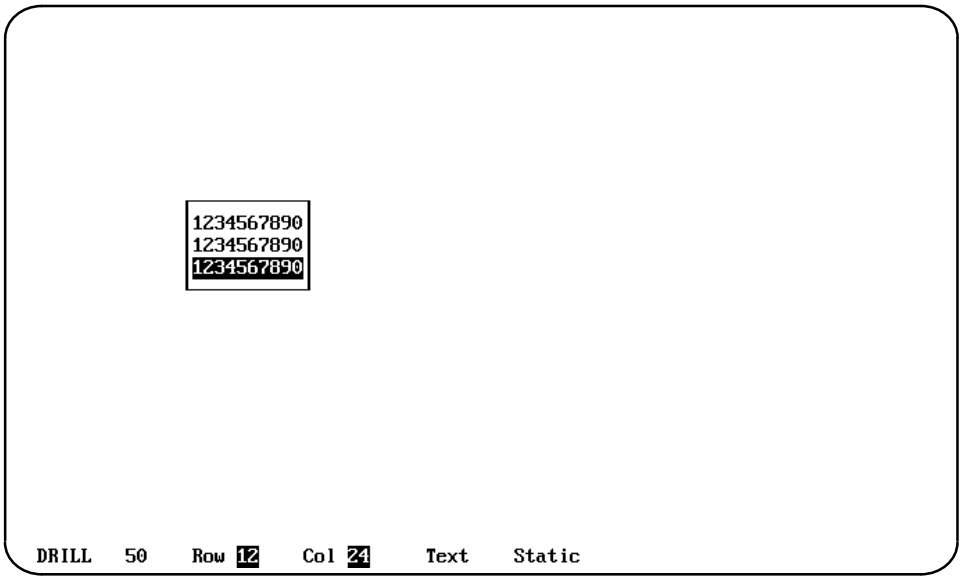
In the following example, the text is to be selected which is between rows 10 and 12 and columns 15 to 24. The cursor is currently located at row 12, column 15.



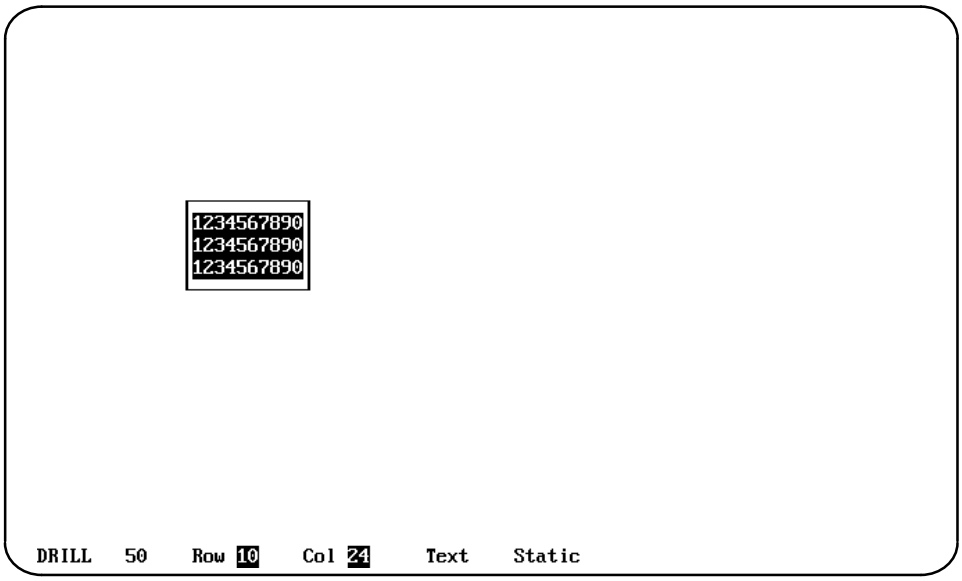
Pressing the <Select> key initiates the select operation. The character at which the cursor is currently positioned is then displayed in reverse video to indicate that it is currently selected.



The [‡] key is then pressed 9 times to select the remaining column width of the region to be selected.



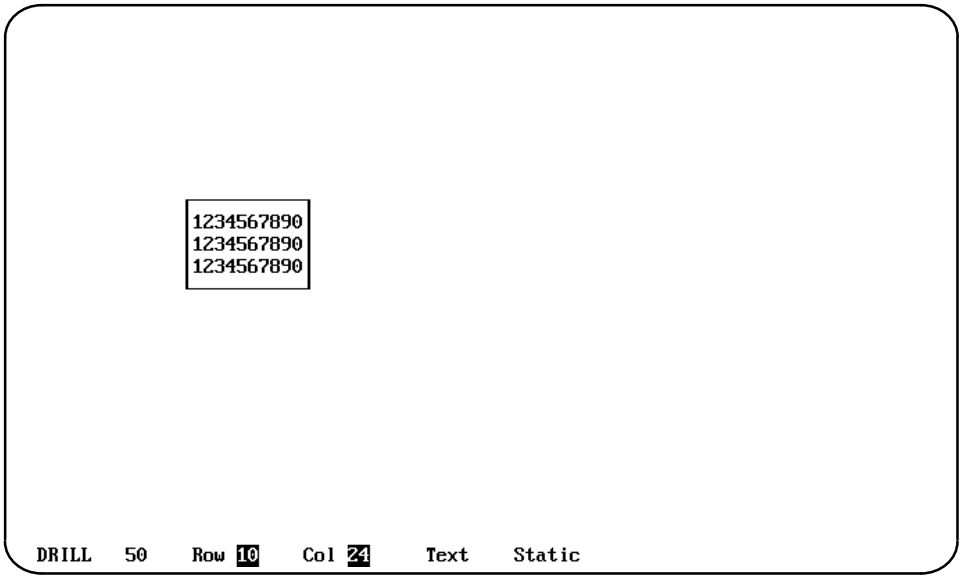
To complete the select, press the [ ] key 2 times to select the remaining row depth of the region to be selected.



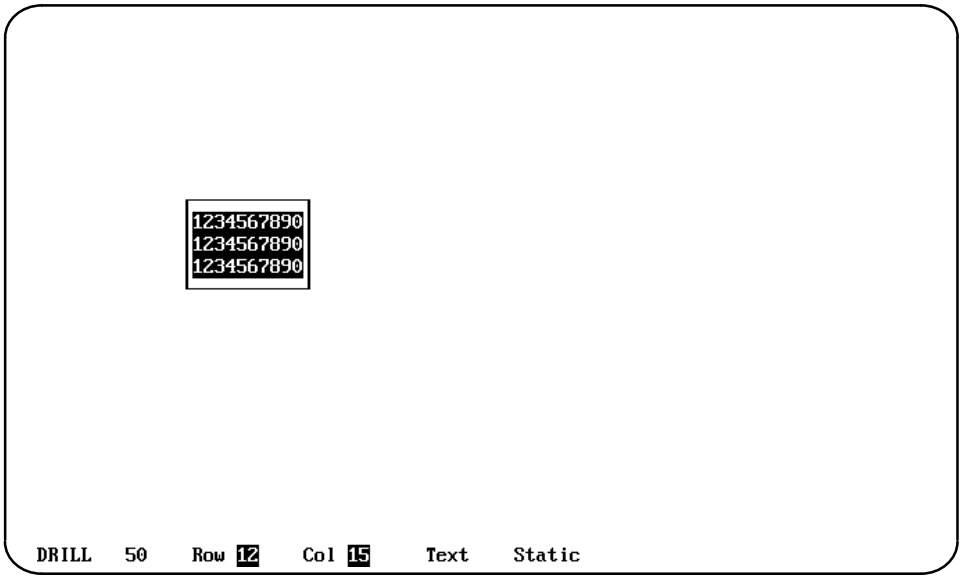
The select operation can be cancelled by pressing the <Select> key again before performing any operation on the selected region. The reverse video is removed from the region and the cursor is left in its current position.

The video attributes and foreground color (on supported color terminals) of a selected region may be altered. To do this, first select the region and then press the appropriate video attribute key, or then select the appropriate foreground color. Video attributes may be removed from a block in the same way.

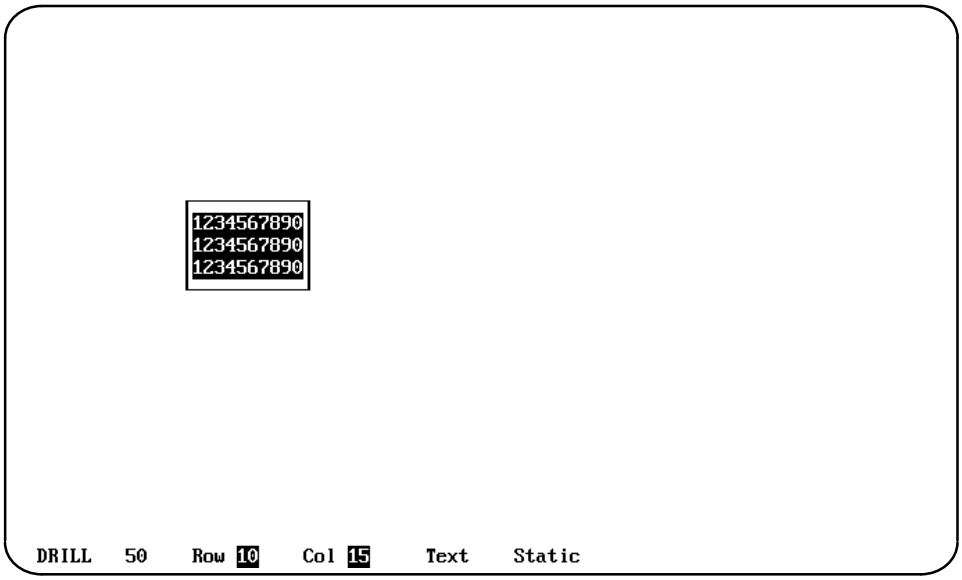
As an example of altering video attributes and foreground color, assume that you want to display the region bounded by rows 10 to 12 and columns 15 to 24 (as shown below) in reverse video.



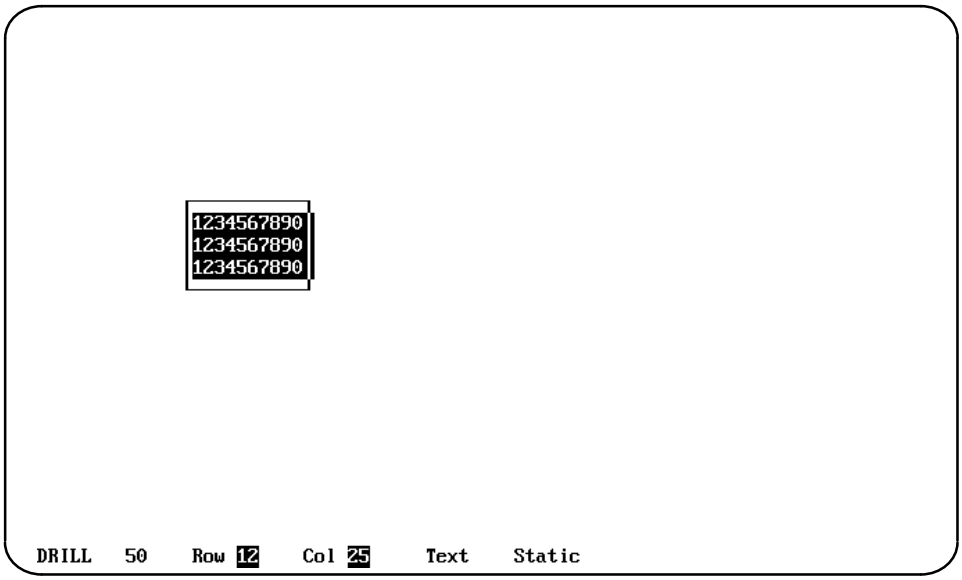
The first step is to select the region following the guidelines given previously.



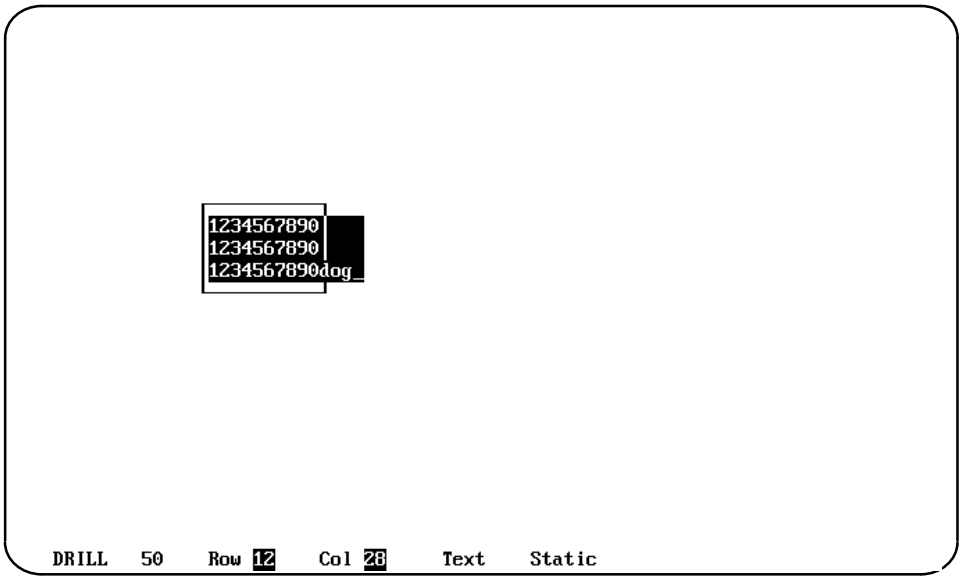
At this point, when you press the <Video Select> key, a pop-up widow of choices will appear. From this window you can select to toggle the <Reverse Video> key which completes the operation. Note that the select operation is automatically completed by executing such a change.



While a select operation is active, new characters may be added to the screen. The select area is expanded as the characters are typed in. As an example of adding characters while the select operation is still active, assume that the select operation as shown on the following screen has been started.



If you now decide that you want to type the character string "dog" onto the screen, as you type the characters, the select region is expanded to follow (and include) the cursor position.



Examples showing how select is used in drawing lines and cutting a block of text are included on the following pages.

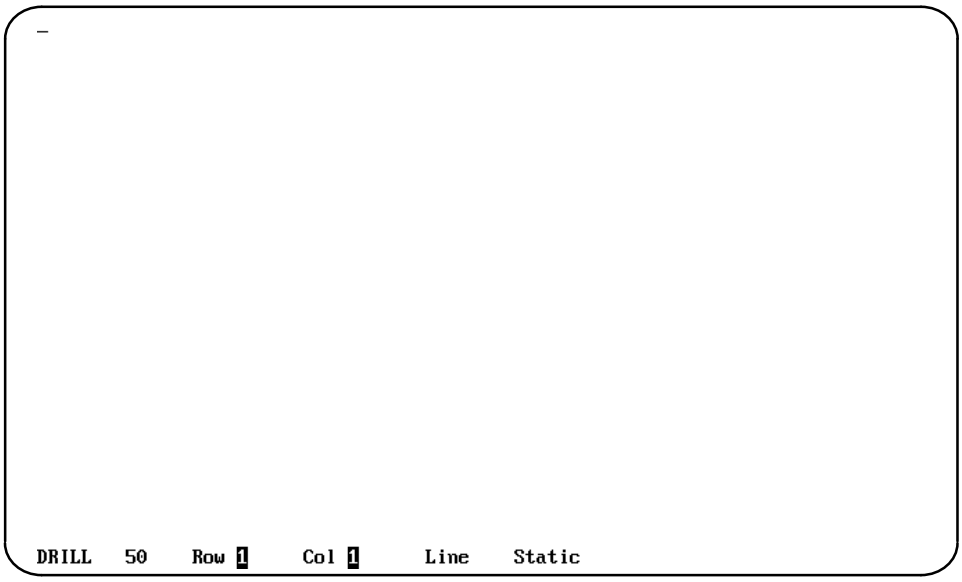
Note that dynamic objects, which are discussed in Chapter 7, cannot be included as part of a selected area. Attempting to do so will result in the select designation skipping over the dynamic object(s). A subsequent cut operation will cut the static text in the select area but not the dynamic object(s) which will remain in their defined location(s).

Section 9: Drawing Horizontal and Vertical Lines

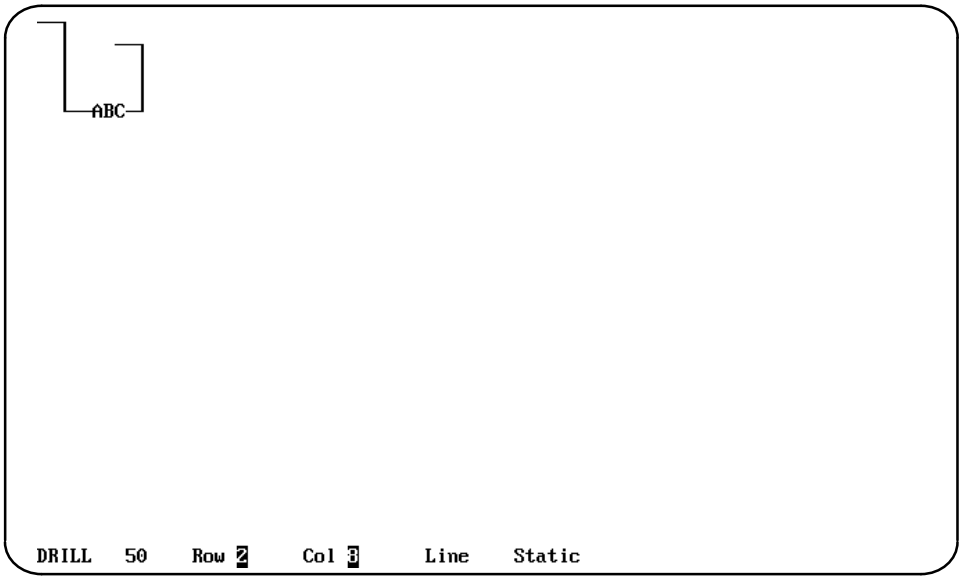
Lines may be drawn in one of three ways. One method is that you can select the alternate character set for the terminal and enter the appropriate line drawing characters as normal static text. This approach is useful if other characters in the alternate set are needed, but is not the easiest method for drawing lines.

A second method is to press the <Draw toggle> key to enable the line drawing mode. This is the preferred method when non-rectangular objects or simple straight lines are to be drawn. In line drawing mode the [ ], [–], [z] and [‡] cursor keys are redefined to draw a line in the direction of movement (up, down, left, right) as opposed to only positioning the cursor. Corners are drawn automatically as you change the direction of movement by 90 degrees. All other keys function as they do for normal text editing.

As an example of line drawing, assume that you want to draw an irregular object beginning at the current cursor position. First, press the <Draw toggle> key to enable line drawing mode. Note that the status area is updated to show that you are now in the Line mode instead of the original Text mode.



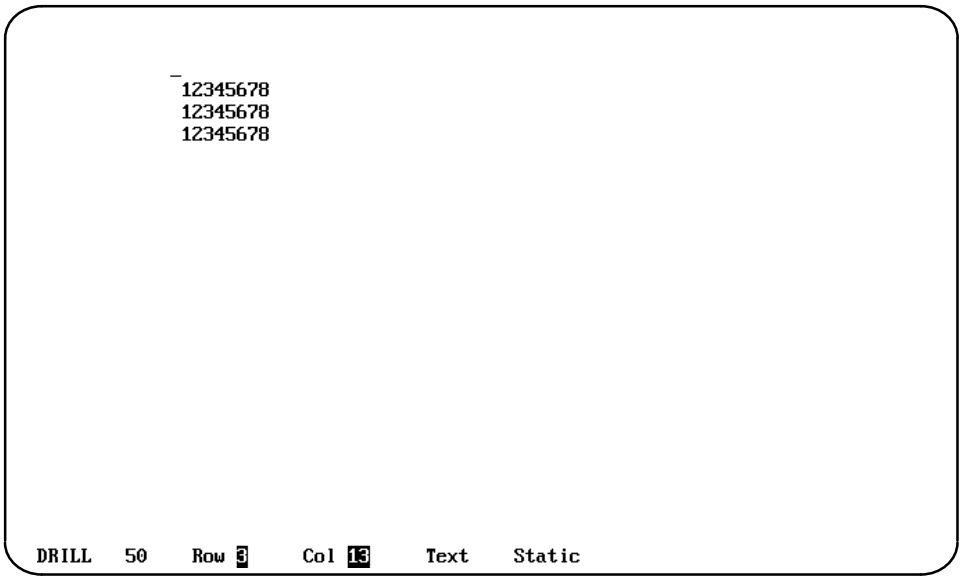
To draw the figure on the following screen, press the key sequence [‡], [‡], [–], [–], [–], [–], [‡], [‡], [‡], [A], [B], [C], [‡], [ ], [ ], [ ], [z], [z].



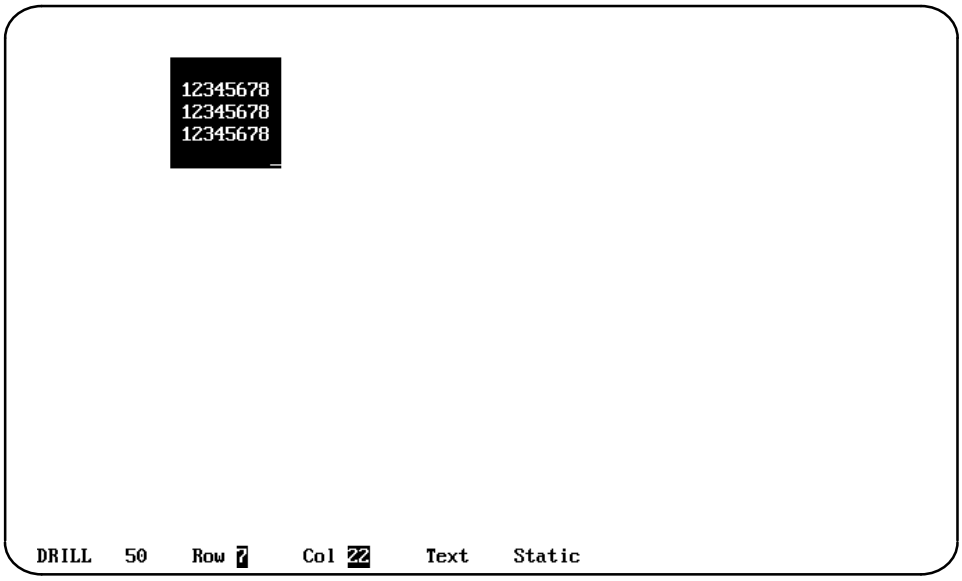
When you have finished drawing, exit the line drawing mode by again pressing the <Draw toggle> key. The status line is updated to reflect the return to Text mode.

A third method for drawing lines, which is useful only for regular shaped rectangles and straight lines, is to draw a box around a selected region. The box is drawn around the inside perimeter of the selected region, so it is important to select the appropriate size region.

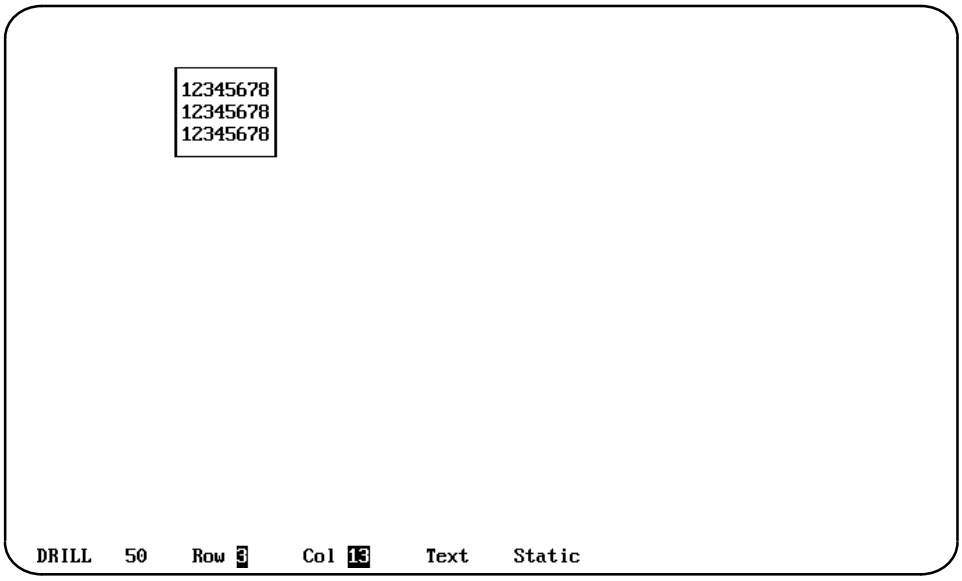
As an example of drawing a box around a select region, assume that you want to draw a box around the block of text shown below. Note that the cursor is initially shown one line above and one column to the left of the block of text; this position will be the upper left corner of the box.



Next, press the <Select> key to initiate the selection of a region. Press the [‡] key nine times and the [–] key four times to select the desired region. Note that this region is two rows and two columns larger than the text around which the box is to be drawn.



After the region has been selected, press the <Draw area> key to complete the operation.



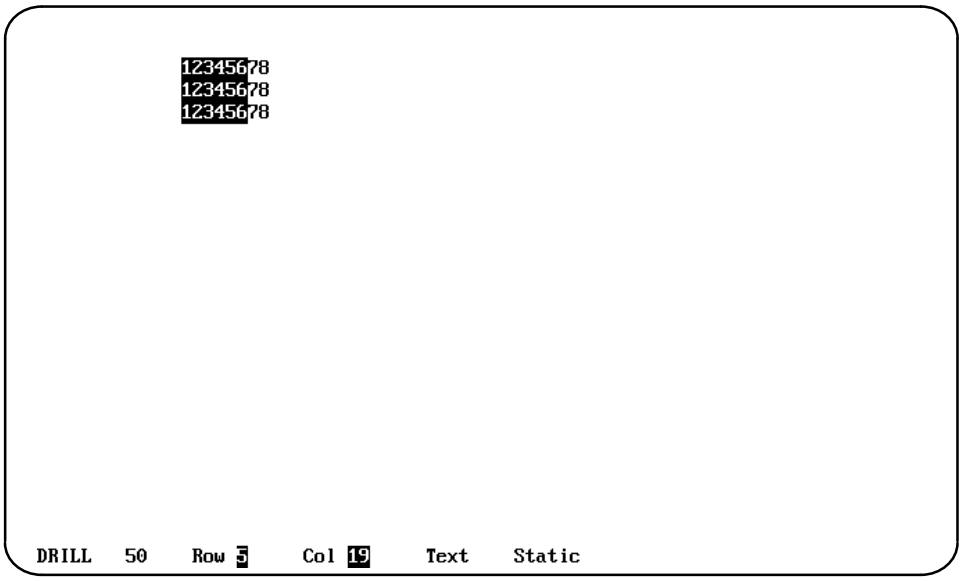
The video attributes and foreground color may be selected for lines in the same manner as for any other characters.

Section 10: Cut and Paste

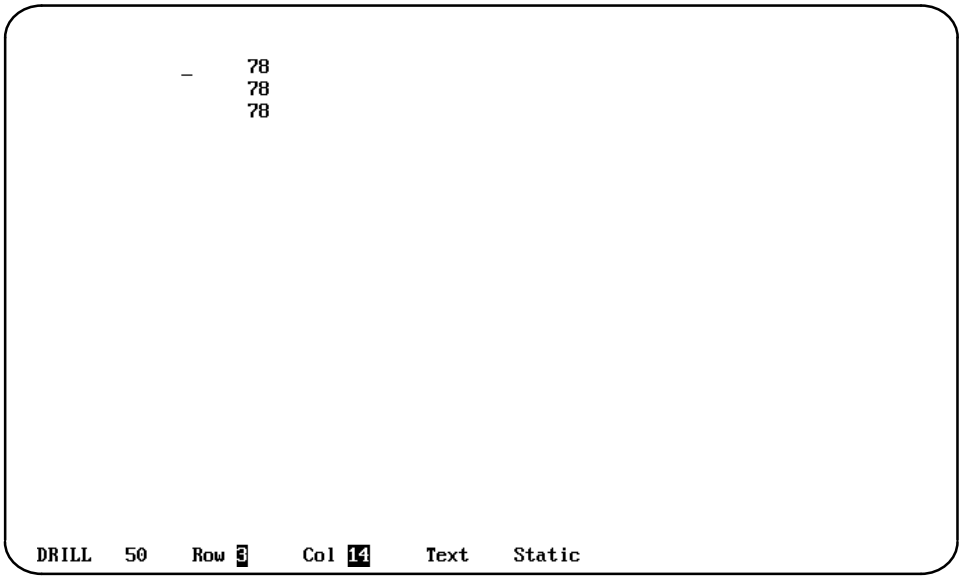
Cutting a Region

A previously selected region may be cut from the screen by pressing the <Cut area> key. The cut region is saved in a buffer for pasting later, if required. Pasting refers to the process of inserting a previously cut region anywhere on a screen at a later time.

As an example of cutting a region and saving in a buffer, assume that you want to cut the area shown below. The region to be cut is in reverse video and has already been selected.



To complete the cutting operation, press the <Cut area> key. The cut area is removed from the screen.

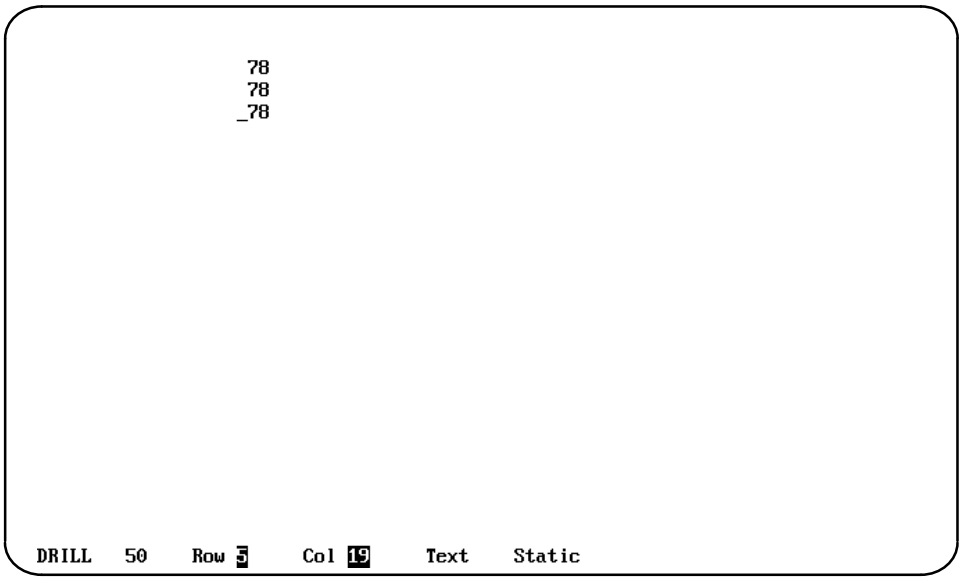


Pasting a Region

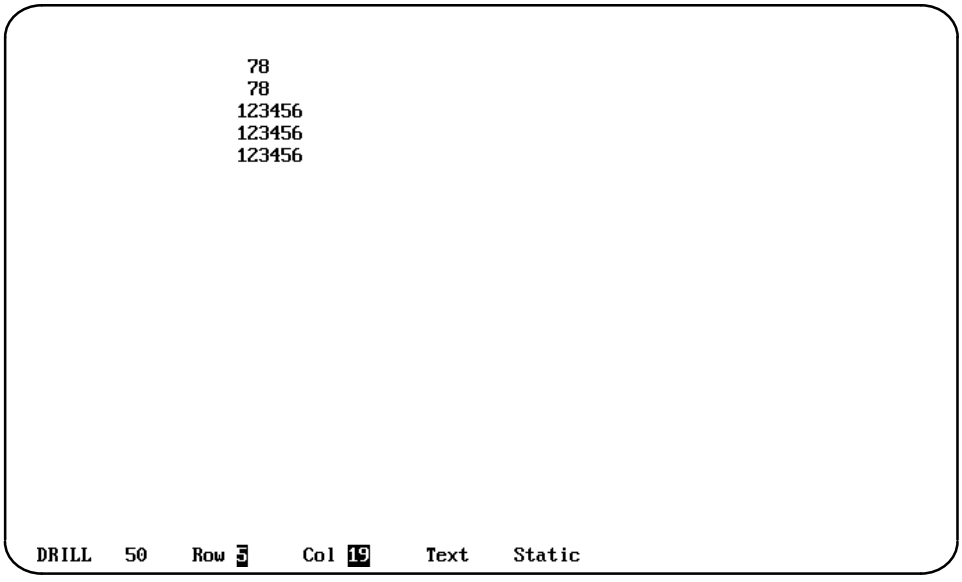
A previously cut region may be pasted any number of times on the current screen. The cut / paste buffer is retained across the editing of different screens and reports; this provides you with an easy way to move / copy text from one screen to another.

The region to be pasted is always placed on the screen with the region's upper left corner positioned at the current cursor location. The region is pasted onto the screen in overwrite mode, so the cursor should be positioned with care prior to invoking the paste operation.

As an example of pasting, assume that you want to paste a previously cut block of text at the current cursor location.



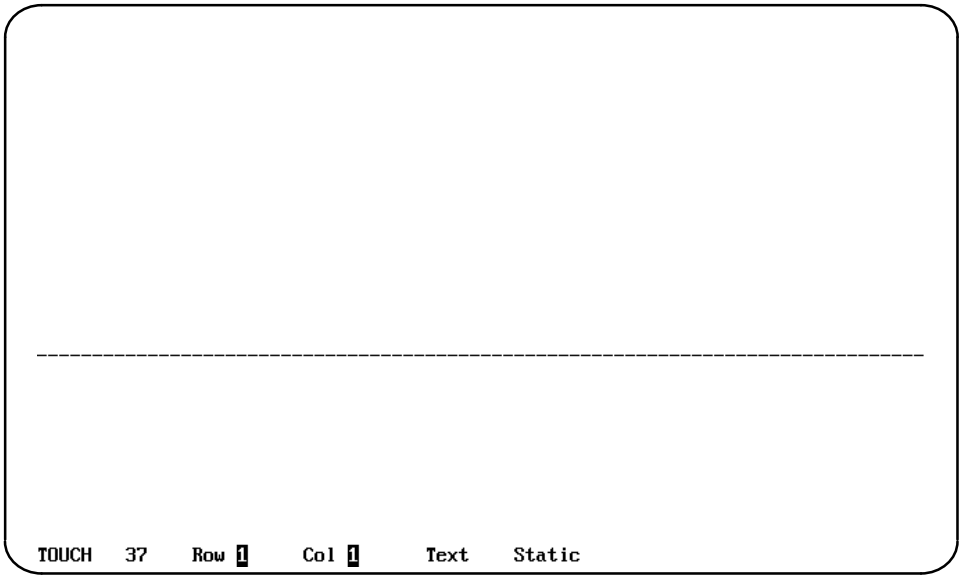
To complete the paste operation, press the <Paste area> key.



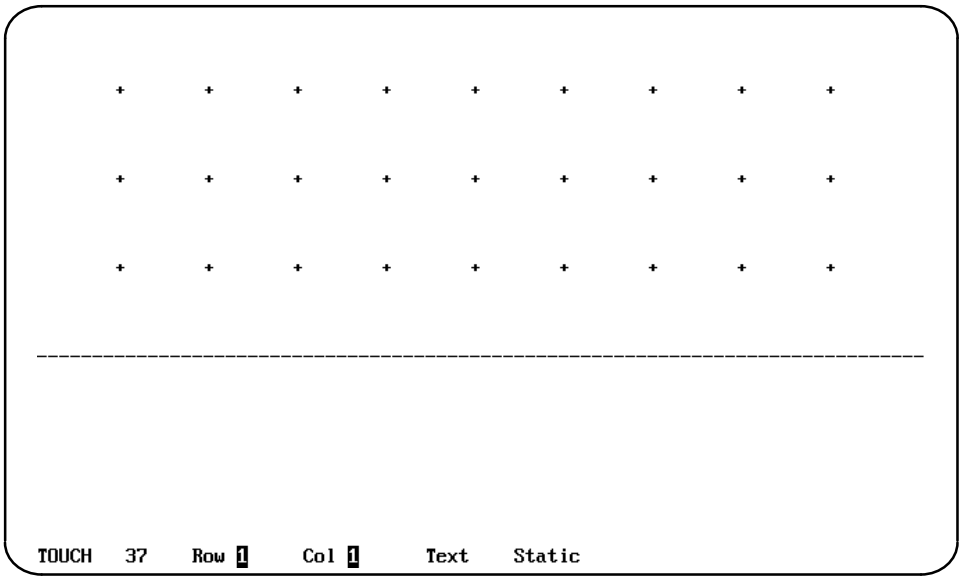
Section 11: Touch Points

For those terminals which support touch points, the Pointer supports two additional keys. The <Touch Screen Grid> key is used to toggle the display of a grid on the screen which outlines the touch points for the target terminal. The actual text on the screen is not affected by the touch point grid.

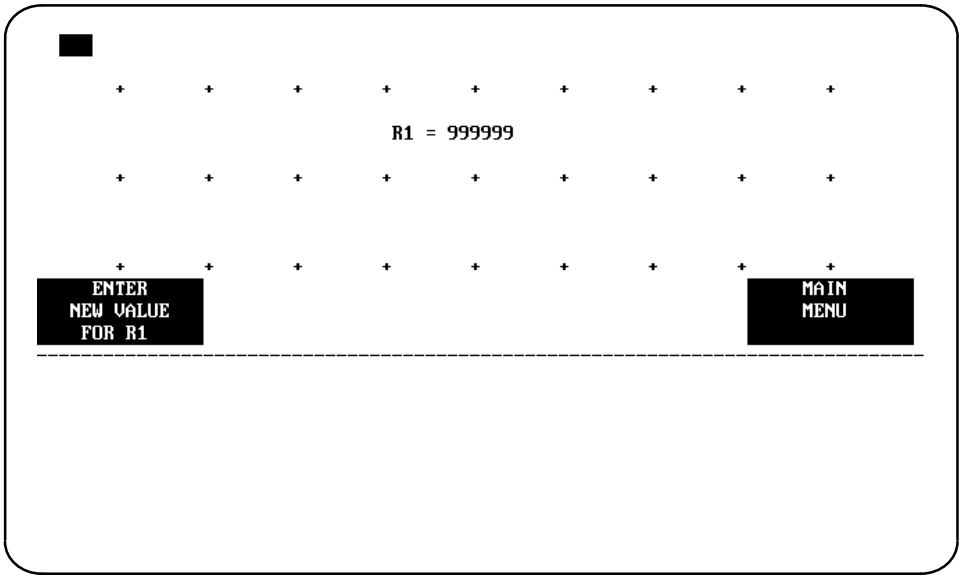
The screen below is to be created for display on a GE Fanuc Mini OIT-Touch Terminal.



Pressing the <Touch Screen Grid> key displays the touch point grid to aid in text placement on the screen.

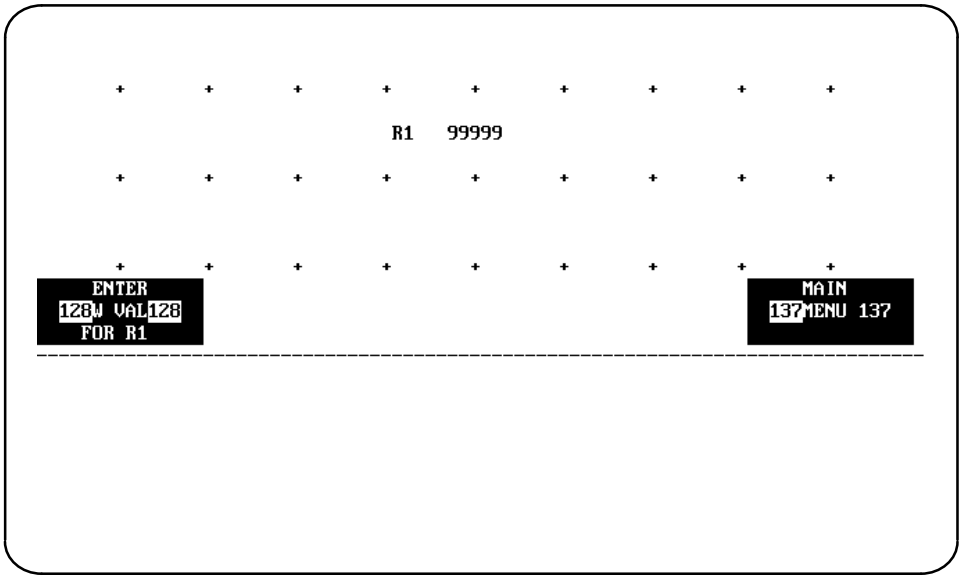


The touch point key values may be assigned from within the screen pointer if desired. Press the <Touch Screen Assignments> key to begin assigning the touch point values.



The first field on the touch point grid is displayed in reverse video. To move between touch points press the [Enter] key or [–] key to move to the next touch point, or the [ ] key to move to the previous touch point. The values entered into the touch point fields represent the numeric key value to be returned when you actually touch the touch point. Refer to Appendix B of the ADS User's Manual for the touch point values used for the GE Fanuc Mini OIT-Touch and Nematron OptiTOUCH terminals.

When all required values have been added, press the <Save> key. If you decide to abandon the changes, press the <Quit> key.



Note

Touch Point assignments may also be made and viewed from the Screen Operations "Touch Screen Assignments" page.

Accessing the Screen/Report Editor Help Screen

Pressing the <Help> key while in the screen / report editor will display a help screen which describes the key assignments for the appropriate terminal table.

Exiting the Screen/Report Editor

You can exit the screen / report editor by pressing either the <Save> key or the <Quit> key. Pressing either of these keys results in all changes being saved in the current system; there is no way to cancel changes made to a screen (other than exiting the Builder without saving the changes whereby ALL changes to the system since that last load / save operation will be lost).

Miscellaneous Hints

Following are some miscellaneous hints and suggestions for accomplishing some tasks which are either not immediately obvious or are not directly supported by the ADS Builder.

Making a Colored Space on the Color OIT

There are times when you may want to create a colored block of text for display on the GE Fanuc color OIT. Normal text characters may be displayed in the chosen color by selecting the appropriate foreground color, but the space character (space bar) is displayed in the background color, not the foreground color as might be desired.

In order to produce a colored space, first select the alternate character set and then press the right parenthesis (”)”) key wherever a colored space is required. This will result in the desired display of a blank character in the currently selected foreground color.

Simulating Text Insert Mode

All text entry in the report / screen editor is accomplished in overwrite, or replace mode; a true insert mode is not provided. To simulate insert mode, you can select the text following the insertion point, cut it, and then paste it where it would fall if a text insert mode were directly supported. Then the text to be inserted may be typed into the opened space.

Error Messages for Screen Painter and Report Painter

Error messages and their causes for screen and report editing are listed below.

Cannot paste double high over double wide/normal line

Cannot paste over double high/wide line

Cannot paste wide over double high/normal line

Static text of one character width may not be pasted onto a line of a different character width.

Cannot SELECT across different character widths

A select operation cannot cross a line which is in a different character width than the one the SELECT operation began on.

Cannot set line 1 into double wide/high mode - select line 2.

The target terminal does not allow line 1 to be selected as the bottom line of a double size line.

Color is NOT supported by system's output terminal

The target terminal does not support color.

Line is already double wide

The requested operation was rejected because the current line has already been set up for double wide.

Line is already in double high/wide mode

The required operation was rejected because the current line has already been set up for double size.

Paste operation ignored

Nothing has previously been cut into the paste buffer.

System terminal does not support touch screen operations

The target terminal does not support a touch screen

You must use SELECT before CUT

In order to cut a region of static text, it first must be selected.

Chapter 7 Dynamic Objects

Dynamic objects are used to display the state of values within the PLC. These objects are manipulated within the screen / painter; refer to the previous chapter for more details on using the painter.

A dynamic object might be the display of a value in a certain format, or the display of a string of text, or the changing of a video attribute or color for a block of text or the movement of an object. Virtually all the animation of a system is achieved by the definition of dynamic objects.

In addition, two predefined dynamic objects are supported by ADS:

- *Bar Chart*
- *Trend Graph*

These objects are predefined in that the selection of one or other of the predefined dynamic objects results in the automatic creation of an object of the correct type. All that is required is for the size of the object to be specified by selection. Refer to ”Creating Predefined Dynamic Objects” for further details.

Dynamic objects must be rectangular in shape; irregular shaped objects are not supported by the ADS system. Dynamic objects consist of two major parts:

1. the characters edited onto the screen and
2. the PLC data source and display format which animate the object.

Whenever the cursor is positioned anywhere on a dynamic object the status area is updated to show the name of the dynamic object in reverse video.

Creating a Dynamic Object

The first step in creating a dynamic object is to decide what is to be displayed and where it is to be placed on the screen. The most frequent application of dynamic objects is to display numerical and text data on the screen. Data formatting characters are used to indicate how big a field to reserve for the display of a value or string. The character 9 is used to indicate the display of a numeric digit. In the case of floating point numbers, the character . (period) is used to indicate where the decimal point is to be displayed. The character X (capital X only) is used to indicate the display of an ASCII character. The sequence of three X characters is also used to indicate the display of a STATE value, which is either ON or OFF.

Some special formatting characters are also available for date and time representation. Note that these character sequences are **ONLY** available when the TIME and DATE PLC locations are used in the referenced data source.

For time display, the following formatting characters are available (capital letters only).

Date:

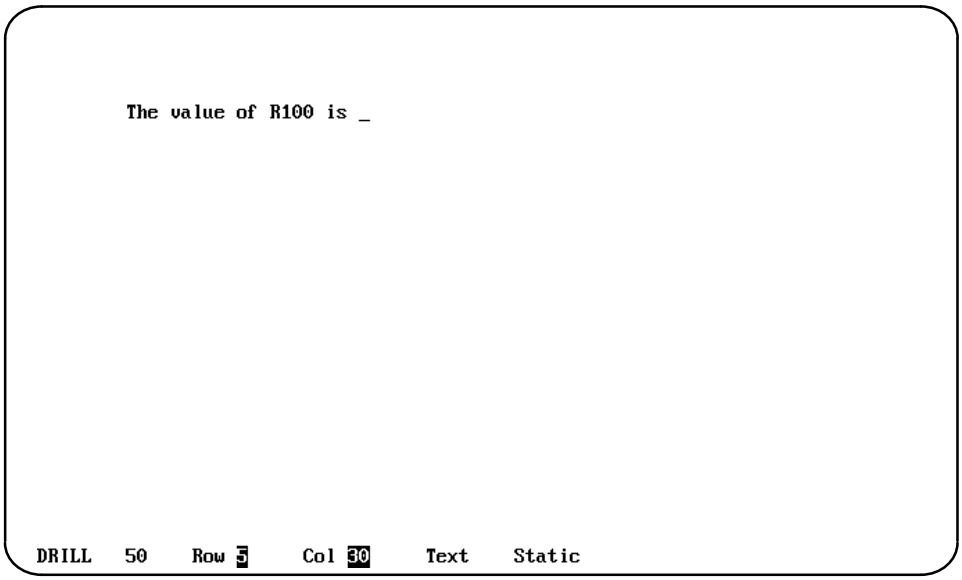
Format Characters	Example Output
DD-MMM-YY	27-JAN-91
DD-MM-YY	27-01-91
MM-DD-YY	01-27-91
DD-MMM	27-JAN
MM-DD	01-27

Time:

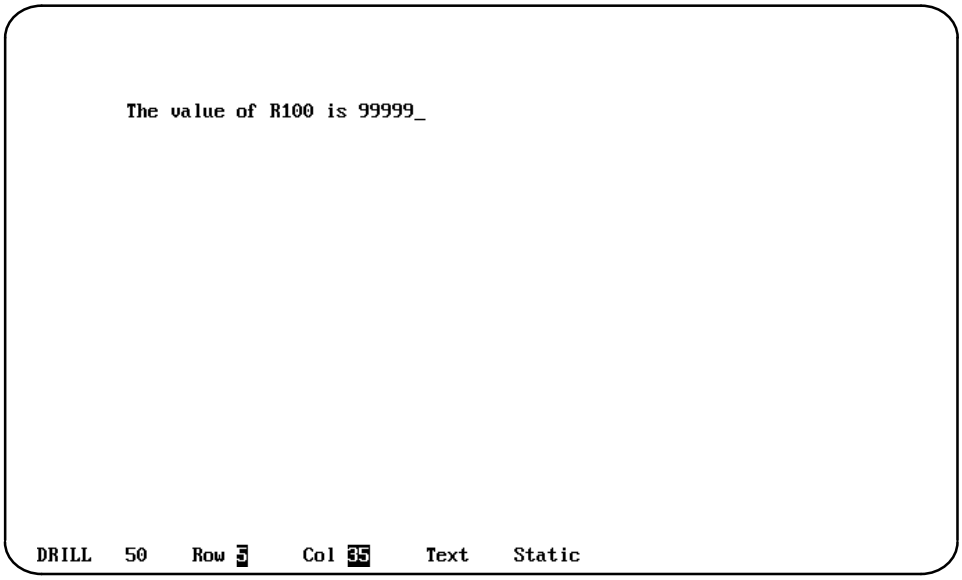
MM:SS	30:01
HH:MM:SS	12:30:01
HH:MM	12:30

The easiest method for creating a dynamic object is to first edit the characters making up the dynamic object onto the screen or report and then actually create the object to encompass them. The following screens are an example of this process.

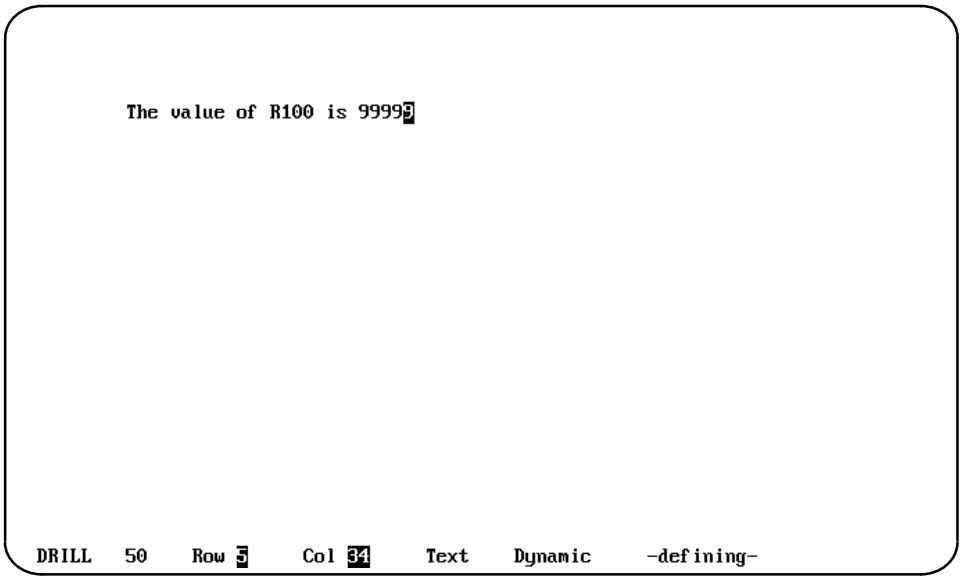
Assume that you want to dynamically display the value of R100 on the terminal screen when the system being created is actually run (using the ADS Executor). Also, assume that the value of R100 is expected to only range between -2000 and 60.



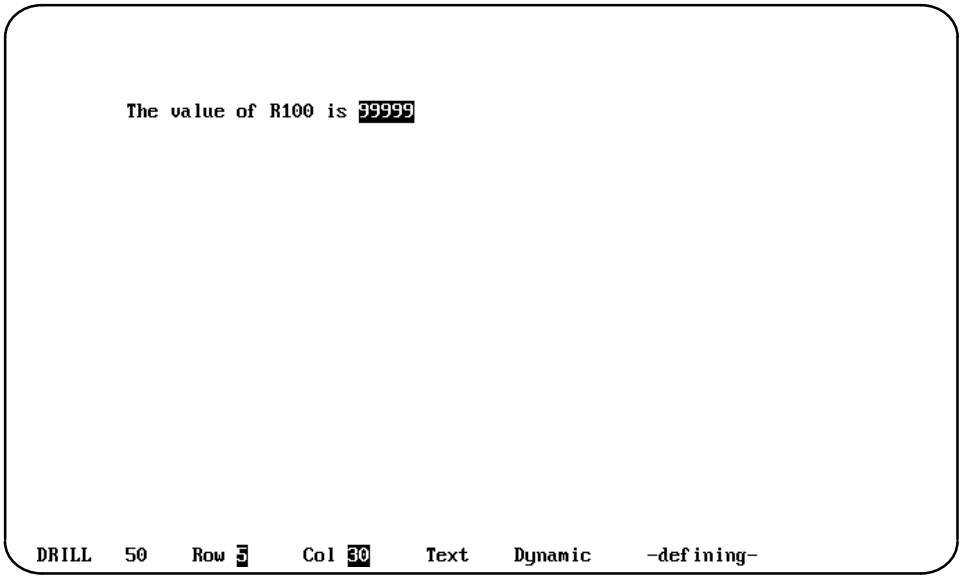
Since you want to display a numeric value, the numeric field formatting character 9 must be used. Since the displayed value is to range between -2000 and 60, you must allow five screen columns to contain the value (four digits plus one sign position). Therefore, a string of 5 numeric formatting characters are edited onto the screen.



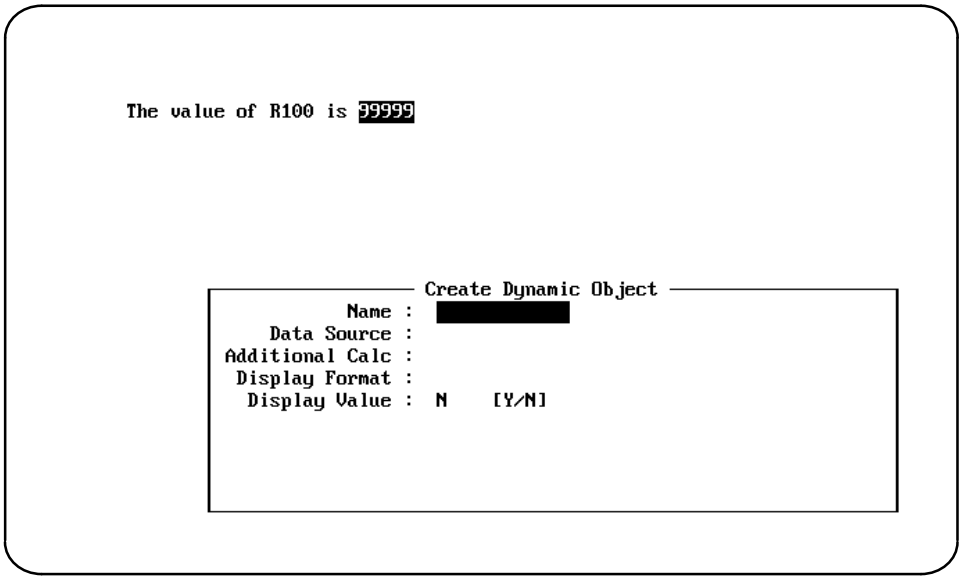
To actually define a dynamic object, first place the cursor on one of the corners of the area to be made dynamic, and then press the <Start dynamic object> key. In this example, you would press the [Z] key once to position the cursor on the rightmost field formatting characters before pressing the <Start dynamic object> key. The status area is updated to indicate that a dynamic object is being defined.



At this point , press the [Z] key four times to cover the entire data field that you have specified by the group of five 9's. Note that the selected area is shown in reverse video.



Pressing the <End dynamic object> key completes the selection of the area which the dynamic object is to cover. Also, at this point, a data entry window is opened on the screen so that you can actually define the dynamic object. Also note that the screen region for the dynamic object is shown in blinking reverse video.



Name

Every dynamic object must be assigned a name unique from that of any other dynamic object defined on the current screen or report (only). The name can be from 1 to 12 characters long; any alphanumeric character may be used in the name, as well as the underscore (_) character.

Note

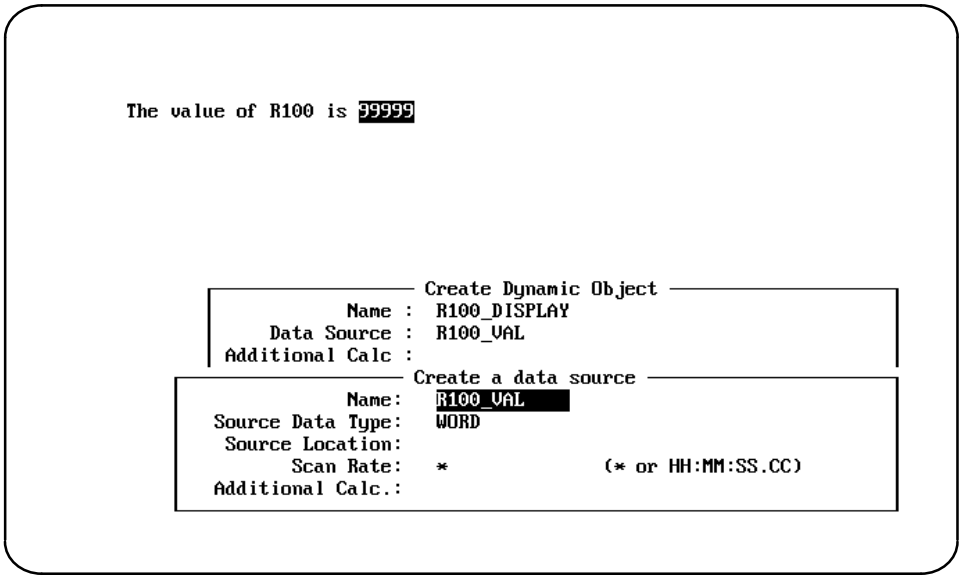
When the resulting ADS system is executed, dynamic objects are processed in the (ascending) alphabetic order of their names. This is important to remember when moving dynamic objects across other dynamic objects or when executing the SCN_EDIT command.

Data Source

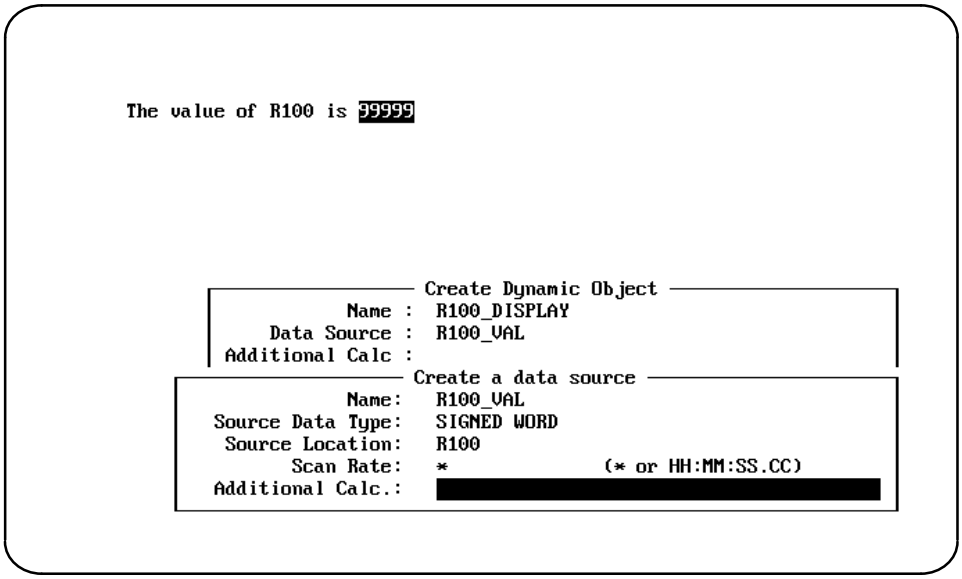
Every dynamic object must be assigned a PLC data source from which it will receive its data. If no additional calculation is specified (see below), the Source data type of the PLC data source is used to validate any field formatting characters which are used (only X formatting characters for State data type, only 9 for all other data types plus . (period) for floating point, except special time and date formats).

The name of a PLC data source which has been previously defined may be referenced, or you may specify the name of a new PLC data source. If a new PLC data source is specified, a data entry form for its definition is displayed on the screen. You can also use the <object list> key to obtain a list of existing PLC data sources or as an alternative method for creating a new one.

In the following example, assume that you have specified R100_VAL for the PLC data source, which has not yet been defined. The appropriate data entry form is displayed on the screen.



Fill out the PLC data source entry form in the same manner as previously described.



Pressing the [Enter] or <Save> key at this point completes the entry of the PLC data source. You are then returned to the dynamic object data entry form. An informative message indicates that the PLC data source was added to the system.

Additional Calculation

An additional calculation may be applied to the value supplied by the PLC data source if so desired. This feature provides the ability for scaling or type converting a PLC data source value for a single usage as opposed to always if the same additional calculation were specified during the definition of the PLC data source.

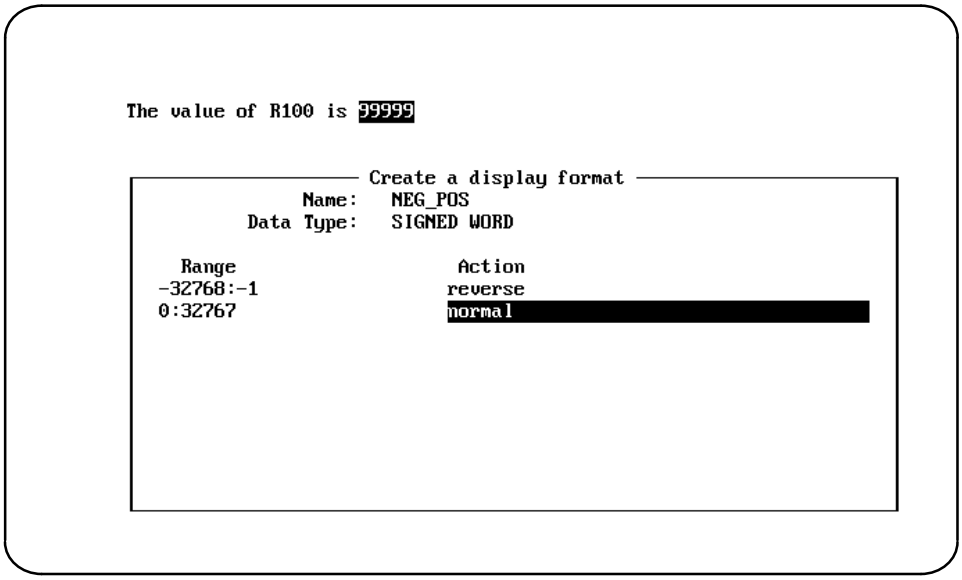
If an additional calculation is specified, the data type resulting from the calculation is used to validate any field formatting characters which are used (only X formatting characters for State or String data types, only 9 for all other data types plus . (period) for floating point).

The additional calculation may be defined as a custom calculation, or may reference the name of a previously defined translation table, engineering units conversion table or lookup table entry. The <object list> key can be used to obtain a list of existing additional calculations or to create a new one.

Display Format

Optionally, a display format may be applied to the dynamic object. This is useful in displaying the dynamic object with certain video attributes or color based on the value driving the dynamic object. You may reference the name of a display format which has been previously defined, or may specify the name of a new display format. If a new display format is specified, a data entry form for its definition is displayed on the screen. You can use the <object list> key to obtain a list of existing display formats or as an alternative method for creating a new one.

In the following example, assume that NEG_POS has been specified for the display format, which has not yet been defined. The appropriate data entry form is displayed on the screen. The display format entry form is filled out in the same manner as has been described previously.



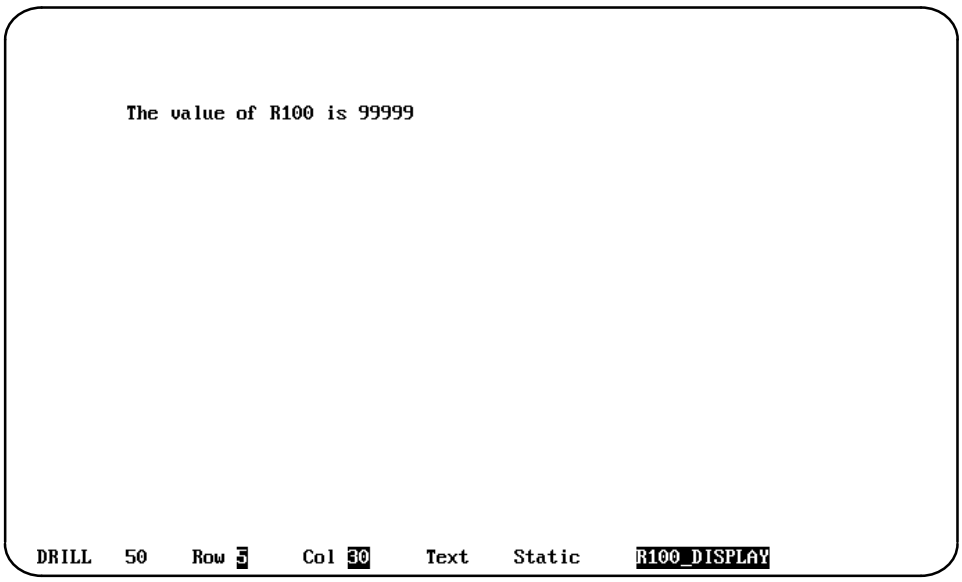
Pressing the <Save> key at this point completes the entry of the display format. You are then returned to the dynamic object data entry form. An informative message indicates that the display format was added to the system.

Display Value

For every dynamic object you must specify whether or not a value should be displayed. This field should only be set to Y if field formatting characters have been specified (the typical case). Only if a display format is completely controlling the dynamic object (e.g. only moving the object or changing its video attributes or color) would this field be set to N.

If the field is set to Y and the [Enter] key is pressed, you are then allowed to select values for the Hex Notation, Left Justify, Zero Fill and Available for Edit fields. By default, each of these fields is set to N, which means that the default display for a value is (a) base ten, (b) right justified in the field, (c) leading zeroes are suppressed, and (d) the field may not be edited.

After all the fields have been filled in with the desired data press the <Save> key (or the [Enter] key from the Available for Edit field) to complete the entry. The name of the dynamic object is now shown in reverse video in the status area.



At any point the creation of the dynamic object can be cancelled by pressing the <Quit> key. The characters selected to be part of the dynamic object will be left on the screen or report.

Available for Edit

The Available for Edit flag indicates that the dynamic object is to be used for data entry at run time. When either the DYN_EDIT or SCN_EDIT command is used, dynamic objects that have been defined as being available for edit can have values entered by the operator.

If the Available for Edit flag is set to Y, three additional fields are displayed on the data entry form for the dynamic object.

```
Min:
Max:
Immediate Write:   N
```

The Min and Max fields are used to specify the minimum and maximum values that may be entered by the operator at run time. Both fields should always be specified since they both default to 0 otherwise.

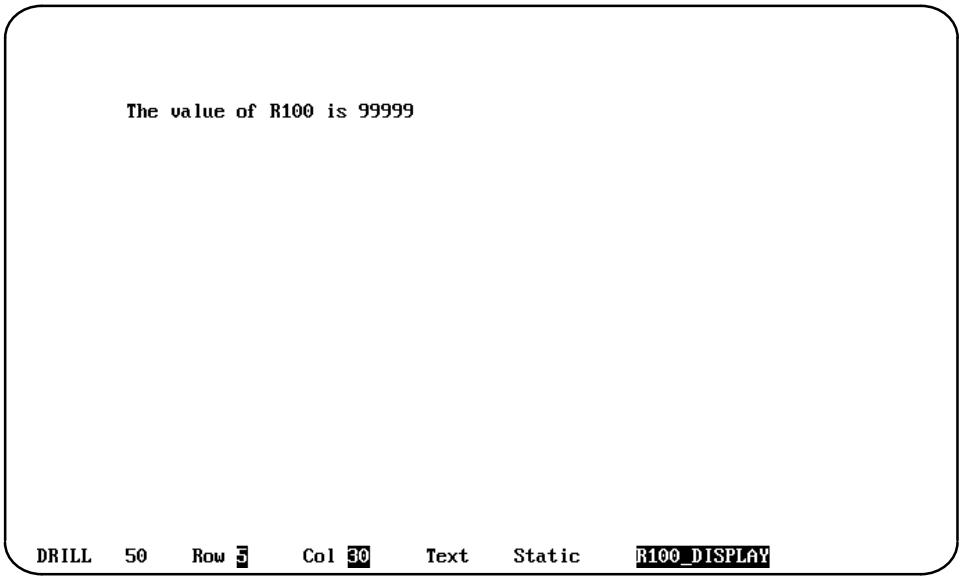
If the Immediate Write flag is set, it indicates that the operator entered value is immediately written to the PLC. This field affects the operation of the SCN_EDIT command. Normally, the values would be written to the PLC after all dynamic objects on the screen have had new values entered.

Note that any additional calculations specified for the dynamic object will be applied in reverse in the case of data entry. For example, if the value from the PLC is multiplied by 10 prior to display, the new value entered by the operator will be divided by 10 before it is written to the PLC location.

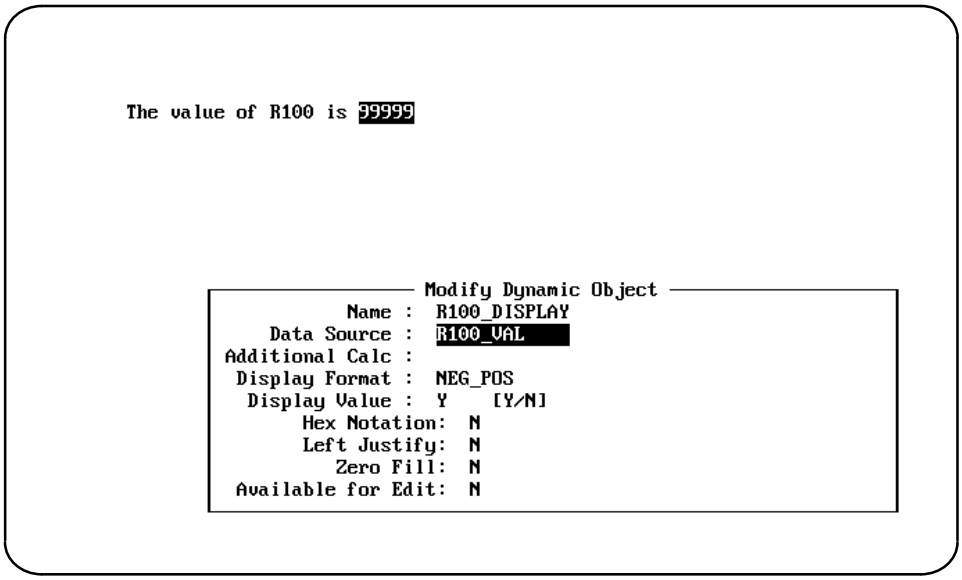
Modifying a Dynamic Object

The data entry form information for a dynamic object (only) may be modified once the dynamic object is initially created. All information appearing on the data entry form may be changed except the name of the dynamic object.

In order to modify a dynamic object, the cursor must first be placed somewhere on the dynamic object. The status area will indicate when the cursor is properly positioned on the dynamic object.



Pressing the <Modify dynamic object> key initiates the modification of the dynamic object. The dynamic object is shown in blinking reverse video and the data entry form is displayed on the screen.



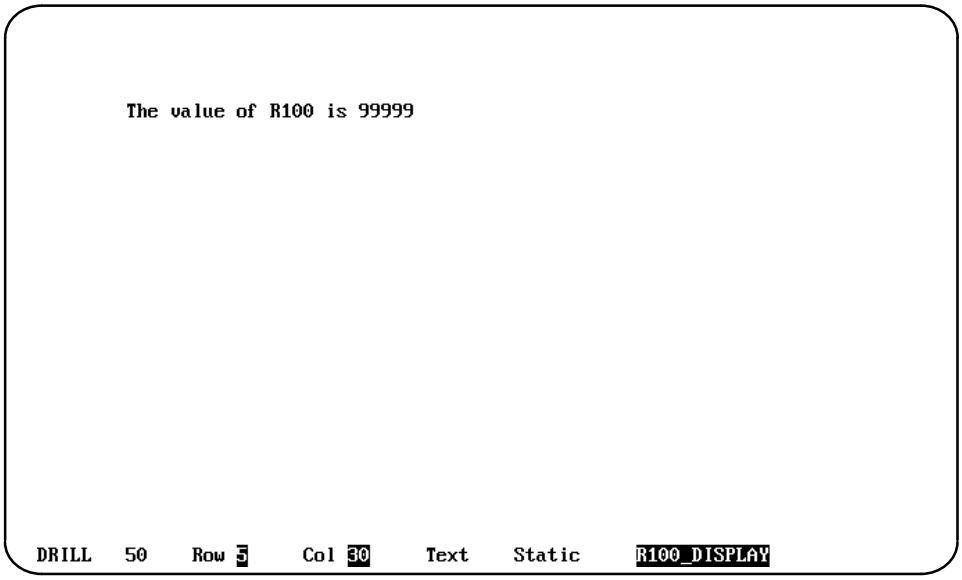
Pressing the <Save> key completes the modification of the dynamic object. At any point the modification of the dynamic object can be canceled by pressing the <Quit> key.

Deleting a Dynamic Object

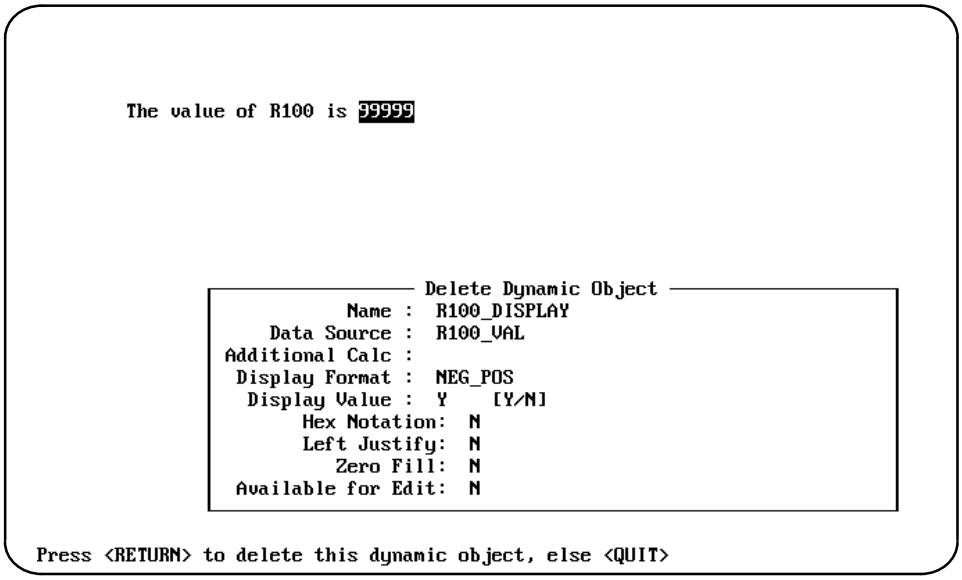
A dynamic object may be irrecoverably deleted from the screen or report by first positioning the cursor somewhere on the dynamic object and then pressing the < Delete dynamic object> key. Both the characters on the screen comprising the dynamic object and the associated data entry form will be deleted from the system. In the example below, the dynamic object R100_DISPLAY is to be deleted. The cursor is first positioned on the object.

Note

Any referenced PLC data source, display format, translation table entry, engineering units conversion table entry or lookup table entry will NOT be affected by the deletion of the dynamic object.



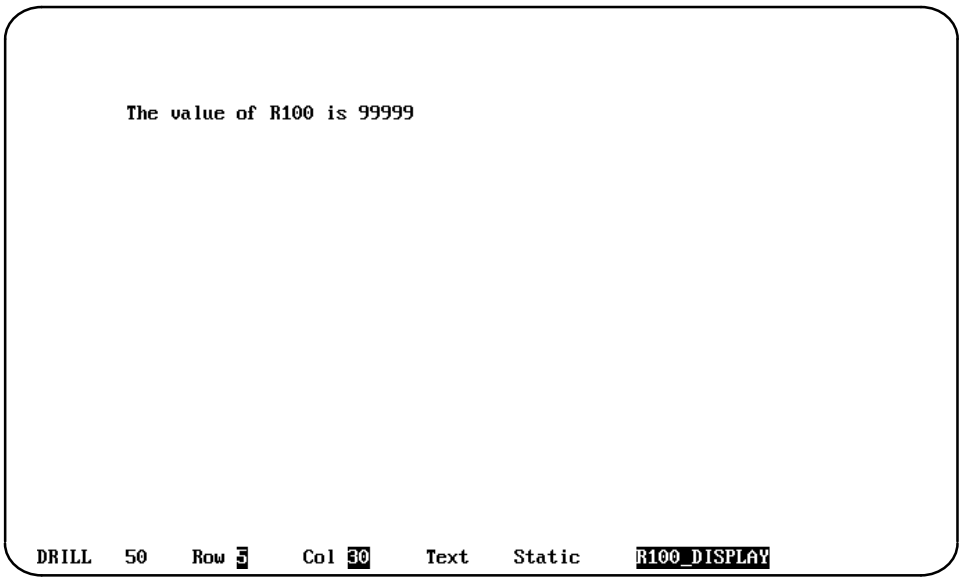
When the <Delete dynamic object> key is pressed, the dynamic object's data entry form is displayed on the screen along with a prompt asking you to confirm the delete. Pressing the [Enter] key causes the dynamic object to be deleted; pressing the <Quit> key cancels the deletion.



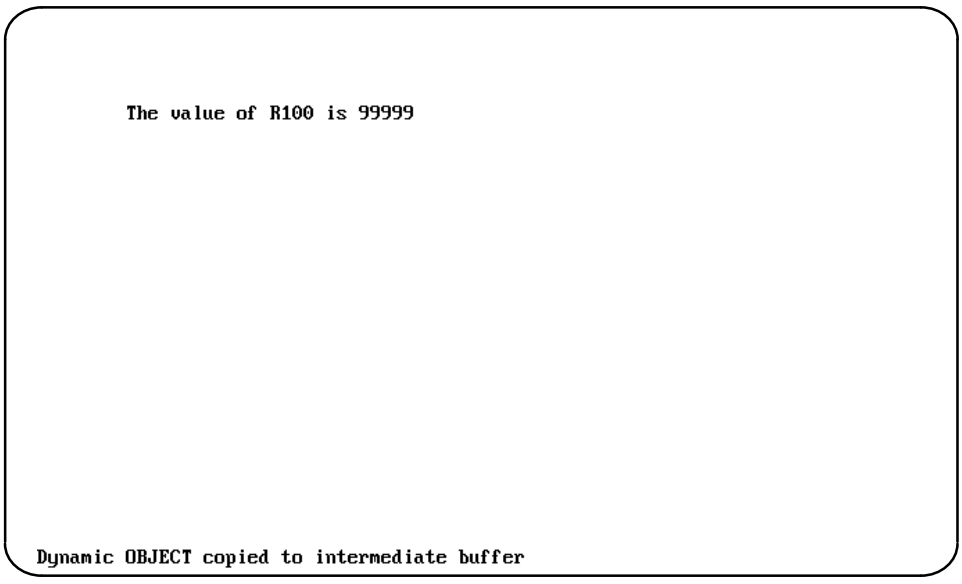
Copying and Pasting a Dynamic Object

A dynamic object may be copied to a buffer and then pasted any number of times on both the current screen or report and other screens or reports. This is useful as a time saving mechanism to quickly place multiple instances of (visually) identical dynamic objects, changing the source of animation and any other attributes of the dynamic object during the paste process.

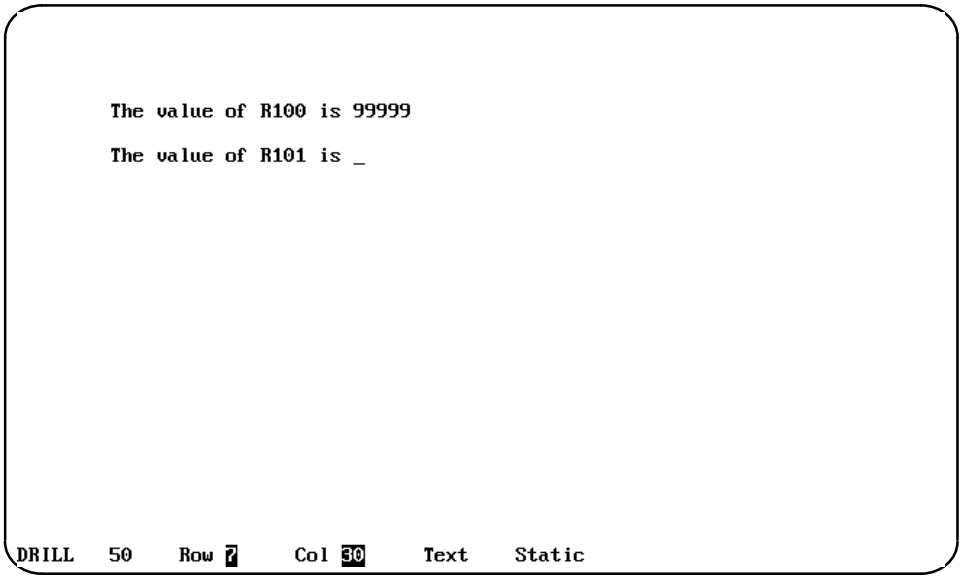
To begin the copy dynamic object operation, first place the cursor somewhere on the (existing) dynamic object to be copied.



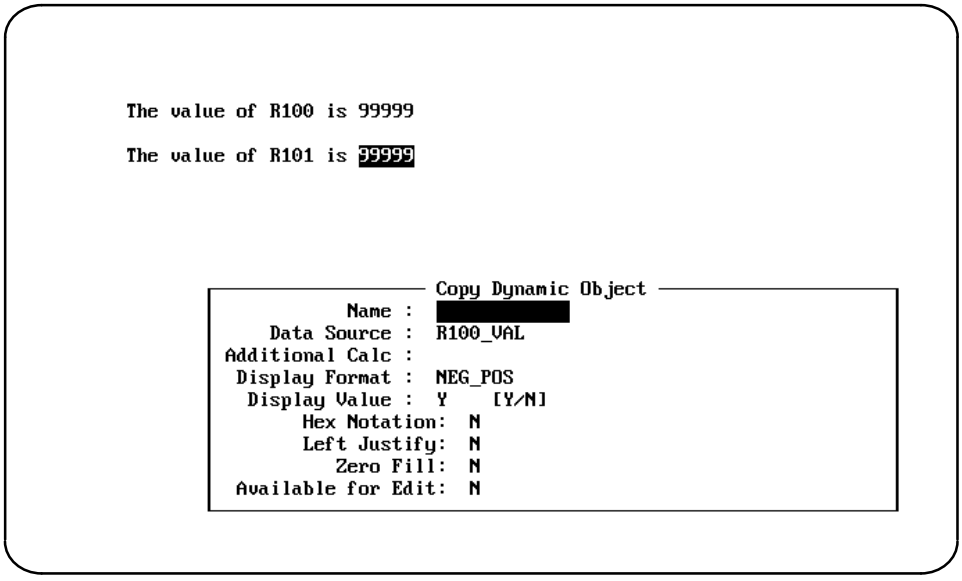
Pressing the <Copy dynamic object> key executes the copy dynamic operation. An informative message is displayed at the bottom of the screen to signal the completion of the operation.



To begin the paste dynamic object operation, first place the cursor at the upper left-hand corner position where the copied object is to be pasted.



Pressing the <Paste dynamic object> key executes the paste dynamic object operation. The dynamic object is placed on the screen at the desired position and is shown in blinking reverse video. A data entry form is opened up at the bottom of the screen so that you can identify the dynamic object. The data entry form is initially filled out with the data of the copied dynamic object except for its name (which must be unique). You must assign a unique name to the dynamic object and may alter any field as described above for creating or modifying a dynamic object.

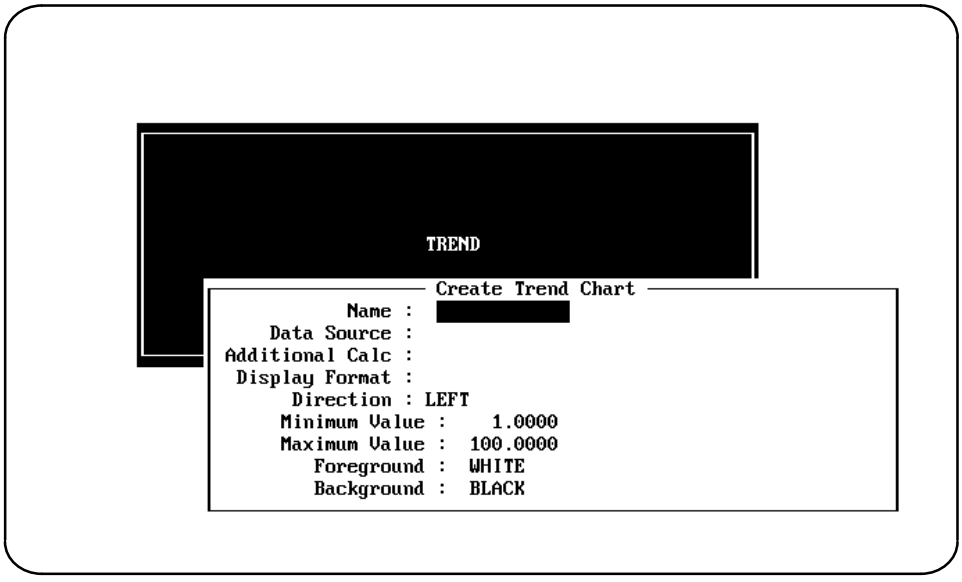


Creating a Predefined Dynamic Object

The two Predefined Dynamic Objects (Bar Chart and Trend Graph) first require definition of the size of the object. To define the size of the object, first press the < Start Dynamic Object> key. The status line is updated to indicate that a dynamic object is being defined.

Use the arrow keys and tab key to select the region in which the dynamic object is to be placed. Once the required region has been defined, press the <End Predefined Objects> key. A window is then displayed on the screen:

Select the required predefined object by using the arrow keys or pressing the first letter of the selection. A data entry window is then displayed on the screen:



The Name, Data Source, Additional Calc and Display Format fields have the same function as in normal dynamic object definition. Note that the STRING data types are invalid with predefined dynamic objects.

The direction field applies to both bar charts and trend graphs. Bar charts may go UP or RIGHT; trend graphs may go RIGHT or LEFT.

The minimum and maximum values specify the range of values that are applied to the object. If the input value is greater than the maximum value or less than the minimum value, it is automatically truncated to the appropriate boundary.

The background color specifies the color in which the background region of the object is displayed. This allows a bar chart, for example, to be overlaid on a colored region which represents a tank. If the background color of the bar chart is set to be the same as the colored region, only the bar chart will be visible at run time.

The foreground color specifies the color in which the filled area (for a bar chart) or trend line (for a trend graph) is displayed. Note that the foreground color cannot be the same as the background color. The foreground color can be modified at run time by a display format.

When all the required data has been entered, save the new object as with any dynamic object. The area of the screen defined to be the dynamic object is now displayed with a border and a title indicating what type of object has been defined. To modify or delete a predefined dynamic object, use the same procedures as for user defined dynamic objects.

Error Messages for Dynamic Objects

Error messages and their causes for Dynamic Objects are listed below.

Cannot paste double high object over normal/wide line

Cannot paste double wide object over normal/double high line

Cannot paste normal object over double high/wide line

A dynamic object may only be pasted onto a line whose size matches the size of the dynamic object.

Cannot PASTE dynamic OBJECT

A dynamic object may not be pasted on top of any part of another dynamic object.

DEFINITION ERROR : Can't find valid formatting characters

When the Display Value field is set to "Y", data formatting characters are searched for. Either no data formatting characters were specified or the characters specified are improper for the data type specified by the data source or additional calculation field.

Definition error - data types don't match

The output data type of the specified additional calculation does not match the input data type of the specified display format.

Direction must be LEFT or RIGHT

Trend graphs may only be defined to animate in the LEFT or RIGHT directions.

Direction must be UP or RIGHT

Bar charts may only be defined to animate in the UP or RIGHT direction.

ENTRY ERROR :: Invalid Additional calculation specified.

An additional calculation has been referenced that does not exist.

ENTRY ERROR :: No display defined for object

If the display value field is set to "N", a display format must be specified to control the dynamic object.

ENTRY ERROR :: No Object name

A name must be specified.

ENTRY ERROR :: Object name not unique

Two dynamic objects on the same screen or report may not have the same name.

Failed to match input data type for XXXX

The data type defined in the specified data source does not match the input data type of additional calculation or display format "XXXX".

String data type is not valid for graphs

A lookup table entry referenced either in the data source or in the additional calculation field specified an output data type of STRING; the STRING data type may not be used with bar charts or trend graphs.

Trend graphs must be at least 2 rows high

A trend graph may not consist of only a single row.

Chapter 8 Alarm Operations

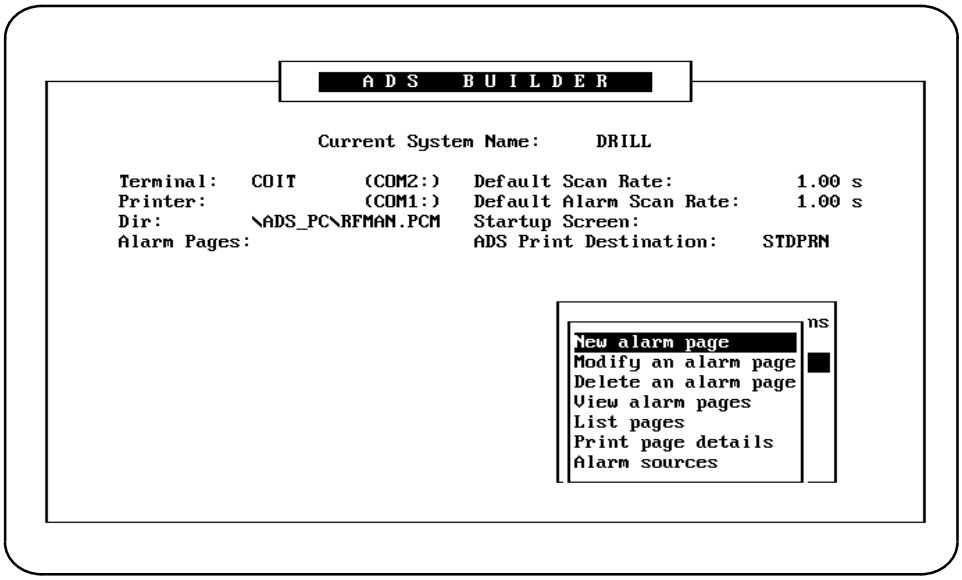
Section 1: Introduction to Using Alarms

This chapter describes the Alarm operations submenu.

When the *alarm operations* submenu is selected, the following screen is displayed. Another menu window is opened on the screen, giving the additional options of

- *New alarm page*
- *Modify an alarm page*
- *Delete an alarm page*
- *View alarm pages*
- *List pages*
- *Print page details*
- *Alarm sources*

Each option is described in this section. In most cases, only the initial screen will be shown for each submenu since the general format for each one is similar. Each of the options from each submenu will be described in the text. Any unique screens will also be shown.

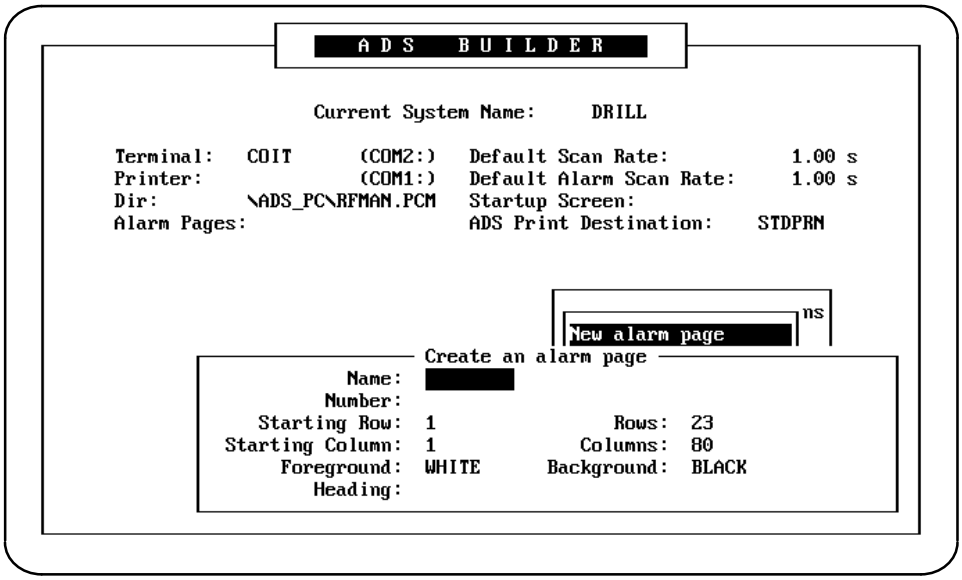


Note

When an ADS system is executed, it is possible that the ADS Executor may log alarms of its own. Those alarms will indicate attempts to access data from the CPU which is not supported by the CPU (e.g., attempt to access R2049 when only 2048 registers have been configured), low memory conditions, etc. These system alarms are logged to the ten lowest numbered alarm pages in the system (if any alarm pages exist at all).

Section 2: New Alarm Page

When the New alarm page option is selected, a data entry window is opened containing nine fields: *Name, Number, Starting Row, Rows, Starting Column, Columns, Foreground (Color), Background (Color), and Heading.*



Name

The alarm page name is used to assign a descriptive tag to an alarm page. Unlike other components of a system, the alarm page name is NOT used to uniquely identify the various alarm pages. Instead, the alarm page number serves that function. Because of this, the ADS system does NOT enforce uniqueness between alarm page names. A name may be from one to eight alphanumeric and underscore (_) characters, and is NOT case sensitive.

As an example of naming an alarm page, assume that the alarm page is to be named AREA_4. Type the name AREA_4 into the *Name* field. To complete the entry press the [Enter] key. At this point, the Name entry is completed and the *Number* field is selected next.

Number

The alarm page number is used to uniquely identify alarm pages within a single system. Alarm page numbers may range from 1 to 999, inclusive, providing for an absolute maximum of 999 alarm pages in a single system. Alarm page numbers do not need to be assigned consecutively, nor do they need to be defined in an increasing numeric order.

As an example of assigning an alarm page number, assume that you want to assign 34 as the alarm page number. Simply type the number 34 into the *Number* field. To complete the entry press the [Enter] key. The *Starting Row* field is selected next.

Starting Row, Rows, Starting Column and Columns

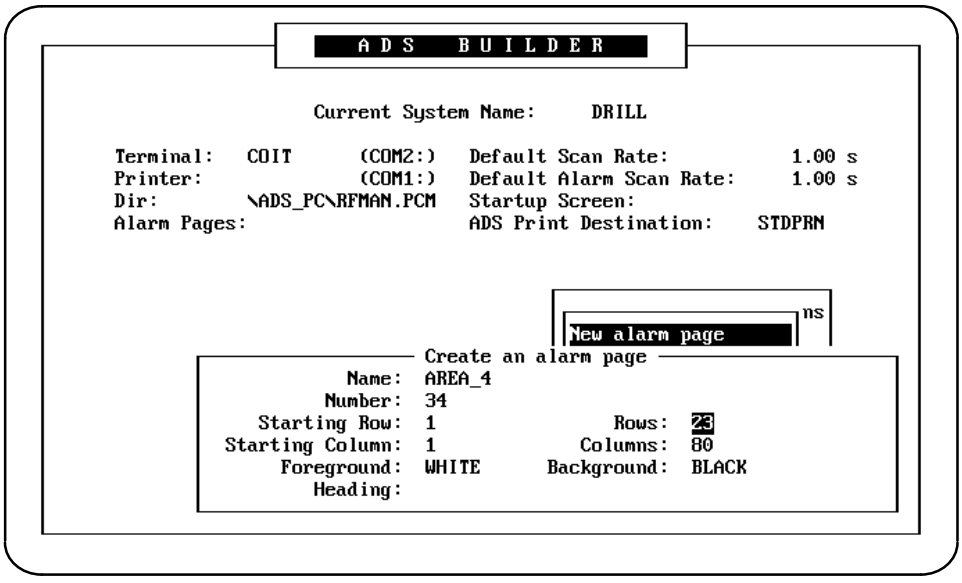
You can control the size of an alarm page and the position it is displayed on the terminal device by specifying the page's starting coordinates on the screen and by specifying the total number of rows and columns covered by the alarm page. The alarm page must be defined so that it falls within the viewing area of the terminal's screen since there is no provision for panning across a larger virtual alarm page. By default, the ADS builder sets these values to exactly match the size of the screen you are using (minus one row reserved for a prompt/status line). You may alter any of these values by typing the new values into the appropriate fields.

If you want to take advantage of windowing multiple alarm pages onto the terminal device, care must be taken when selecting the page coordinates and size. The alarm page will always be displayed at the given coordinates with the defined size regardless of what else is displayed on the screen. You normally would want to have a portion of covered pages remain visible on the screen so that you can readily see that more information is present and accessible (assuming that an alarm page POPALM command is made available).

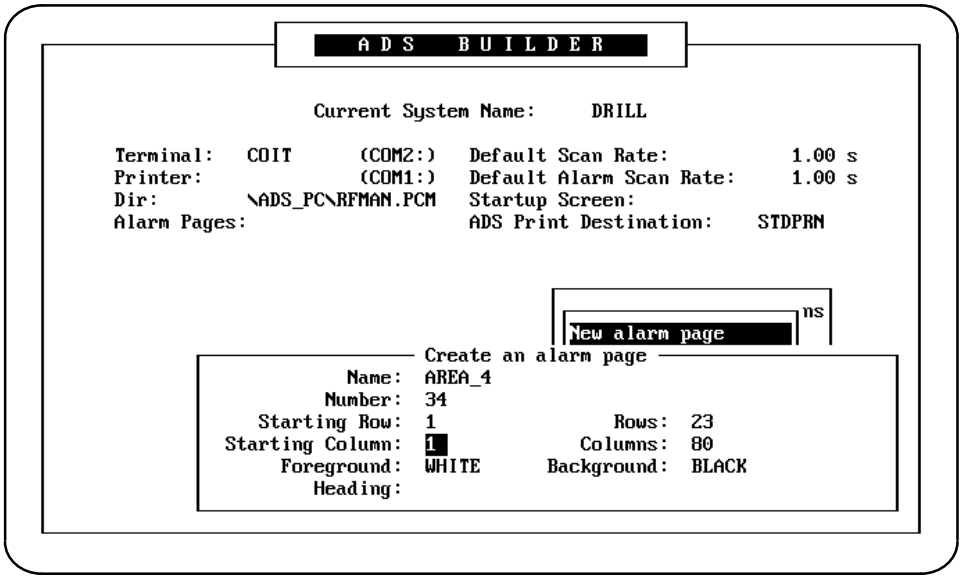
Values for the *Starting Row* and *Starting Column* fields must be selected so that the upper left-hand corner of the alarm page falls within the viewing area of the screen; however, you are not required to have the entire page fall within the confines of the physical device (although for most applications this is what you would want). You must define the *Rows* field to be a minimum of 3, which allows for a border and a single visible alarm entry. Generally, you will want to select a value which allows an appropriate number of alarm entries to be viewed simultaneously.

When selecting a value for the *Columns* field you should analyze carefully what is to be displayed on the screen. At a minimum you will have to specify a value which is greater than or equal to 10, which allows for a border and the prompt *More* during system execution. If a heading is to be displayed the number of columns should be increased by the length of the heading so that all of the heading will fit on the screen. Two other pieces of information must be considered: alarm timestamping and alarm message text. You should allow for 20 columns if timestamping is used. Also, enough columns should be provided so that the maximum sized alarm message text will fit on the defined screen area.

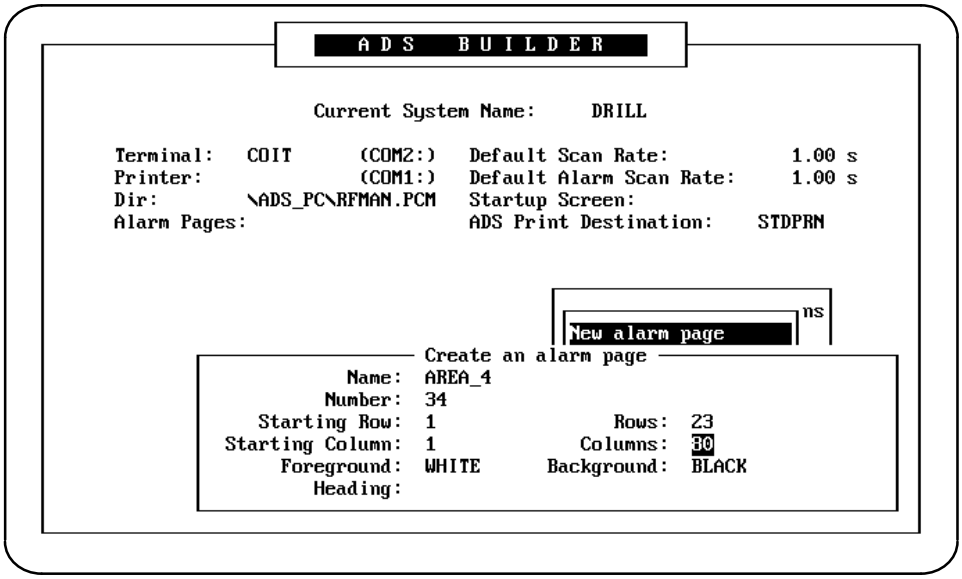
Assume that you want to set the default values so that the new alarm page will be created full sized. The cursor is initially on the Starting Row field. You do not make an entry (in this example) since the default value is to be used. Press the [Enter] key to move the cursor to the Rows field.



Press the [Enter] key again which selects the *Starting Column* field. Again, no entry is made since the default value is to be used.



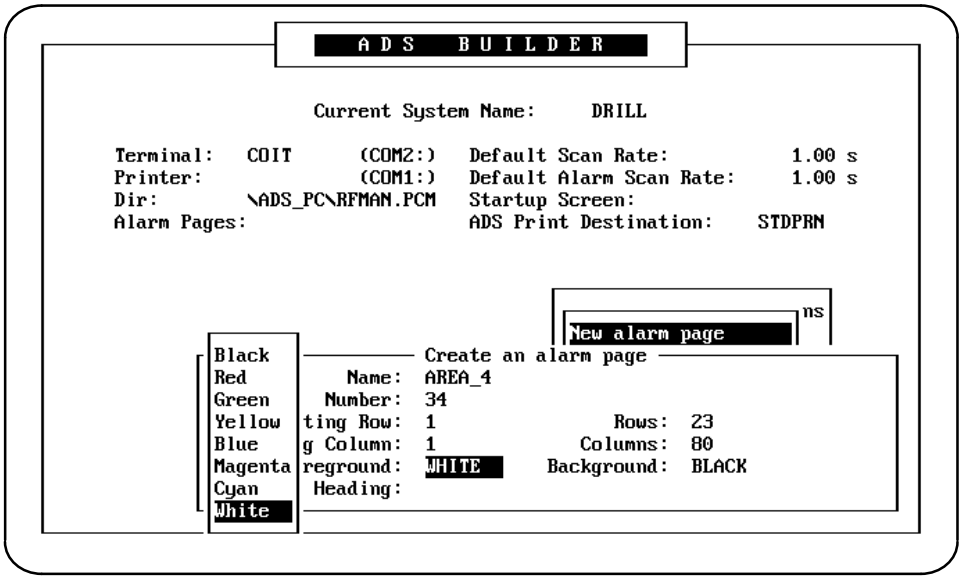
Pressing the [Enter] key again selects the *Columns* field. Once again, no entry is made since you want the default value to be selected.



Foreground and Background Colors

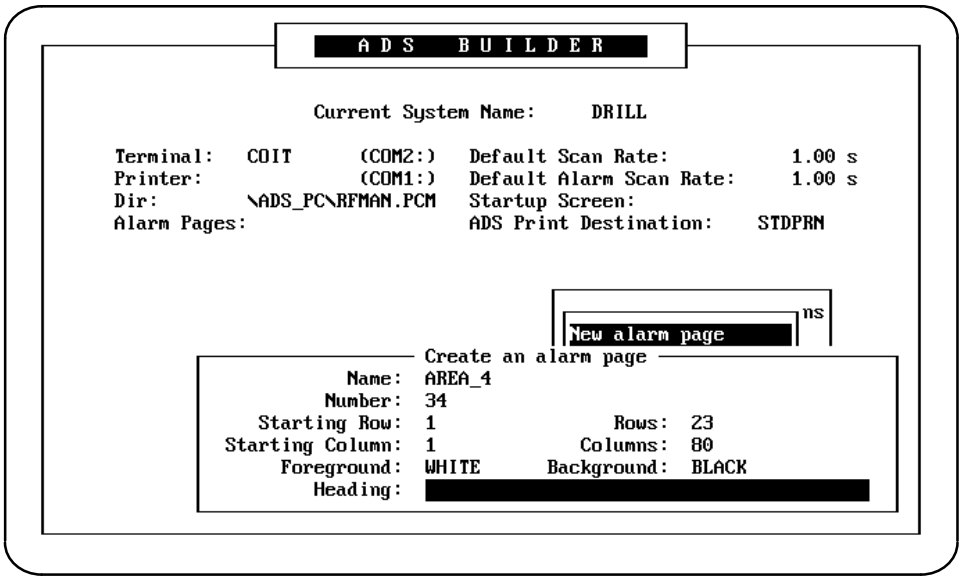
The foreground and background colors specify the colors in which to display the alarm page at run time. The foreground color specifies the color that the alarm messages are displayed in. The foreground and background colors cannot be the same value.

When you cursor to the foreground or background color fields, a window is opened on the screen showing what choices are available.



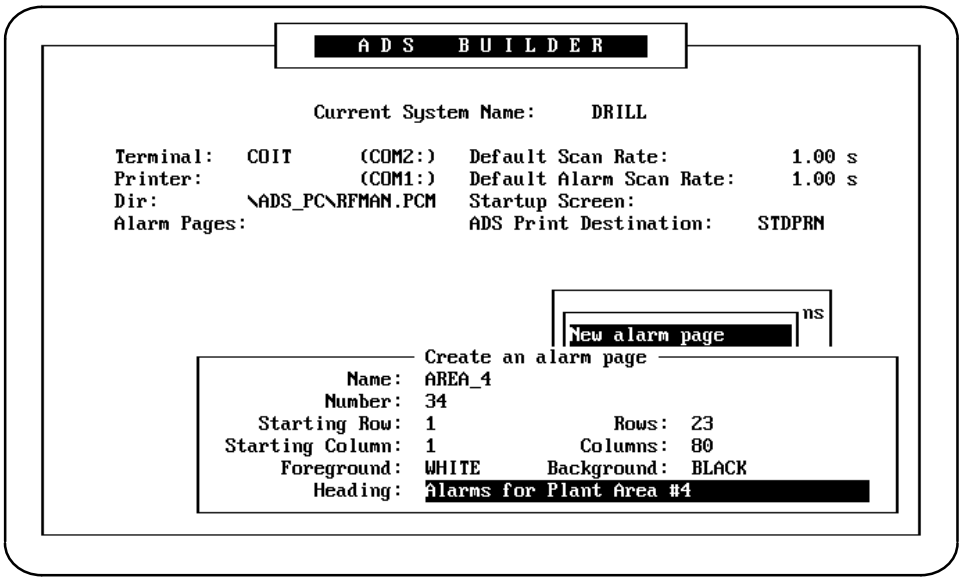
Heading

Pressing the [Enter] key from the background color field completes the entry of the alarm page size, positioning and color fields. The *Heading* field is selected next.

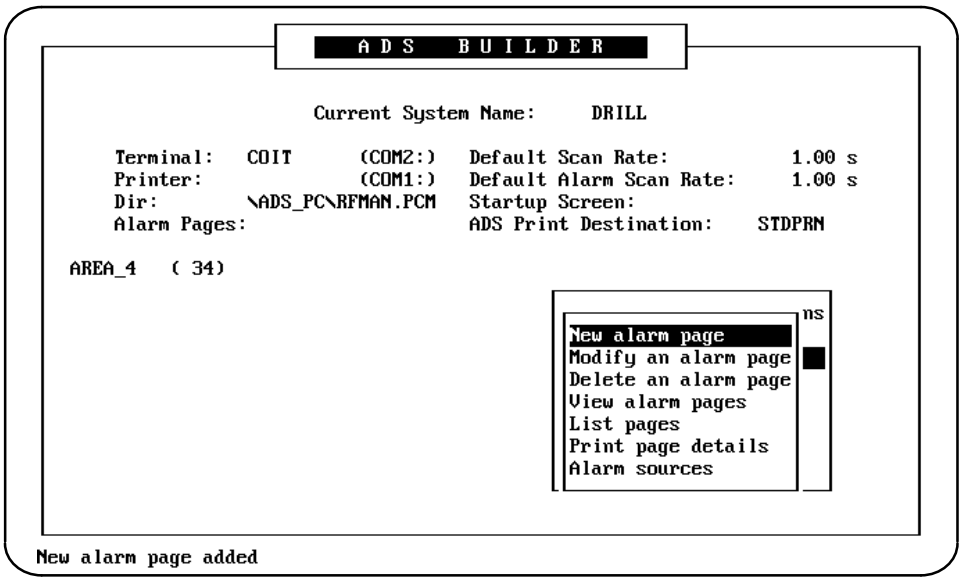


The option is provided to have a heading displayed at the top of the alarm page whenever the page itself is displayed on the terminal device. The heading consists of from 0 to 40 printable ASCII characters. You must ensure that the alarm page is large enough to display the heading, otherwise the ADS Builder will flag it as an error.

Assume that you want the text **Alarms for Plant Area #4** to be displayed as the alarm page heading. Type the text for the heading into the *Heading* field.



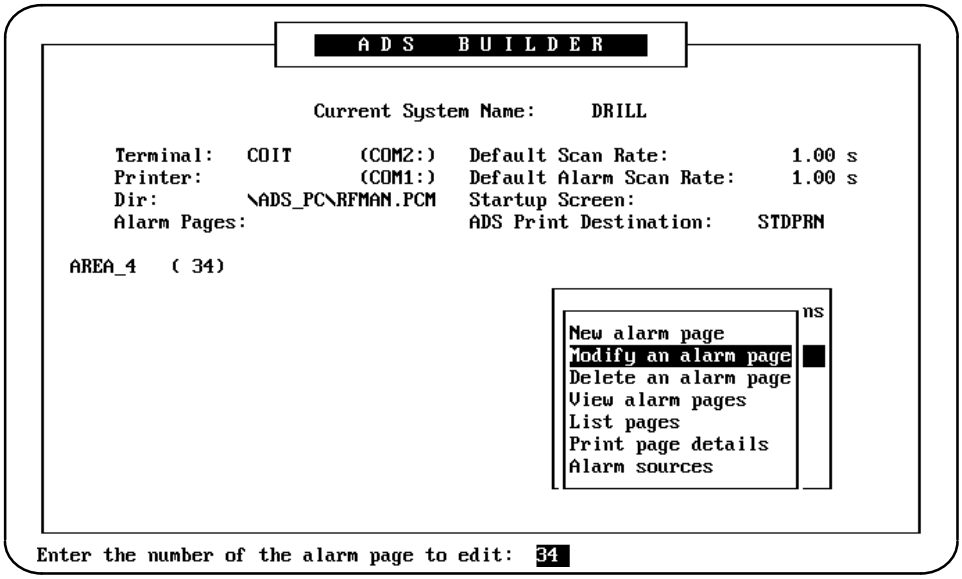
Press the [Enter] key at this point to complete the creation of the alarm page. You are then returned to the menu page along with an informative message displayed indicating that the creation of the alarm page is complete. The alarm page you have just created is also listed in the status area on the left-hand side of the screen.



Modify an Alarm Page

An existing alarm page may be modified in much the same manner in which it was originally created. The alarm page's *Name* and *Number* fields may not be changed, only the page's size, position, heading, and foreground and background color fields.

To initiate an alarm page modification first select the Modify an alarm page menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [M] key. The ADS Builder will prompt you for the number of the alarm page to be modified. Only existing alarm pages may be modified; the New alarm page menu option must be used in order to create a new alarm page.



For example, assume that you want to modify alarm page 34 (AREA_4). Type the alarm page number into the prompt field. When you press the [Enter] key the form for the alarm page is displayed with the *Starting Row* field initially selected.

You can now proceed to change any of the fields (except the *Name* and *Number* fields). Pressing the <Save> key from any field or the [Enter] key with the *Heading* field selected completes the modification. You are now returned to the menu page with an informative message displayed on the status line indicating the modification was completed.

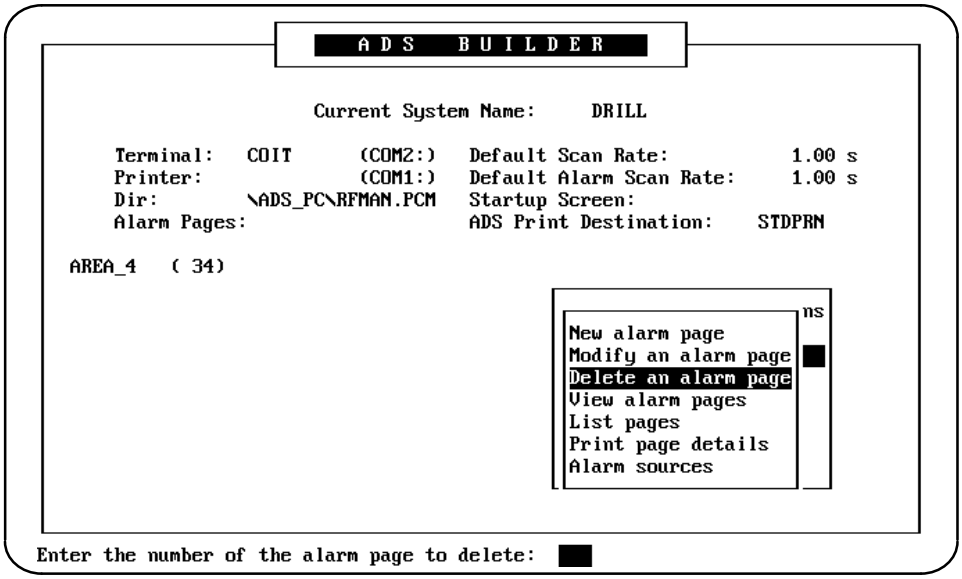
If you want to cancel the modification, disregarding any changes which have been made, press the <Quit> key. An informative message will be displayed on the status line indicating that no changes were made to the alarm page. If you specify an alarm page number which does not currently exist, you will be returned to the menu page with the message

Invalid alarm page specified

displayed on the status line.

Delete an Alarm Page

An alarm page may be (irrecoverably) removed from a system by deleting it. To initiate an alarm page deletion select the Delete an alarm page menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [D] key. The ADS Builder will prompt you for the name of the alarm page to be deleted. Only existing alarm pages which are not referenced by any alarm source in the system may be deleted.



As an example of deleting an alarm page, assume that you want to delete alarm page 34 (AREA_4). To select this alarm page number type it into the prompt field. When you press the [Enter] key the form for the alarm page is displayed along with a prompt on the status line asking you to confirm the delete.

When you press the [Enter] key at this point, the alarm page will be deleted from the system. Upon deletion of the alarm page, you are returned to the menu page with an informative message displayed on the status line indicating that the deletion was completed.

If you press the <Quit> key indicating that the alarm page delete should be canceled, you are returned to the menu page (no message will be displayed to indicate that the deletion was canceled). If you specify an alarm page number which does not currently exist, you will be returned to the menu page with the message

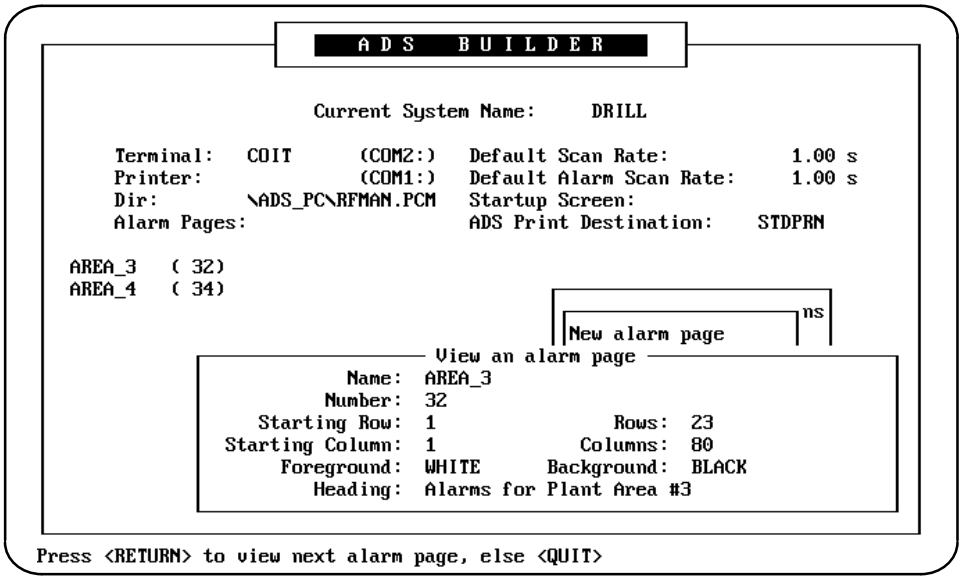
`Invalid alarm page specified`

displayed on the status line.

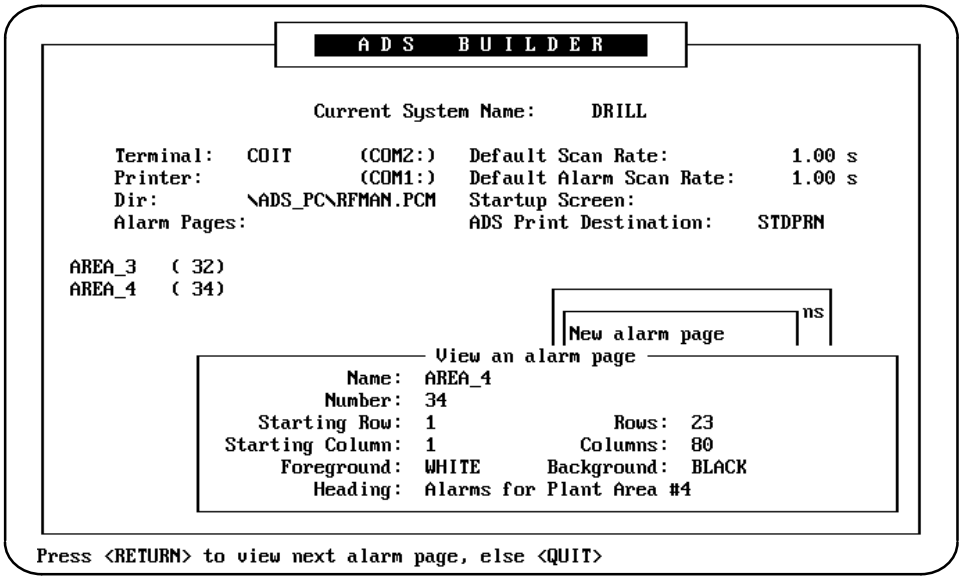
View Alarm Pages

The ADS system allows you to view all the existing alarm pages in a system one by one, in numerical order. To initiate the viewing of a system's alarm pages select the View alarm pages menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [V] key.

In the following example, two alarm pages are currently defined in the system: AREA_3 and AREA_4. When the [Enter] key is pressed, the form for the first alarm page is displayed along with a prompt on the status line giving you the choice of viewing the next alarm page in the list or of quitting the view function.



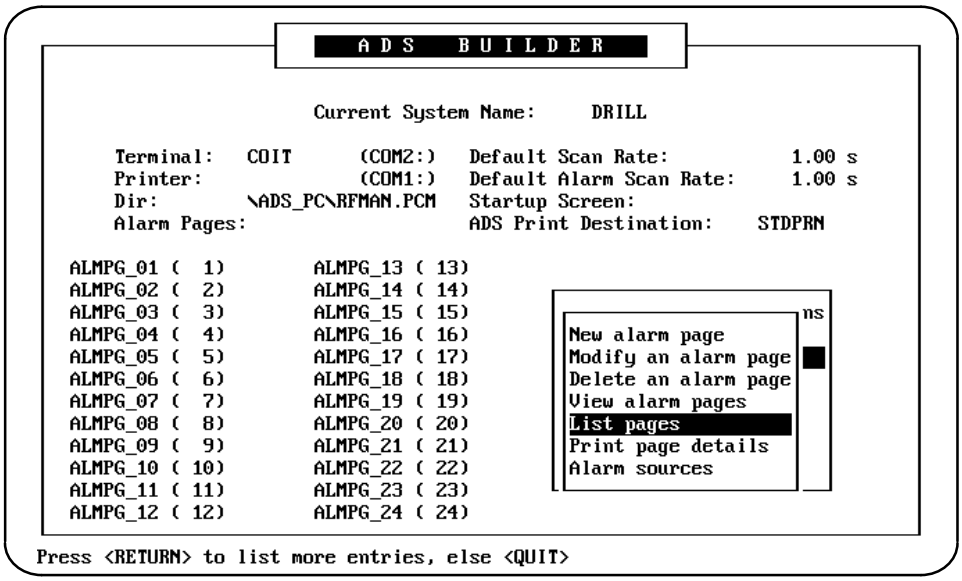
Pressing the [Enter] key at this point will display the next alarm page in the list, which is AREA_4.



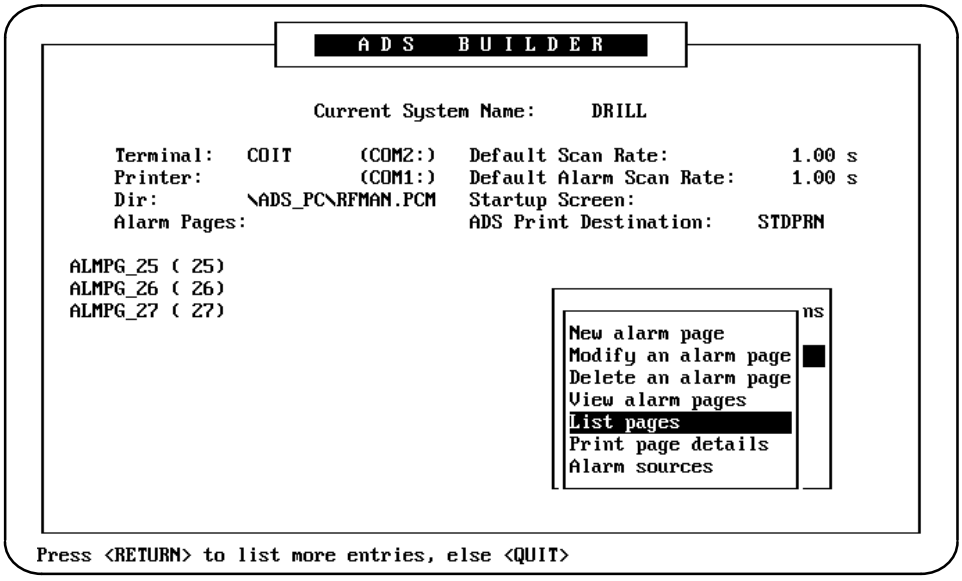
Pressing the [Enter] key again will return you to the menu page since AREA_4 is the last alarm page in the list.

List Pages

On the left-hand side of the screen is a list of alarm page names and numbers maintained in numerical (alarm page number) order. You can page through the total list of alarm page names and numbers. To initiate listing of a system's alarm page names and numbers first select the List pages menu option, either by cursoring to that option and then system. When the [Enter] key is pressed, the first group of alarm page names and numbers are displayed along with a prompt on the status line giving you the choice of listing the next group of names and numbers or of quitting the list function.



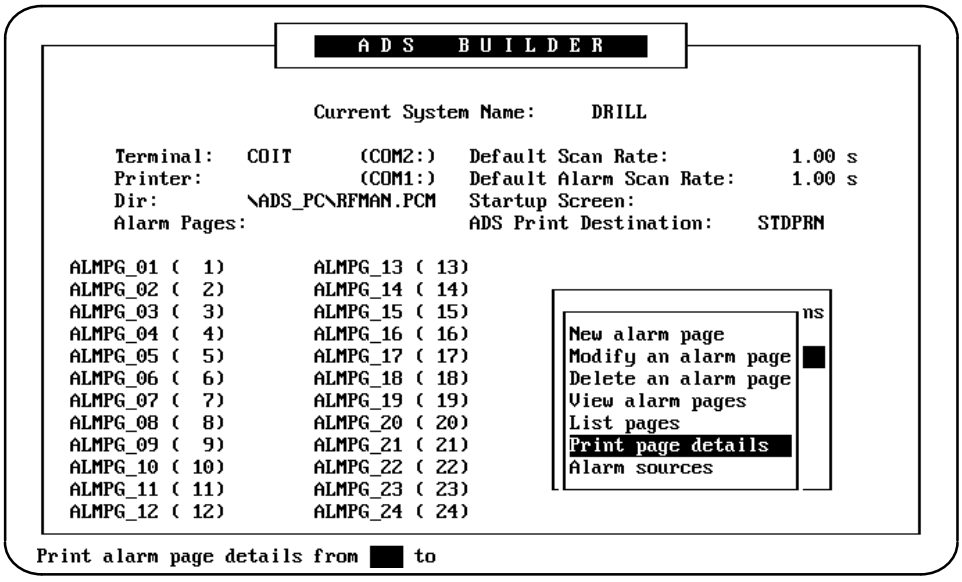
Pressing the [Enter] key at this point will display the remaining three alarm page names and numbers.



Pressing the <Quit> key exits the list operation. The alarm page names and numbers currently displayed on the screen will be left displayed.

Print Page Details

The Print page details option allows the details of the defined alarm pages to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

Print alarm page details from ################## to ##################

Depending upon the response entered into the from and to field, several different listings can be generated. The listing options are as shown below.

```
from = "<id1>"   to = "<id2>"   --> print out alarm pages id1 to id2
from = "<id1>"   to = ""        --> print out alarm page id1
from = ""        to = "<id2>"   --> print out alarm page id2
from = "*"       to = "<id2>"   --> print out all alarm pages up to id2
from = "<id1>"   to = "*"       --> print out all alarm pages from il1
from = "*"       to = ""        --> print out all alarm pages
from = ""        to = "*"       --> print out all alarm pages
from = "*"       to = "*"       --> print out all alarm pages
```

Pressing the <Quit> key aborts the print operation. After selection of the required range of alarm pages to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see Load / Save menu discussion in Chapter 9).

Alarm page detail information is formatted as shown in the following examples:

```
       ALARM PAGE LISTING
       ------------------

Alarm Page :   100     CRITICAL

                        Start Row :  10          End Row : 17
                     Start Column :  30       End Column : 79
                       Foreground :  RED      Background : WHITE
                          Heading :  Critical Alarms - Urgent Priority

Alarm Page :   101     CAUTION
                        Start Row :  5           End Row : 14
                     Start Column :  20       End Column : 69
                       Foreground :  BLUE     Background : YELLOW
                          Heading :  Cautionary Alarms
```

Error Messages for Alarm Pages

Error messages and their causes for Alarm pages are listed below.

ENTRY ERROR :: alarm page number is not unique

Two alarm pages may not have the same number.

ENTRY ERROR :: alarm page number may not be zero

An alarm page number must be specified.

ENTRY ERROR :: Name not specified

A name must be specified.

ENTRY ERROR :: page heading too big for page size

The specified page heading will not fit within the number of columns defined for the alarm pages.

ENTRY ERROR :: Row or column sizes are invalid for this terminal

The row / column specification for the alarm page would place all or part of the alarm page off the physical display.

ENTRY ERROR :: specified rows value is invalid

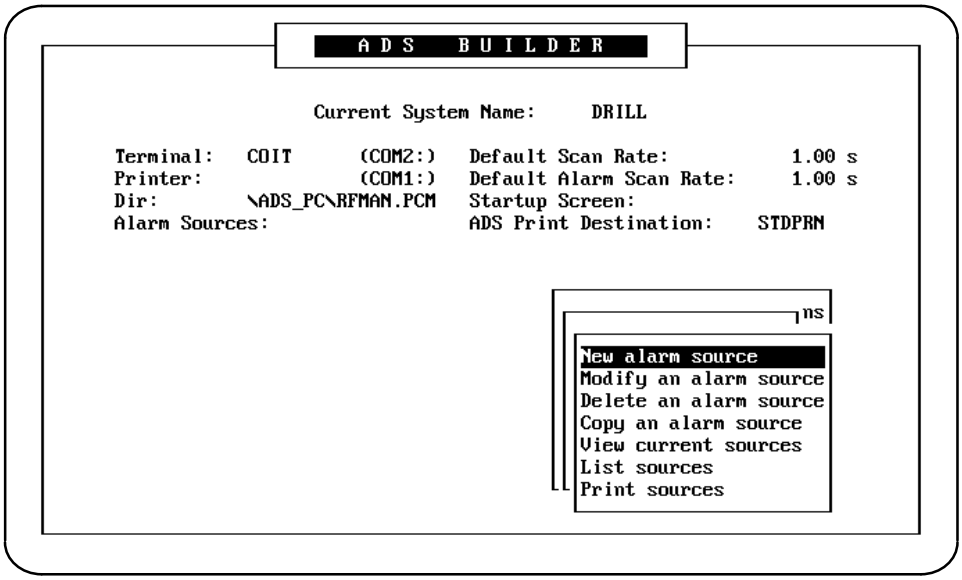
An alarm page must consist of at least 3 rows.

Alarm Sources

When the *alarm sources* submenu is selected, the following screen is displayed. Another menu window is opened on the screen, giving the additional options of

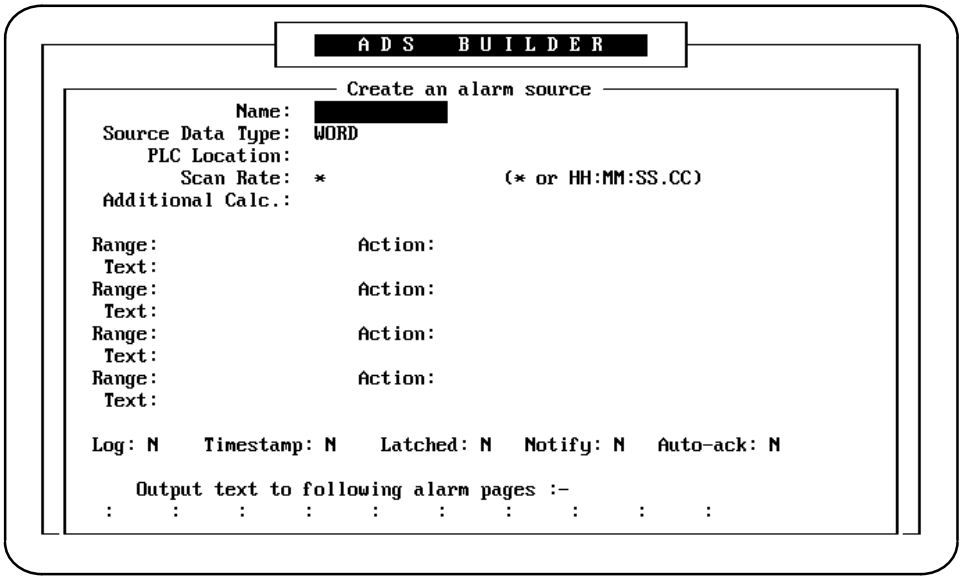
- *New alarm source;*
- *Modify an alarm source;*
- *Delete an alarm source;*
- *Copy an alarm source;*
- *View current sources and*
- *List sources.*
- *Print sources*

Each of these options is described in the sections which follow. Not all screens for all options are shown, since the general format for each option is similar.



Section 3: New Alarm Source

When the *New alarm source* option is selected, a data entry window is opened containing fourteen fields: *Name, Source Data Type, PLC Location, Scan Rate, Additional Cal., Range, Action, Text, Log to printer, Timestamp, Latched, Notify, Auto Acknowledge, and Output text to following alarm pages.*



Name

Every alarm source must be given a name. This name must be unique with regards to alarm source names, but does not need to be unique from all other names in the ADS system (for example, the system itself might be named DRILL and an alarm source might also be named DRILL). A name may be from one to twelve alphanumeric and underscore (_) characters, and is NOT case sensitive.

As an example of naming an alarm source, assume that you want to create an alarm source with the name OVER_TEMP. Type the the name OVER_TEMP into the *Name* field. To complete the entry press the [Enter] key. The *Source Data Type* field is selected next.

Source Data Type

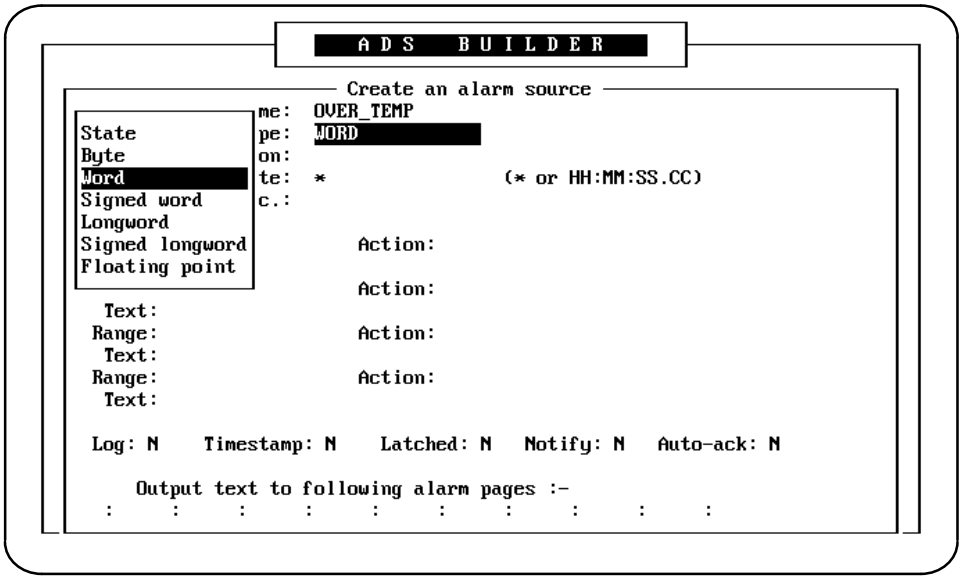
Every data source must be tagged as to what type of data it represents. The data types supported by the ADS system are specified in the table below.

Table 8-1. Source Data Types Supported for Alarm Sources

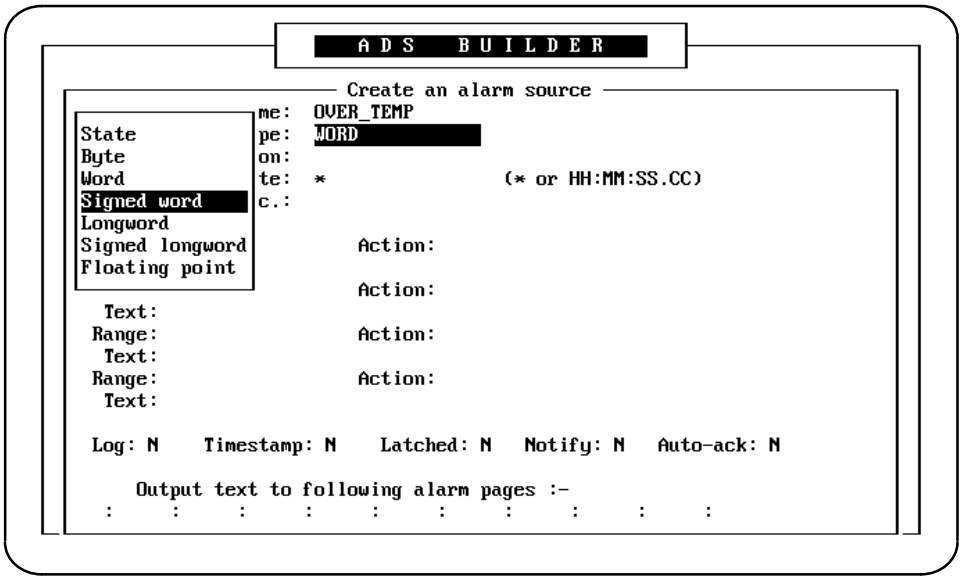
Data Type	Size (Bits)	Value Range
State	1	OFF, ON
Byte	8	0 to 255
Word	16	0 to 65535
Signed Word	16	–32768 to +32767
Longword	32	0 to 4294967295
Signed Longword	32	–2147483648 to +2147483647
Floating Point	32	–999999999.99 to +9999999999.99 †

† Only 7 digits of precision.

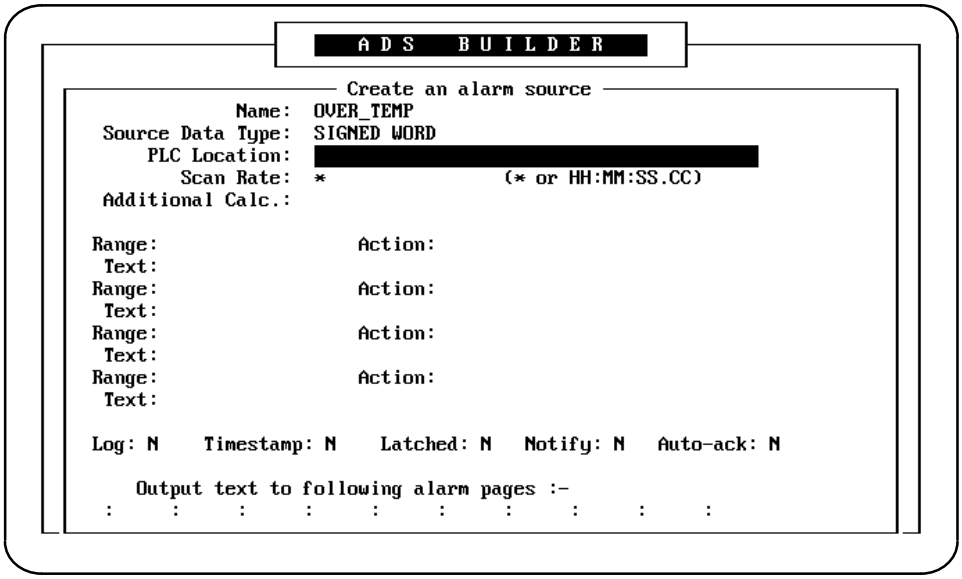
When you cursor onto the *Source Data Type* field a window is opened on the screen showing the available choices. The default source data type selected by the system is WORD.



In this example, a source data type of *Signed word* is to be selected. Press the [–] key to select the desired source data type, Signed Word.



Pressing the [Enter] key completes the entry of the source data type and selects the *PLC Location* field next.



PLC Location

The *PLC Location* field is used to identify an alarm source with a specific location, or collection of locations, in the PLC. The following table lists memory locations in the PLC supported by the ADS system for use with alarm sources.

Table 8-2. Series 90 PLC References Supported by ADS System

PLC Memory	Description	Size/ Ref.	Over	Diags	Slice	Ref	Write
PLC_STATUS	PLC Status	16	N	N	Y	N	N
PLC_ACCESS	Control Program / Privilege Level	16	N	N	Y	N	N
PLC _SWEEP	Last Sweep Time	16	N	N	N	N	N
RACK_mm	Fault in Rack mm	1	N	N	N	N	N
SLOT_mn	Fault in Rack m, Slot n	1	N	N	N	N	N
BUS_mno	Fault in Rack m, Slot n, Bus 0	1	N	N	N	N	N
M_mnopp	Fault in Rack m, Slot n, Bus 0, Module pp	1	N	N	N	N	N
R	Registers	16	N	N	Y	Y	Y
AI	Analog inputs	16	N	Y	Y	Y	Y
AQ	Analog outputs	16	N	Y	Y	Y	Y
I	Discrete inputs	1	Y	Y	N	Y	Y
Q	Discrete outputs	1	Y	Y	N	Y	Y
M	Internal coils	1	Y	N	N	Y	Y
T	Temporary coils	1	N	N	N	Y	Y
S	Special Contacts	1	N	N	N	Y	N
SA	Special Contacts A	1	Y	N	N	Y	Y
SB	Special Contacts B	1	Y	N	N	Y	Y
SC	Special Contacts C	1	Y	N	N	Y	Y
G	Global Data	1	Y	N	N	Y	Y
GA	Global Data A	1	Y	N	N	Y	Y
GB	Global Data B	1	Y	N	N	Y	Y
GC	Global Data C	1	Y	N	N	Y	Y
GD	Global Data D	1	Y	N	N	Y	Y
GE	Global Data E	1	Y	N	N	Y	Y
^P [1]	Main program block data	16	N	N	Y	Y	Y
^L [2]	Sub program Block data	16	N	N	Y	Y	Y
Z	ADS Internal data	16	N	N	Y	Y	Y
MEMORY	ADS Internal free memory	32	N	N	N	N	N
MAX_BLOCK	ADS internal free memory, largest block	32	N	N	N	N	N

[1] The full syntax for Main Program locations is: <program_name>^P<address>.

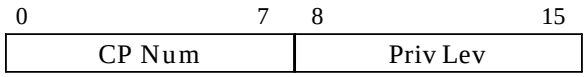
[2] The full syntax for Sub Program locations is: <block_name>^L<address>.

[3] The parameters listed in this table are as follows:

PLC Memory	Refers to the identifier used in the <location_type> field of the location reference syntax.
Size /Ref.	Data size in bits.
Over	Is there an override bit associated with the location type? Override bits are specified by using "O" in the <modifier> field of the location reference syntax.
Diags	Is there a diagnostic bit associated with the location type? Diagnostic bits are specified by using "F" in the <modifier> field of the location reference syntax.
Slice	Indicates whether it is possible to specify individual bits, or groups of bits from the location.
Ref	Indicates whether it is necessary to provide an address for the location type.
Write	Indicates whether a value can be written to the location.

PLC_ACCESS and PLC_STATUS are ”special” locations that allow you to look at individual bits pertaining to program access and system status. These bits are described below.

PLC_ACCESS



CP Num	Indicates the number of the Control Program to which the requesting device is attached. Possible values are -1 to 7, where -1 indicates not attached to any control program. This number is always 0 for Series 90-30.
Priv Lev	Current privilege level of requesting device for accessing memory in the PLC CPU (valid entries are 0 through 4).

PLC_STATUS

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
PLC State				NU	Prg chg	OEM prot	Run SW	IO SW	Prg Att	IO flt	PLC flt	IO chg	PLC chg	Con Swp	Ovr Swp

PLC State	Current State (as opposed to switch settings or commanded state). Possible values are: 0 - RUN_ENABLED; 1 - RUN_DISABLED: 2 - STOP_IO_DISABLED 3 - CPU_STOP_FAULTED; 4 - CPU_HALTED; 5 - CPU_SUSPENDED 6 - STOP_IO_ENABLED
NU	Not used (reserved for future expansion).
Prg chg	Program changed flag: 1 = Program change; 0 = No program change (90-70 rel 2.X and later).
OEM prot	OEM protected flag: 1 = OEM protection in effect; 0 = No OEM protection.
Run SW	Front panel RUN / STOP switch setting; 1 = RUN; 0 = STOP.
IO SW	Front panel ENABLE / DISABLE switch setting: 1 = Outputs Disabled; 0 = Outputs Enabled.
Prg Att	Programmer Attachment flag. Shows whether or not there is a programmer attachment in the system. 1 = Programmer attachment found; 0 = No programmer attachment found.
IO flt	I / O Fault Entry present flag; 1 = Fault entry in I / O fault table; 0 = I / O fault table is empty.
PLC flt	PLC Fault Entry present flag: 1 = Fault entry in PLC fault table; 0 = PLC fault table is empty.
IO chg	I / O Fault Entry changed flag: 1 = I / O fault table has changed since last read by this device; 0 = I / O fault table same as when last read.
PLC chg	PLC Fault Entry changed flag: 1 = PLC fault table has changed since last read by this device; 0 = PLC fault table same as when last read.
Con Swp	Constant sweep mode setting: 1 = Constant sweep mode enabled for current control program; 0 = Constant sweep mode not enabled.
Ovr Swp	Oversweep flag (if constant sweep mode enabled). Shows whether the constant sweep value was exceeded on the last sweep. 1 = Constant sweep value was exceeded; 0 = Normal sweep.

The Z, MEMORY, and MAX_BLOCK locations are internal to ADS; i.e., they are not present in the PLC. There are 1024 references in Z memory, Z1 through Z1024. These are typically used for special ”interlocks” in your system. The demonstration systems provided with the product have a number of examples that show how Z memory can be used. MEMORY returns the number of free (unallocated) bytes of memory left on the ADC module while the Executor is running. It is useful while you are developing your system to monitor the maximum runtime memory usage. You should specify a source data type of LONGWORD. Any dynamic object referencing a data source whose PLC location is MEMORY should allow for up to a 6-digit number. You may need to monitor

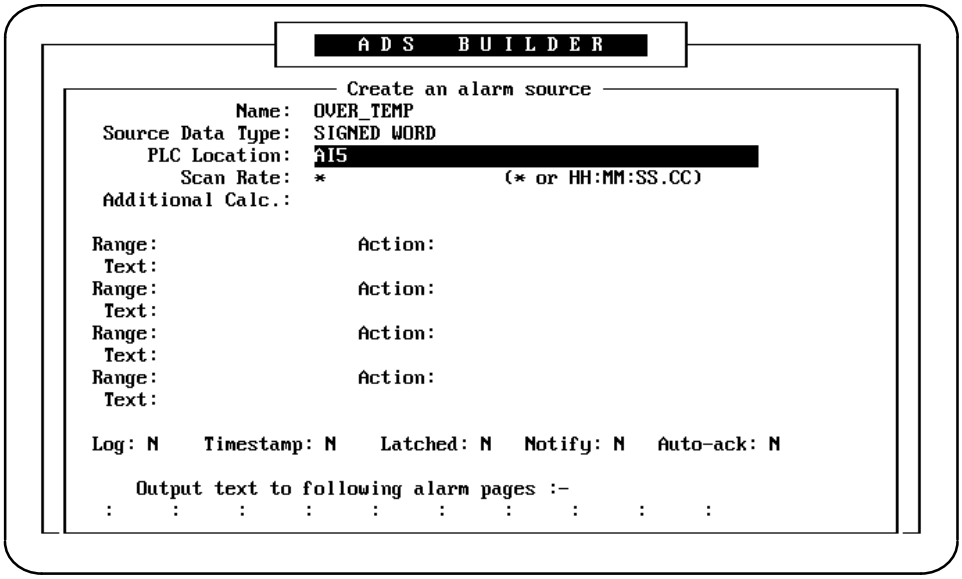
memory usage on multiple screens since memory "shrinks" and "expands" as screens are pushed and popped. Also, alarm logging continually shrinks memory until alarms are acknowledged. MAX_BLOCK functions identically to MEMORY, except that it returns the size (in bytes) of the largest contiguous block of free (unallocated) memory.

The typical information which you must type in to specify a source location is:

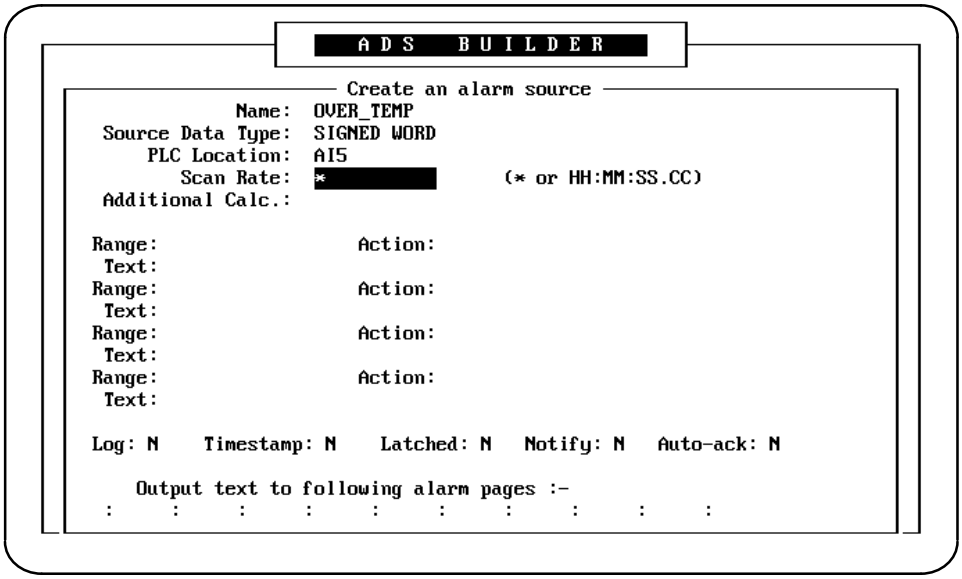
<Source location> ::= <PLC memory> <reference>

where <PLC memory> is as listed in the table above and <reference> is a numeric value specifying a particular reference offset within the PLC memory. For example, to indicate a source location for PLC memory reference %R1, you would specify R1. The previous field, *Source Data Type*, determines how many consecutive references are implied by the source location selection. For example, if a source location of I1 were specified along with a source data type of WORD, the data source would include PLC memory locations %I1 to %I16. The reason for this is that the WORD data type requires sixteen bits of storage and that each %I reference is a single bit in size.

Assume that you wish to tie the alarm source to PLC memory reference %AI5. To do this, type AI5 into the *PLC Location* field. Note that only %AI5 is referenced since the source data type SIGNED WORD requires sixteen bits of storage and each %AI reference is sixteen bits in size.



To complete the entry, press the [Enter] key. The *Scan Rate* field is selected next.



Not all source locations can be specified as simply as in the example above. At times you may only be interested in part of the data stored in a PLC memory location. In other cases you may need to construct a source location for non-consecutive bits of storage in the PLC. In still other cases you may only be interested in a subset of a group of bits of storage in a PLC. To support those situations the following more complicated grammar is supported by the ADS system,

```
<bit reference>       ::= <bit offset> (-<bit offset>)
<reference subset>    ::= [<bit reference> 0(, <bit reference>)]
<PLC memory reference>
::= <PLC memory> <reference> (:<modifier>) (<reference subset>)
<Source location>     ::= <PLC memory reference> 0{; <PLC memory reference>}
```

where <PLC memory>, <reference> and <modifier> are as defined above, <bit offset> is a starting bit position within this location, -<bit offset> is the upper limit of a range of bits, <bit offset> indicates a further bit position and; <PLC memory reference> indicates that multiple locations can be defined.

Source locations are evaluated left to right, building up the required data from the least significant bit to the most significant bit. The total number of bits specified must be less than or equal to the number of bits implied by the source data type. Some examples are given below which should help clarify the grammar.

Assume that you wish to access a WORD of data which is located across the upper byte of %R1 (low byte of WORD) and the lower byte of %R2 (high byte of WORD). This could be accomplished by specifying a source location of

```
R1[8-15];R2[0-7]
```

Assume that there are a set of 16 boolean flags in PLC word memory location %AI6, and you want to access the sixth flag beginning with the least significant bit (bit b5). For this example, assume that you have already specified a source data type of STATE. The source location would be specified as

```
AI6[5].
```

Assume that you are only interested in the lower order twelve bits of PLC word memory location %AQ2; it is possible that the upper four bits are not zero. Also assume that you have already specified a source data type of WORD. The source location would be specified as

```
AQ2[0-12].
```

Assume that you wish to compose a word value where bit b0 is from %M1, bit b1 from %I5, bit b2 is from bit b3 of %R123, bits b3-b5 are from bits b13 through b15 of %R123 and bit b6 is from %T7. In this case you have already specified a source data type of WORD. The source location would be specified as

```
M1;I5;R123[3,13-15];T7.
```

Assume that you wish to access the override indicator for %I12. In this case you would specify a source data type of STATE, and the source location as

```
I12:0
```

Assume that you wish to access the fault indicator for the Genius block configured as block 27 located on bus 1 of the Genius Bus Controller located in slot 5 of rack 1. You would specify a source data type of STATE and a source location of

```
M_15127
```

Assume that you wish to access the PLC state information from the PLC status word. You would specify a source data type of WORD and a source location of

```
PLC_STATUS [12-15]
```

As you can see from the above examples, very complicated source locations may be specified. *When specifying these source locations, you must take care, however, that data values are specified in the correct bit order.* If they are not in the correct order, erroneous data will be gathered and displayed. The ADS system assumes that you are correctly specifying what is really desired, but you must ”tell it” what you actually want.

Scan Rate

The *Scan Rate* field defines the synchronous rate at which the ADS Executor will scan the alarm sources from the PLC defined in the PLC Location field. By default, this field is set to "*", indicating that the data should be gathered at the system default alarm scan rate. For information on the default alarm scan rate, refer to the discussion Modify System Parameters, Default Alarm Scan Rate in Section 1. This setting should be changed only if you want to guarantee a specific alarm scan rate regardless of the default setting. The format for specifying a specific scan rate is given by

```
HH:MM:SS.CC
```

where *HH* refers to hours, *MM* to minutes, *SS* to seconds and *CC* to hundredths of a second. Any time between 00:00:00.01 and 59:59:59.99, inclusive, may be entered. The ADS Executor's basic time element is defined to be 0.25 second; because of this, the ADS Builder will round all times up to the nearest 0.25 second. This means that the fastest rate which can be specified is 00:00:00.25, and the slowest 60:60:60.00.

When specifying a time, the entire specification must be given, not just the significant portion. For instance, to specify an alarm scan rate of 3 seconds, you must enter 00:00:03.00, not just 3 or 3.00. As an example of a scan rate setting, assume that you want the alarm source to be scanned at the system default alarm scan rate. Since the desired setting is the default for the field you do not need to alter the setting. Pressing the [Enter] key completes the entry and selects the next field, *Additional Calculation*.

Additional Calculation

Often data retrieved from the PLC is not in the proper form for use by any part of the ADS system and may need to be converted to a usable format. For example, a counts value might need to be converted to engineering units prior to being used by the ADS system. The *Additional Calculation* field provides a method for doing this. In this field, you can optionally specify one of four different types of calculations.

- *lookup table entry;*
- *translation table entry;*
- *engineering units conversion table entry;*
- *custom translation.*

Only the custom translation calculation will be discussed in detail here; for a discussion of lookup table entries, translation table entries and engineering unit conversion table entries, see *Lookup Table*, *Translation Table* and *Engineering Units Conversion Table* earlier in this chapter. An existing lookup table, translation table or engineering units conversion table entry may be referenced. Multiple calculations may be specified by separating each reference by a space " " (output / input data type matching must be maintained. The <object list> key can be used to obtain a list of existing additional calculations or to create a new one.

A custom translation allows you to apply the formula

```
(A * (Input Value + B) ) + C
```

```
where
    A is the scaling factor
    B is the pre-scaling offset
    C is the post-scaling offset
```

to the data retrieved from the PLC (with the data interpreted according to the Source Data Type field). Note that the formula defined here is the same as defined for

translation table entries. In general, if a given translation is to be used only once it should be defined in the alarm source as a custom translation. If it is to be used multiple times, it is better to define the actual translation only once as a translation table entry and then reference the entry as the additional calculation. The format for defining a custom translation is

(A,B,C)

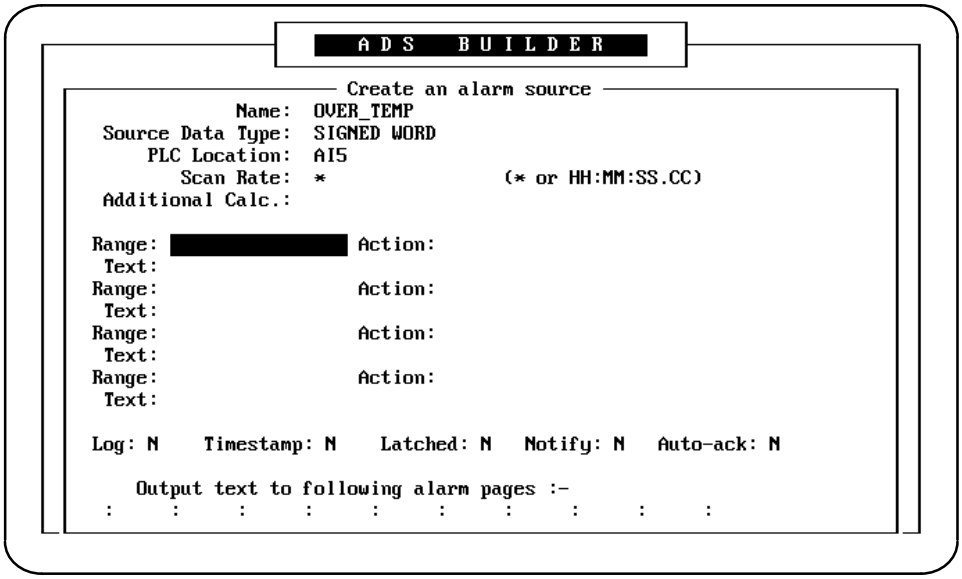
where the parentheses and commas are required parts of the format. The range of data acceptable for each parameter is given in the table below.

Table 8-3. Data Range for a Custom Translation

Parameter	Minimum Value	Maximum Value
A	–100000000	+1000000000
B	–100000000	+1000000000
C	–100000000	+1000000000

(1) Only 7 digits of precision.
(2) Maximum of 6 digits to right of decimal point.

For this example of specifying an additional calculation, assume that you do not need to scale the data being retrieved from the PLC. Since the desired setting is the default for the field, pressing the [Enter] key completes the entry. At this point, the first *Range* field is selected next.



Range

Ranges, along with their associated actions and text, form the heart of the alarm source. When the PLC system is running, the alarm source is checked against the specified ranges, sequencing from top to bottom, with the first range found to include the value triggering an alarm. If the value is not within any specified range (normal condition), no alarm will be triggered. The action (if any) associated with the selected range is then carried out and the text (if any) will be sent to the specified alarm page(s) (if any). Up to

four range / action / text sets may be specified. These four sets correspond to the normal alarm settings of LOW, LOW-LOW, HIGH and HIGH-HIGH.

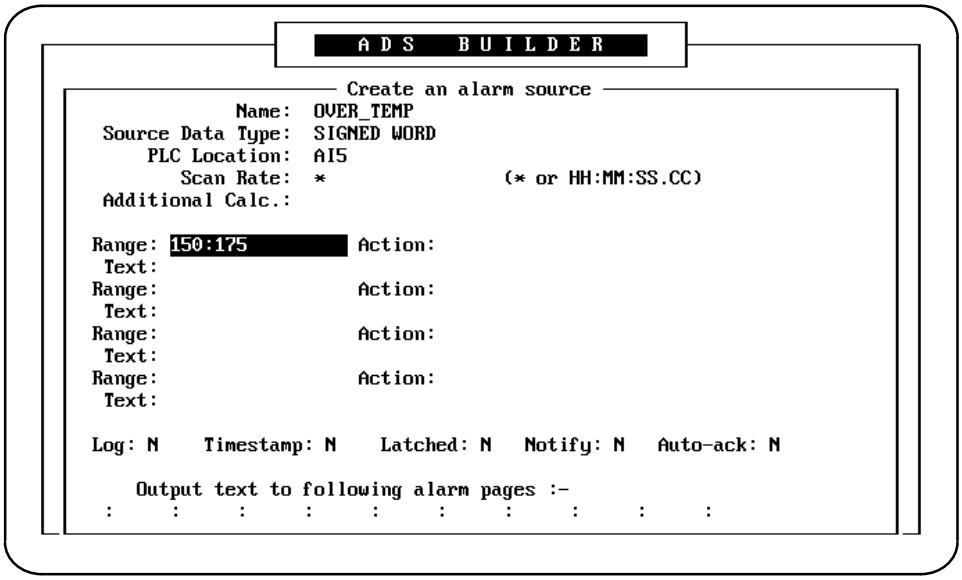
The format for specifying a range is

<I1> {:<I2>}

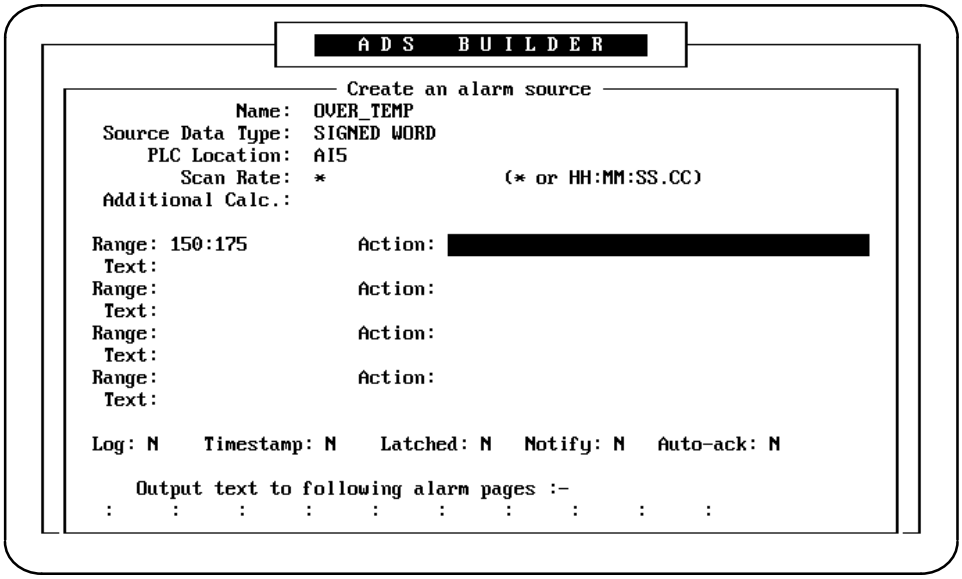
where I1 must be defined and I2 Š I1.

As stated above, a range must agree with the alarm source's assigned source data type. This means, for instance, that only ON and OFF may be used as range designators for alarm sources with an assigned source data type of STATE, and that only numbers in the range -32768 to +32767 may be used with an assigned data type of SIGNED WORD.

In the following example, an alarm is to be triggered whenever the alarm source is within the range of 150:175. To specify that range, type it into the *Range* field.



To complete the entry, press the [Enter] key. The associated *Action* field is selected next.



Action

The *Action* field defines what is to take place whenever its associated range triggers an alarm. This field is optional; if specified, one or more commands from the following table may be specified, and / or one or more command scripts may be specified (multiple commands should be separated by a space character or a semicolon). The <object list> key can be used to obtain a list of existing command scripts or to create a new one. The following tables define the valid commands for use as an alarm action. See "Command Scripts" in Chapter 3, Section 7, for details on individual commands.

Table 8-4. Get PLC Data

Action	Description
PLCGETB(loc[1])	Get a STATE value from location loc.
PLCGETBY(loc[1])	Get a BYTE value from location loc.
PLCGETW(loc[1])	Get an UNSIGNED WORD value from location loc.
PLCGETI(loc[1])	Get a SIGNED WORD value from location loc.
PLCGETL(loc[1])	Get an UNSIGNED LONGWORD value from location loc.
PLCGETS(loc[1])	Get a SIGNED LONGWORD value from location loc.
PLCGETF(loc[1])	Get a FLOATING POINT value from location loc.

[1] The syntax for specifying the loc reference is the same as for specifying a PLC data source location (refer to PLC Data Sources for details), *except* that the references must be consecutive within the same PLC memory type. For example, PLCGETW(R1) and PLCGETW(R1[1,9]) are valid, but PLCGETW(R1[1];R2[5-9]) and PLCGETW(R1[0-14];Q1) are not.

Table 8-5. Set PLC Data

Action	Description
PLCSETB(l[1], v[2], p[3], c[4], mn[5], mx[5])	Set location 1 to STATE value v (or prompt if no v).
PLCSETBY(l[1], v[2], p[3], c[4], mn[5], mx[5])	Set location 1 to UNSIGNED BYTE value v (or prompt if no v).
PLCSETW(l[1], v[2], p[3], c[4], mn[5], mx[5])	Set location 1 to UNSIGNED WORD value v (or prompt if no v).
PLCSETI(l[1], v[2], p[3], c[4], mn[5], mx[5])	Set location 1 to SIGNED WORD value v (or prompt if no v).
PLCSETL(l[1], v[2], p[3], c[4], mn[5], mx[5])	Set location 1 to UNSIGNED LONGWORD value v (or prompt if no v).
PLCSETS(l[1], v[2], p[3], c[4], mn[5], mx[5])	Set location 1 to SIGNED LONGWORD value v (or prompt if no v).
PLCSETF(l[1], v[2], p[3], c[4], mn[5], mx[5])	Set location 1 to FLOATING POINT value v (or prompt if no v).

[1] The syntax for specifying the loc reference is the same as for specifying a PLC data source location (refer to PLC Data Sources for details), *except* that the references must be consecutive within the same PLC memory type. For example, PLCGETW(R1) and PLCGETW(R1[1,9]) are valid, but PLCSETW(R1[1];R2[5-9]) and PLCSETW(R1[0-14];Q1) are not.

[2] If no value parameter is specified a prompt will appear on the terminal's display line asking you to input a value. STATE values are specified as 0 for OFF and 1 for ON.

[3] An optional 1-19 character prompt may be specified; any alphanumeric character plus ":".

[4] An additional calculation may be optionally specified; the additional calculation may be either a translation table entry, a lookup table entry or an engineering units conversion table entry.

[5] Min / Max bounding of the user's entry for value v may be optionally specified.

Table 8-6. Screen Commands

Action	Description
SCREEN([n][1])	Remove all screens and go to screen n.
PSHSCN([n[1][,r,c]])	Overlay screen n at optionally specified row and column positions r and c.
POPSCN([n][1])	Remove last screen overlaid, or all down to and including n.
REMSCN([n][2])	Remove last screen overlaid, or *only* n.

[1] If n = 0 a prompt will appear on the terminal's display line asking you to specify the screen / alarm page to be selected.

[2] If n = 0 only the most recently pushed screen / alarm page will be removed from the terminal display.

Table 8-7. Alarm Page Commands

Action	Description
ALARM([n][3])	Remove all alarm pages and overlay n.
PSHALM([n][1])	Overlay alarm page n.
POPALM([n][2])	Remove last alarm page overlaid, or all down to and including n.
REMALM([n][2])	Remove last alarm page overlaid, or *only* n.
CLRALM()	Remove all currently displayed alarm pages.

[1] If n = 0 a prompt will appear on the terminal's display line asking you to specify the screen / alarm page to be selected.

[2] If n = 0 only the most recently pushed screen / alarm page will be removed from the terminal display.

[3] If n = 0 all alarm pages will be removed from the screen and no new alarm page will be displayed.

Table 8-8. Alarm Source Related Commands

Action	Description
ACTION_OFF()	Disable actions associated with alarms.
ACTION_ON()	Enable actions associated with alarms.
ACK_ALARM()	Acknowledges all alarms in system.
ACK_ALARM(<page number>)	Acknowledges all alarms on a page.
ACK_ALARM(<alarm source>)	Acknowledges a particular alarm.

Table 8-9. Option Module Access Commands

Action	Description
PLC_FAULT([f,b])	Display the PLC Fault table screen with optionally specified foreground and background colors f and b.
IO_FAULT([f,b])	Display the I/O Fault table screen with optionally specified foreground and background colors f and b.
SETUP_LOOP([f,b])	Display the PID Loop Setup screen with optionally specified foreground and background colors f and b.
CONFIGURE_LOOP([f,b])	Display the PID Loop Configure screen with optionally specified foreground and background colors f and b.
MONITOR_LOOP([f,b])	Display the PID Loop Monitor screen with optionally specified foreground and background colors f and b.
TUNE_LOOP([f,b])	Display the PID Loop Tuning screen with optionally specified foreground and background colors f and b.

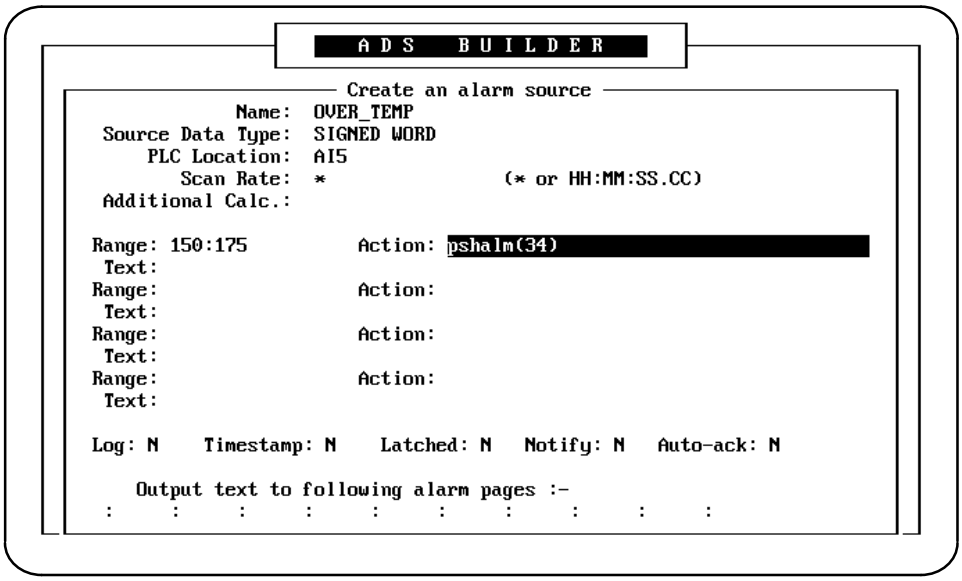
Table 8-10. Dynamic Object Related Commands

Action	Description
ATTACH(n,o,[d,c])	Attach dynamic object o (on screen n) to (optionally) PLC data source d using (optionally) new calculation c.
DYN_EDIT(n,o,v)	Enter edit mode for dynamic object o on screen n using video highlight v to indicate editing mode.
SCN_EDIT(n,v)	Enter edit mode for all editable dynamic objects on screen n using video highlight v to indicate editing mode for object.
WAIT_DATA(n,o)	Pause until data next scanned for dynamic object o on screen n.

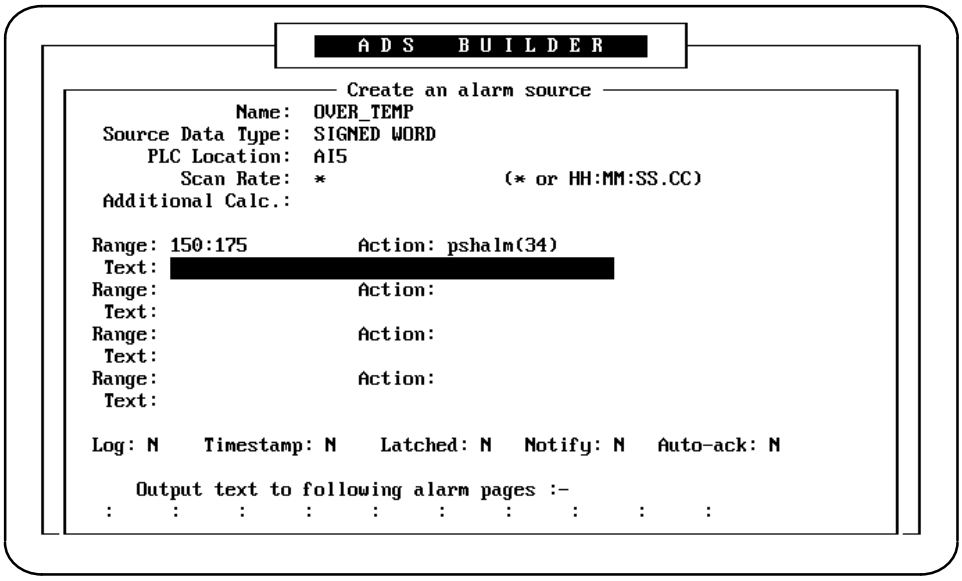
Table 8-11. Miscellaneous Commands

Action	Description
LOGTTM(x)	Log message x to message line on screen.
LOGMES(x)	Log message x to attached printer and to message line on screen.
REPORT([n])	Output report n to the attached printer.
HELP([n])	Overlay help screen indexed by n.
TTDUMP( )	Output the terminal's screen to the attached printer.
REFRSH( )	Clear and rewrite the screen.
PORTW(p,t)	Output text string to port.
EXIT( )	Exit the ADS system.

As an example of defining an alarm action, assume that you want to overlay alarm page 34 on the terminal whenever an alarm is triggered by a value within the range 150:175.



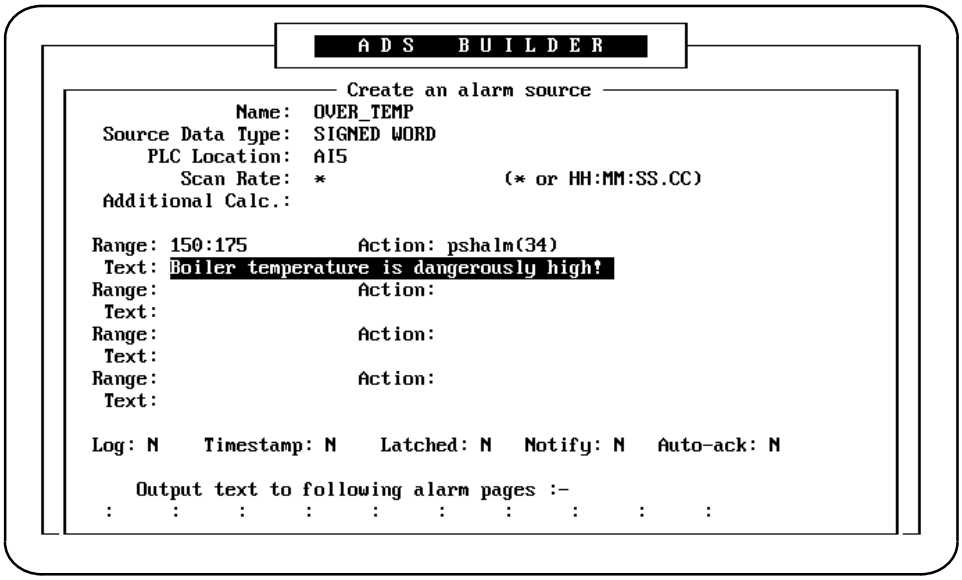
After entering the action definition, press the [Enter] key to complete the entry. The associated *Text* field is selected next.



Text

The *Text* field associated with a given range defines the text which will be displayed on any alarm page (see Output Text to Alarm Page(s) later in this section) to which the alarm is sent. The field is optional; if used the text may consist of from 1 to 40 printable ASCII characters.

Continuing with our example, assume that the text string ”Boiler temperature is dangerously high!” is to be displayed when the alarm condition is detected. Type the text string into the *Text* field.

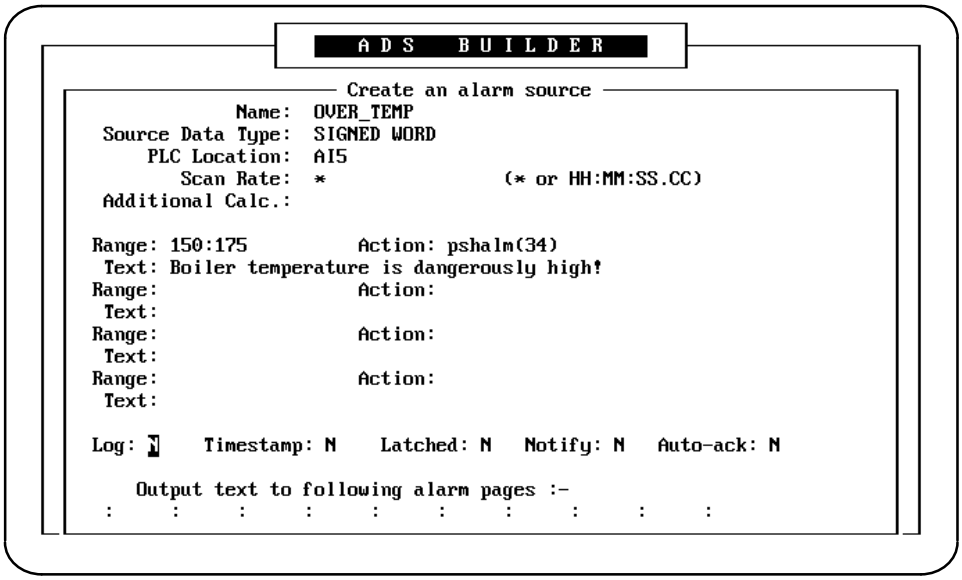


To complete the text entry, press the [Enter] key. Note that the second *Range* field is selected next. You may define additional alarm triggers or press the [Enter] key to skip over the remaining alarm trigger fields.

Log to Printer

The *Log to Printer* field is used to indicate whether the text defined in the *Text* field above, along with the alarm's timestamp if requested should be displayed on the printer. The default setting is to NOT log the alarm to the printer.

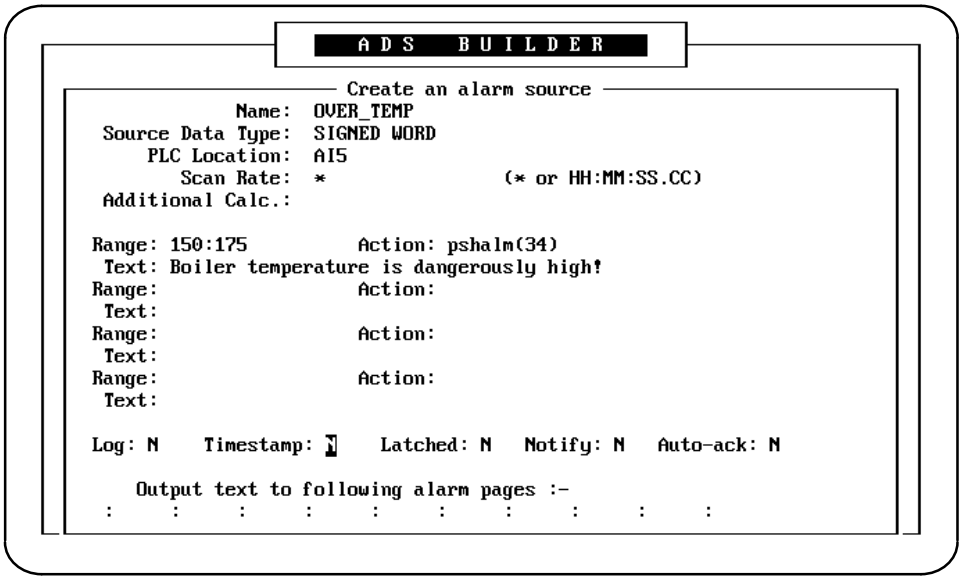
Pressing the [Enter] key with the fourth *Text* field selected in turn selects the *Log to Printer* field.



If you want to log the alarm to a printer, type Y, if you do not want to log the alarm to a printer, pressing the [Enter] key accepts the default choice of N. The *Timestamp* field is selected next.

Timestamp

This option allows you to specify whether or not an alarm is timestamped with the date and time that it occurred. This feature is useful if you want to display or print the alarm. By default the ADS Executor will NOT timestamp an alarm.



For example, if you want the ADS Executor to timestamp the alarm whenever it occurs, type Y into the *Timestamp* field and press the [Enter] key. If you want to accept the default of N, just press the [Enter] key. In either case, pressing the [Enter] key completes the entry. The *Latched* field is selected next.

Latched

Alarms may be defined to trigger whenever there is a transition into a given alarm state (range) or only whenever there is such a transition AND the alarm is not currently logged and unacknowledged. In the former case the alarm is said to be unlatched; in the latter case, it is said to be latched.

If the *Latched* field is set to N, an alarm will trigger every time there is a transition into an alarm state as defined by a given range. If the field is set to Y, an alarm will trigger only when both of the following conditions are met:

- *A range in this alarm source is transitionally satisfied.*
- *An unacknowledged occurrence of this alarm does not already exist.*

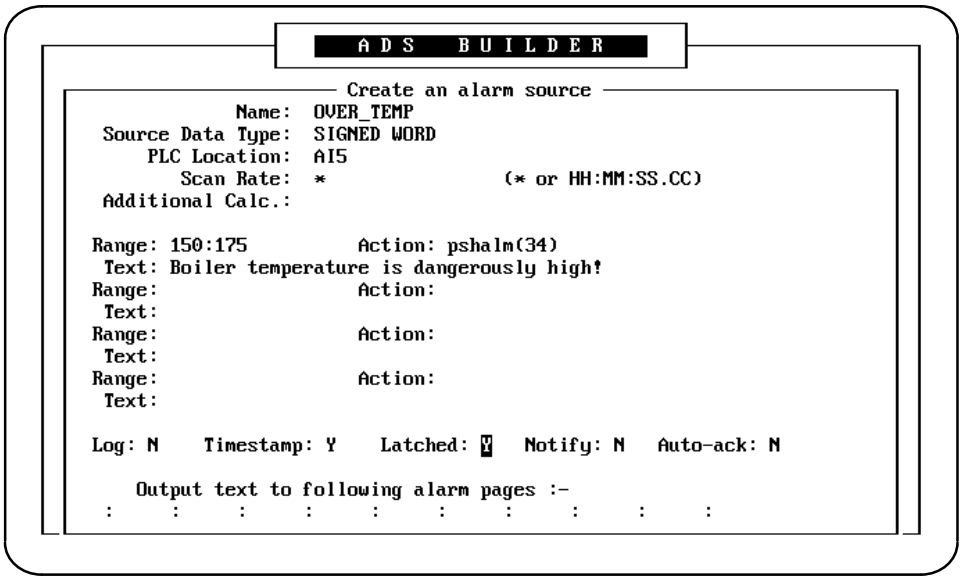
Assigning an alarm source the attribute of latched is particularly useful when the source has a tendency to wander in and out of an alarm condition at a high frequency. An alarm source of this type, if not latched, can cause a great number of occurrences to be logged in the system which differ only by a short amount of time. Associated alarm pages and printer output can become saturated with information about what is actually a single condition. However, if it is important to log EVERY occurrence of a particular alarm, then the alarm source should not be latched.

By default, all alarm sources are unlatched.

Latching an alarm source only has an effect if there are alarm pages associated with the alarm source (refer to Output Text to Alarm Page(s), below). If no alarm pages are

associated with the alarm source, there is no way for an operator to acknowledge the alarm condition. Therefore, if there is no alarm page associated with the alarm source the alarm condition is considered to have been automatically acknowledged when it occurs. This makes the latched and unlatched conditions equivalent when alarm pages are not used.

The default N is selected in the Latched field. If you want to latch this alarm source Type Y into the *Latched* field.



Pressing the [Enter] key completes the entry and selects the *Notify* field.

Notify

The *Notify* field is used to indicate whether the text defined in the *Text* field, as described above, should be displayed on the terminal's status line. The default setting is to NOT display the alarm on the terminal's status line.

It is important to note that many messages are written to the terminal's status line during normal operation. While displaying the alarm text on the status line can help warn the operator of some condition, it should NOT be selected as the ONLY means of providing such a warning.

Assume that you do not want to be notified of the alarm on the terminal's status line when the alarm is triggered. Pressing the [Enter] key accepts the default choice of not notifying the operator via the status line and selects the *Auto-ack field.*

Auto Acknowledge

The *Auto Acknowledge* field is used to indicate whether or not an alarm should automatically acknowledge itself without operator intervention. The default setting is to NOT automatically acknowledge the alarm. You would want to specify auto acknowledgement for any alarm text you would want to see in an alarm page *only* when the source was still in alarm. Setting this field to "Y" will cause the alarm text to be removed from the alarm page as soon as the alarm condition is cleared. To accept the default setting of "N", press the [Enter] key. Note that the first *Output Text to Alarm Pages(s)* is selected next.

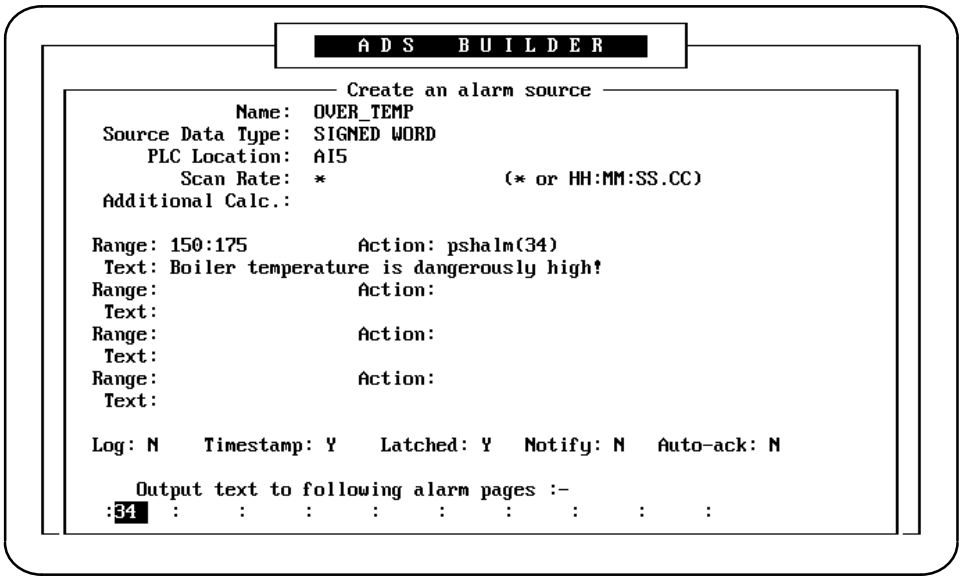
Output Text to Following Alarm Page(s)

The *Output Text to Following Alarm Page(s)* field are used to specify up to ten different alarm pages to which the text defined in the *Text* field above, along with the alarm's timestamp if requested, should be logged. If you intend to view and optionally acknowledge alarms, at least one alarm page should be specified. Multiple alarm page specifications are useful if you want to categorize an alarm in multiple ways (e.g. plant area alarm occurred in, priority of alarm, etc.); otherwise, a single alarm page specification is sufficient.

Note

It is important to remember that you must have previously created any alarm page that is specified on the Output text to Alarm Pages(s).

As an example of specifying an alarm page to which text is to be output, assume that you want to log the occurrence of this alarm to alarm page 34. Type the alarm page number into the current field.



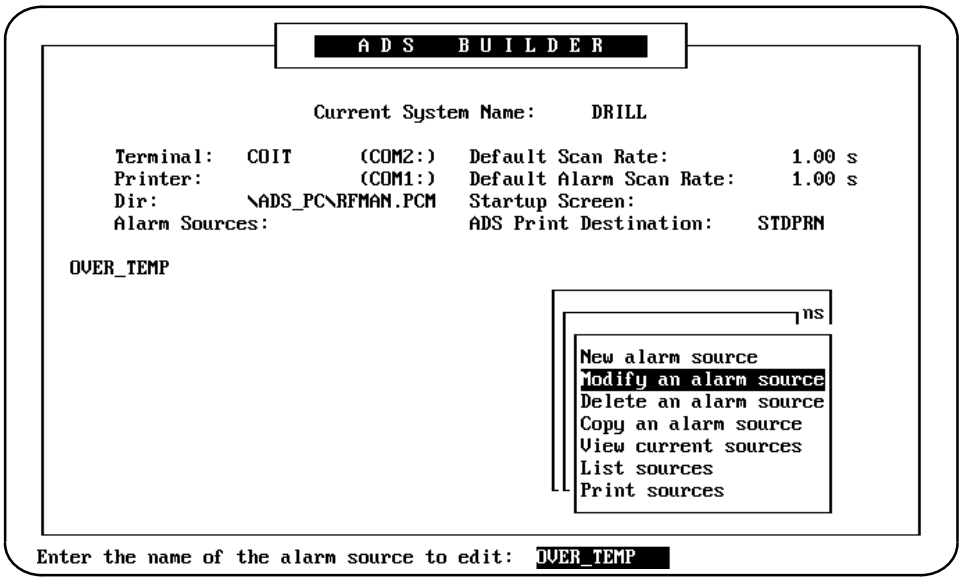
Pressing the <Save> key at this point completes the entry of the alarm source. You are returned to the menu page along with an informative message displayed on the status line indicating that the alarm source creation is complete.

Modify an Alarm Source

An existing alarm source may be modified in much the same manner in which it was originally created. All information concerning the alarm source may be changed except its name. Changing the name of an alarm source requires you to first delete it and then recreate it with the new name.

To initiate an alarm source modification, first select the Modify an alarm source menu option, either by cursoring to that option on the menu and then pressing the [Enter] key, or by pressing the [M] key. The ADS Builder will prompt the user for the name of the alarm source to be modified. Only existing alarm sources may be modified; the New alarm source menu option must be used in order to create a new alarm source.

In the following example, assume that you want to modify the alarm source OVER_TEMP. Type the alarm source name into the prompt field.



When the [Enter] key is pressed, the form for the specified alarm source is displayed with the *Source Data Type* field initially selected.

You can now proceed to change any of the fields (except the *Name* field. Pressing the [Enter] key with the tenth *Output Text to Alarm Page(s)* field selected or pressing the <Save> key from any field completes the modification. You are returned to the menu page with an informative message displayed on the status line indicating that the modification was completed.

If you want to cancel the modification, disregarding any changes which have been made, press the <Quit> key. An informative message is displayed on the status line indicating that no changes were made to the alarm source.

If you specify an alarm source which does not currently exist, you will be returned to the menu page with the message

`Invalid alarm source specified`

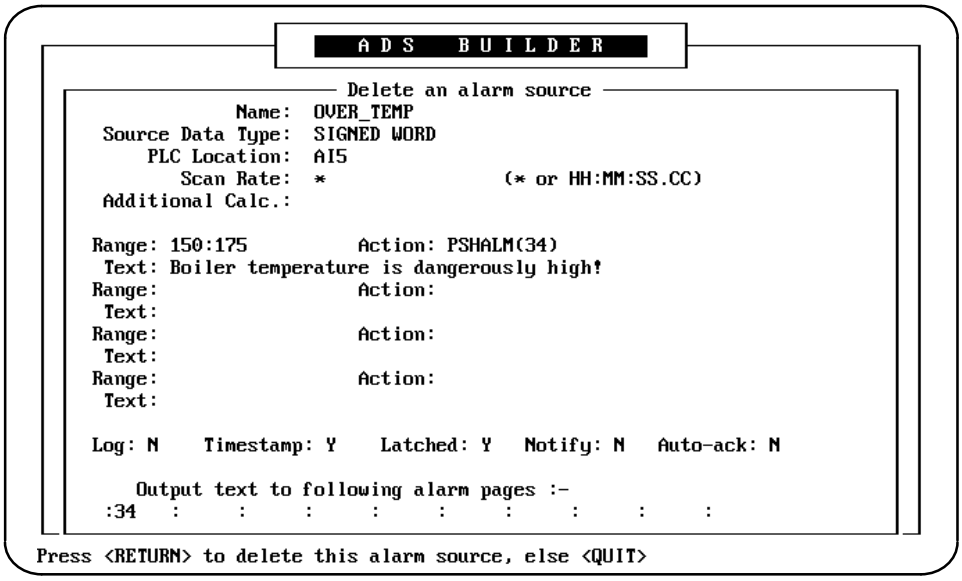
displayed on the status line.

Delete an Alarm Source

An alarm source may be (irrecoverably) removed from a system by deleting it. To initiate an alarm source deletion, first select the Delete an alarm source menu option, either by cursoring to that option on the menu and then pressing the [Enter] key, or by pressing the [D] key. The ADS Builder will prompt you for the name of the alarm source to be deleted.

In this example, assume that you want to delete alarm source named OVER_TEMP. Type the alarm source name into the prompt field.

When the [Enter] key is pressed, the current form for the designated alarm source is displayed on the screen along with a prompt on the status line asking you to confirm the delete.



If the [Enter] key is pressed at this point, the alarm source will be deleted from the system. Upon deletion of the alarm source you are returned to the menu page with an informative message displayed on the status line indicating that the deletion was completed.

If you press the <Quit> key indicating that the alarm source deletion should be canceled, you will be returned to the menu page (no message will be displayed to indicate that the deletion was canceled). If you should specify an alarm source which does not currently exist, you will be returned to the menu page with the message

Invalid alarm source specified

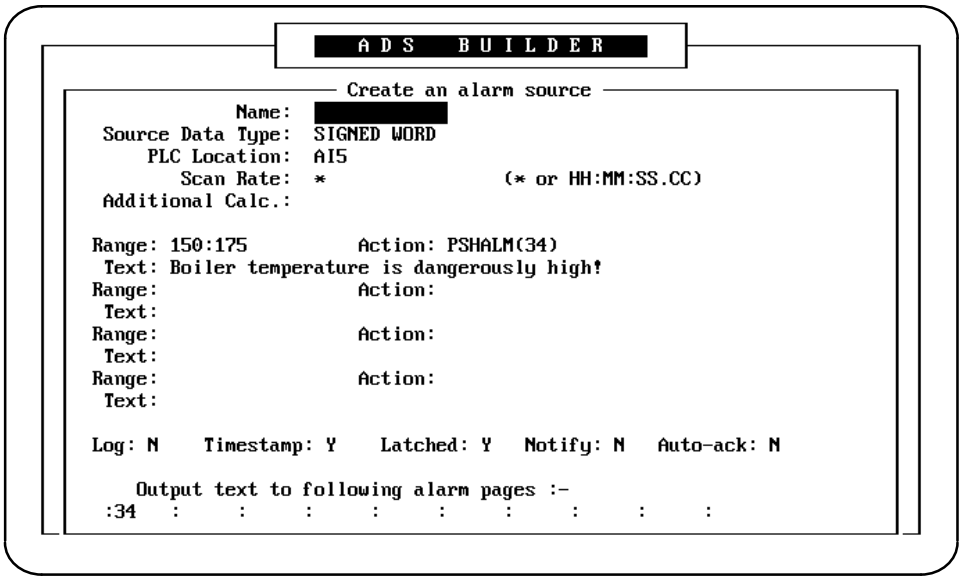
displayed on the status line.

Copy an Alarm Source

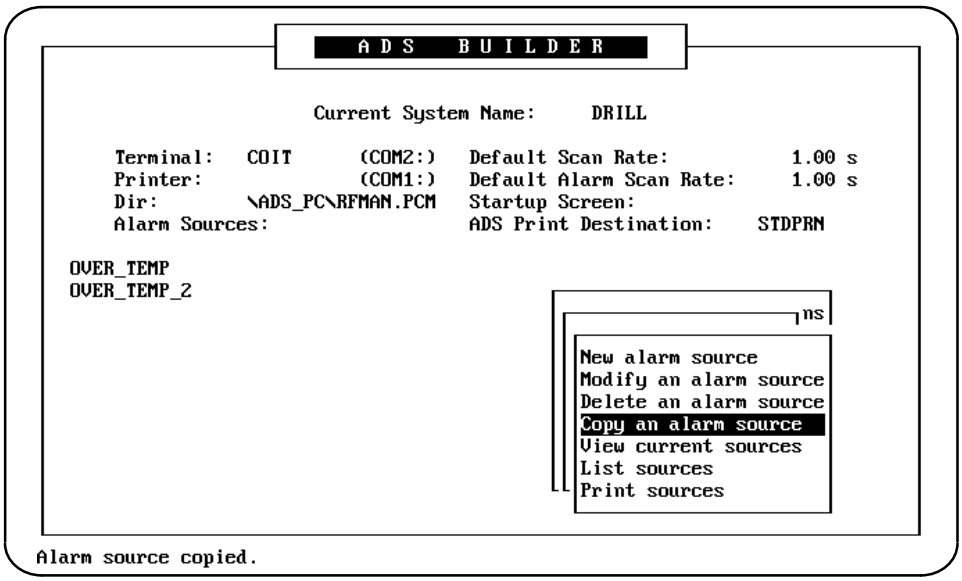
A new alarm source may be created by making a copy of an existing source. During the copy process any of the alarm source definition may be altered. At a minimum, a unique name must be given to the copied alarm source to distinguish it from the original.

To initiate an alarm source copy, first select the Copy an alarm source menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [C] key. The ADS Builder will prompt you for the name of the alarm source to be copied.

In this example, assume that you want to create a new alarm source which is a copy of existing alarm source OVER_TEMP. Type the name of the existing alarm source into the prompt field. Upon pressing the [Enter] key a data entry window is opened which is identical to the one used for creating a new data source. The form is initialized with the information from the existing alarm source OVER_TEMP's form, except that the name field is blank and selected for entry.

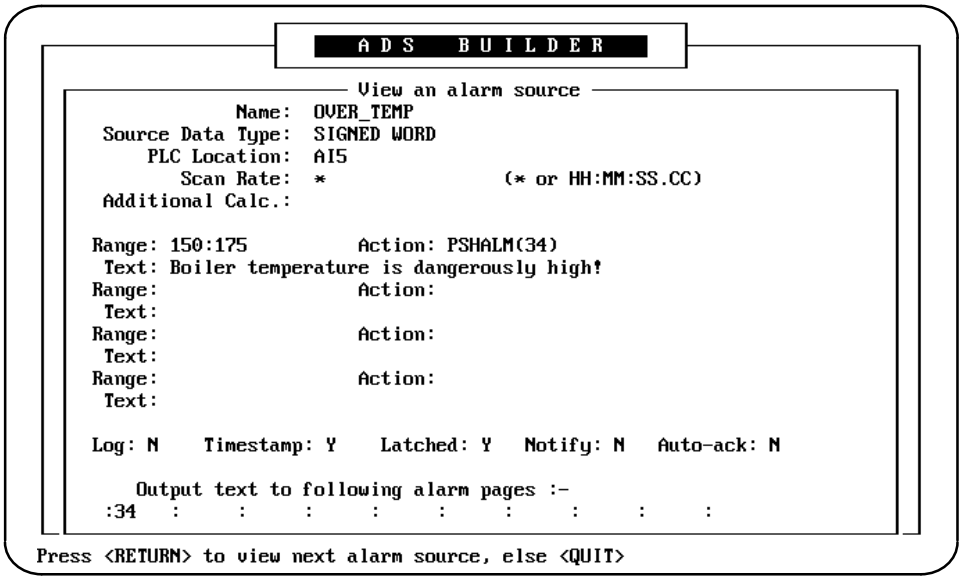


After assigning a name to the new alarm source and making any modifications required to its definition, press the <Save> key to complete the copy. You are then returned to the menu page with an informative message displayed on the status line indicating that the copy operation is complete. Also, the listing of alarm source names is updated to reflect the addition of the new alarm source, which for this example, is OVER_TEMP_2.

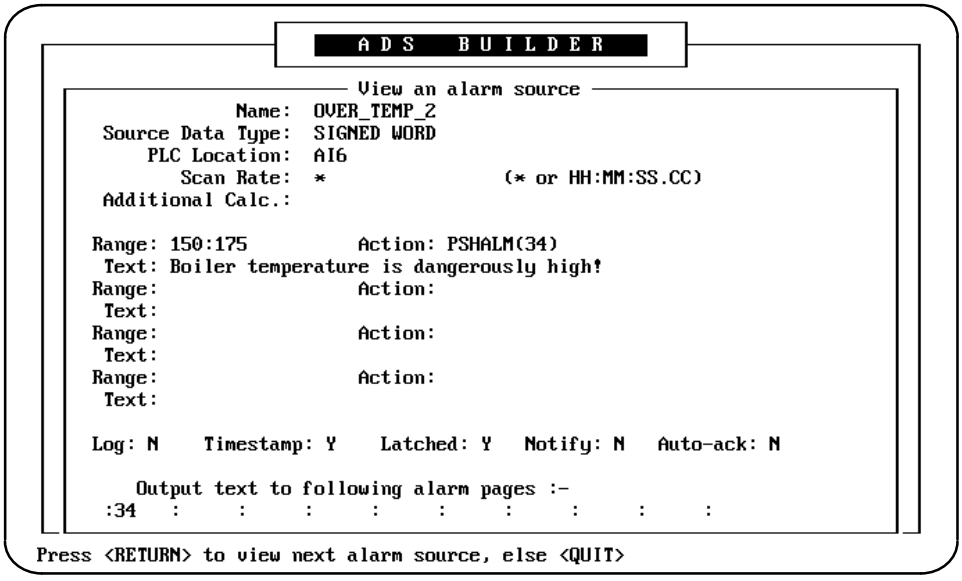


View Current Sources

The ADS system allows you to view all the existing alarm sources in a system, one at a time, in alphabetical order. To initiate the viewing of a system's alarm sources, first select the View current sources menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [V] key. In this example sequence, two alarm sources are currently defined in the system: OVER_TEMP and OVER_TEMP_2. When the [Enter] key is pressed, the form for the first alarm source in the list (OVER_TEMP) is displayed along with a prompt on the status line giving you the choice of viewing the next alarm source in the list or of quitting the view function.



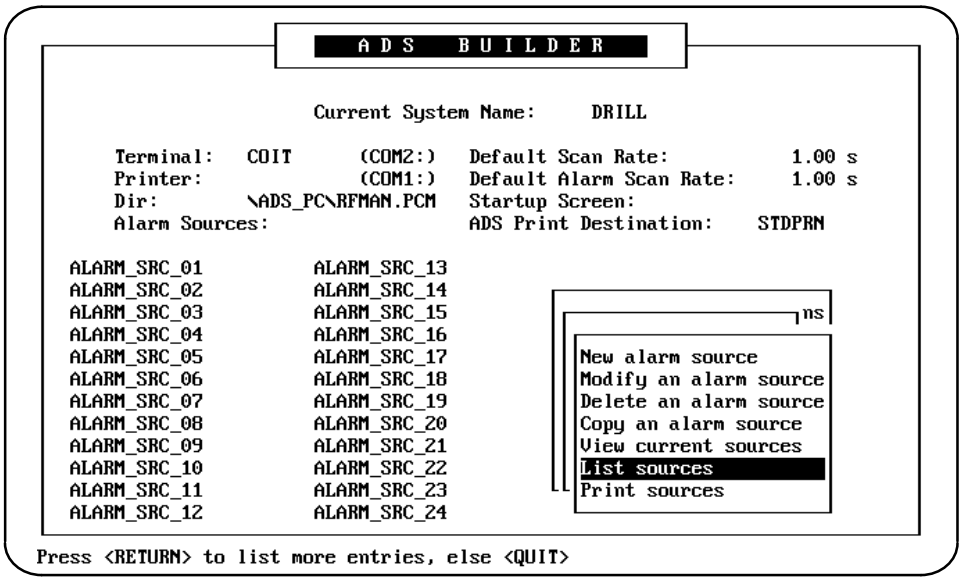
Pressing the [Enter] key at this point will display the next alarm source in the list, OVER_TEMP_2.



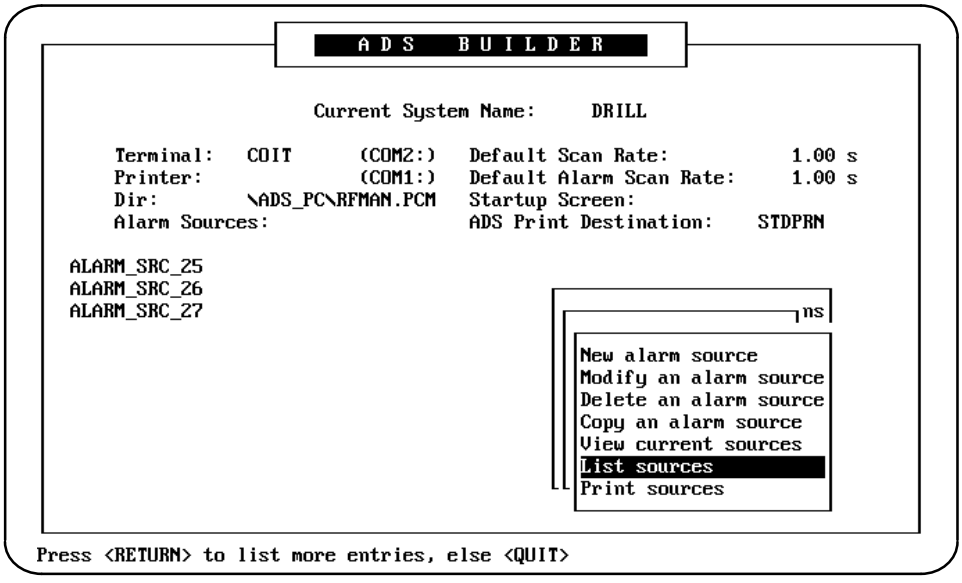
Pressing the [Enter] key again will return you to the menu page since OVER_TEMP_2 is the last alarm source in the list.

List Sources

A list of alarm source names is maintained in alphabetical order on the left side of the screen. The ADS system lets you page through the total list of alarm source names. To initiate listing a system's alarm sources, first select the List sources menu option, by cursoring to that option and upon pressing the [Enter] key, the first (listed alphabetically) group of alarm source names is displayed along with a prompt on the status line giving you the choice of listing the next group of alarm source names or of quitting the list function.



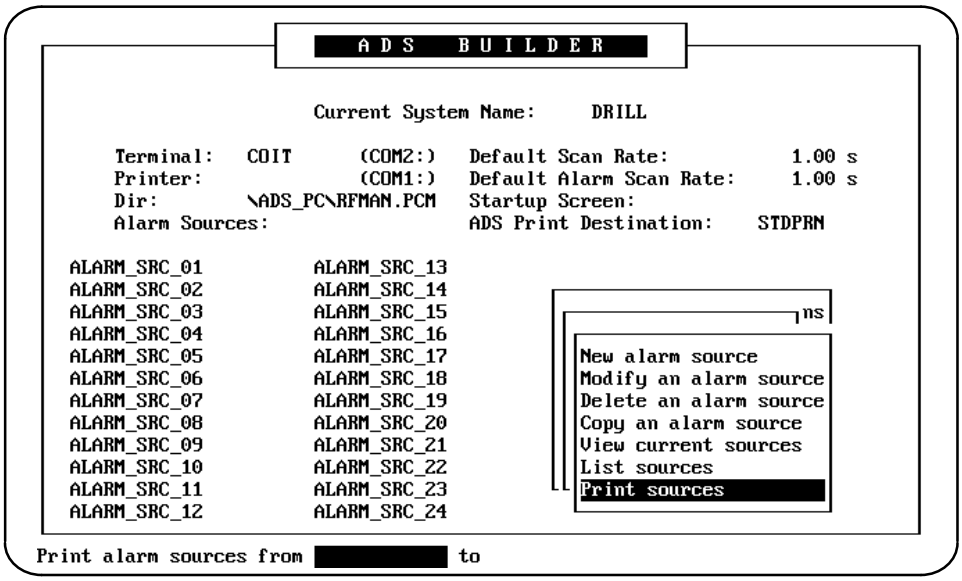
Pressing the [Enter] key at this point will display the remaining thirteen alarm source names.



Pressing the <Quit> key exits the list operation. The alarm source names currently displayed on the screen will remain displayed.

Print Sources

The Print sources option allows the details of the defined alarm sources to be printed on an attached printer. When running the ADC version of the ADS Builder, access to the Print options is only available if the ADS Print Module and Spooler are installed. To initiate a print of the defined alarm sources, select the Print sources option by either cursoring to the option and pressing the [Enter] key, or by pressing the [P] key.



A prompt is displayed at the bottom of the screen.

```
Print alarm source details from ################ to ################
```

Depending upon the response entered into the from and to field, several different listings can be generated. The listing options are as shown below.

```
from  = "<id1>"   to  = "<id2>"   -->  print out alarm sources id1 to id2
from  = "<id1>"   to  = ""        -->  print out alarm source id1
from  = ""        to  = "<id2>"   -->  print out alarm source id2
from  = "*"       to  = "<id2>"   -->  print out all alarm sources up to id2
from  = "<id1>"   to  = "*"       -->  print out all alarm sources from il1
from  = "*"       to  = ""        -->  print out all alarm sources
from  = ""        to  = "*"       -->  print out all alarm sources
from  = "*"       to  = "*"       -->  print out all alarm sources
```

Pressing the <Quit> key aborts the print operation. After selection of the required range of alarm sources to be printed, the ADS Builder sends the information to the Print Destination specified using the Print Destination option (see Load / Save Operations, Chapter 9).

Alarm source detail information is formatted as shown in the following examples:

```
          ALARM SOURCE LISTING
          --------------------

Alarm Source : TANK_&_LEVEL         Data Type : WORD
                                     Location : R41
                                    Scan Rate : *
                                Additional Calc :

                            Alarm Pages : 1

                                  Flags : Print Notify Timestamp

      Range : 100:200             Text : TANK 7 LEVEL IS HIGH
                                 Action :

      Range : 201:300             Text : TANK 7 LEVEL IS VERY HIGH
                                 Action :

      Range : 301:500             Text : TANK 7 LEVEL IS CRITICAL - URGENT ACTION
                                 Action : PSHALM(1)

      Range :                     Text :
                                 Action :
```

Error Messages for Alarm Sources

Error messages and their causes for alarm sources are listed below.

Bit specifications not allowed on location

Bit specification is not allowed for the specified source location.

Conversion error - invalid time format entered

The scan rate must be specified as either * or HH.MM.SS.CC.

ENTRY ERROR :: Alarm source name not unique

Two alarm sources may not have the same name.

ENTRY ERROR :: Invalid Additional calculation specified

The referenced additional calculation does not exist.

ENTRY ERROR :: Invalid Alarm page number specified

An alarm page must exist prior to being referenced as a destination for logging an alarm.

ENTRY ERROR (#n) - Invalid item XXXX

The action command ”XXXX” specified for alarm page number ”n” is unknown.

ENTRY ERROR :: No Alarm source name

A name must be specified.

Error parsing bit specification

A bit offset has been specified that exceeds the number of bits provided for by the source data type.

Failed to find the specified location type

Anunsupported / incorrect source location has been specified.

Failed to match input data type for XXXX

The input data type for the referenced additional calculation does not match the data type specified as the source data type.

Too many bits for data type

The PLC location specified requires more storage space (bits) than provided for by the specified source data type.

Note

See Chapter 3, Section 7, Command Scripts, for a list of error messages pertaining to particular commands.

Chapter 9 Load/Save Operations

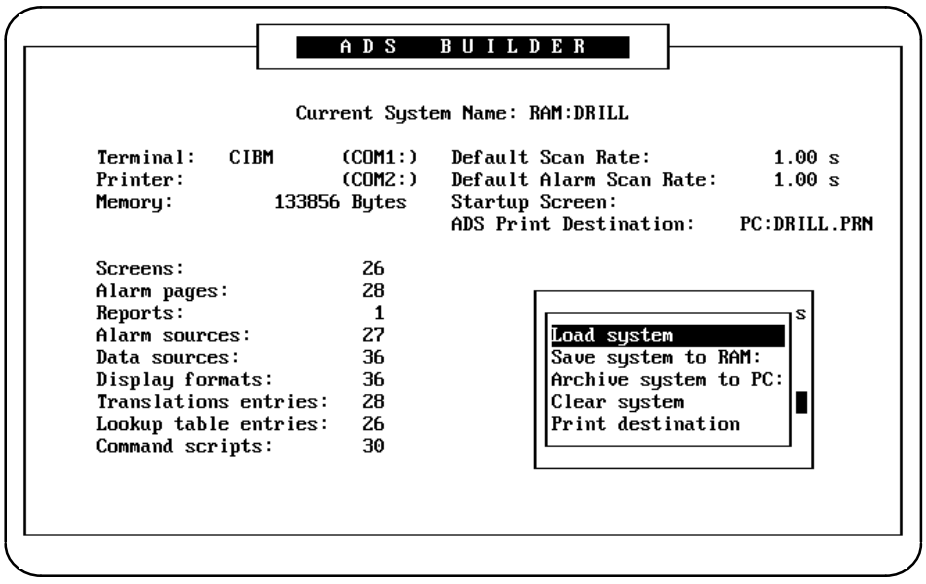
There are two versions of the *Load/Save operations* submenu. The version displayed depends on whether you are using the ADC-based or the PC-based Builder version of software.

When the *Load/Save operations* submenu is selected, the following screen is displayed. Another menu window is opened on the screen, giving the additional options of

- *Load system*
- *Save system to RAM*
- *Archive system to PC*
- *Clear system*
- *Print destination*

The PC-based Builder differs from the ADC-based Builder in that it does not support the "Save System to RAM:" option and it has additional options "Modify Current Directory", "Refresh system in RAM" and Execute system in RAM". Also the third entry listed above, Archive system to PC:, is labeled Save to Disk on the PC-based Builder's Load / Save operations submenu.

Each of the options listed above is described in the following pages.



An ADS system consists of a series of files which store information regarding system parameters, alarm definitions, screens and reports. At a minimum, every system consists of at least two files:

<system>.CFG - system configuration parameters
<system>.ALM - alarm definitions

The .CFG file contains everything defined for a system except the alarm definitions, screens and reports. This includes the system parameters (system scan rate, printer definition, etc.), PLC data sources, display formats, translation table entries, lookup table entries and command scripts. The size of this file will vary with the number and type of objects which have been defined.

The .ALM file contains all alarm source and alarm page definitions. The size of this file will vary with the number of alarm sources and alarm pages which have been defined; it will be created even if no alarm sources or alarm pages have been defined.

For every screen that you create, a file

<system><number>.SCN - screen definition

is created (where <number> is the screen number that you assigned when the screen was created). A screen file contains the static text and attributes for the screen, definitions for the dynamic objects appearing on the screen and the function key assignments for the screen (also touch screen assignments for touch terminals).

For every report that you create, a file

<system><number>.REP - report definition

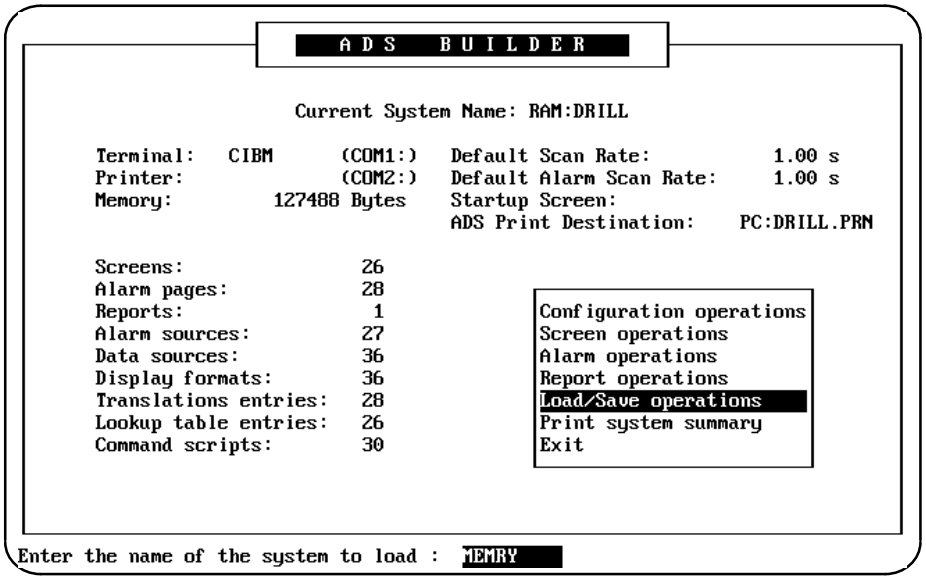
is created (where <number> is the report number that you assigned when the report was created). A report file contains the static text for the screen as well as definitions for the dynamic objects appearing on the report.

Section 1: Load System

An existing system may be loaded into the ADS Builder from either the ADCs RAM: disk or from the PC: disk (currently selected folder on an attached computer running TERMF).

To initiate the loading of a new system into the ADS Builder first select the Load System menu option, either by cursoring to that option on the menu and then pressing the [Enter] key, or by pressing the [L] key.

When Load system option is selected, the ADS Builder will prompt you for the name of the system to be loaded. In this example, assume that you want to load the system named MEMRY into the ADS Builder. Simply type the desired system name into the prompt field.



When the ADS Builder looks for a new system to load, and you have not told the system where it is to be found, the ADS Builder first checks the RAM: disk on the ADC. If the system is found there, it is loaded into the ADS Builder. If the system is not found on the RAM: disk the ADS Builder will next check the PC: disk. As mentioned previously, you must have selected the appropriate folder containing the desired system and be running TERMF prior to accessing the PC: disk.

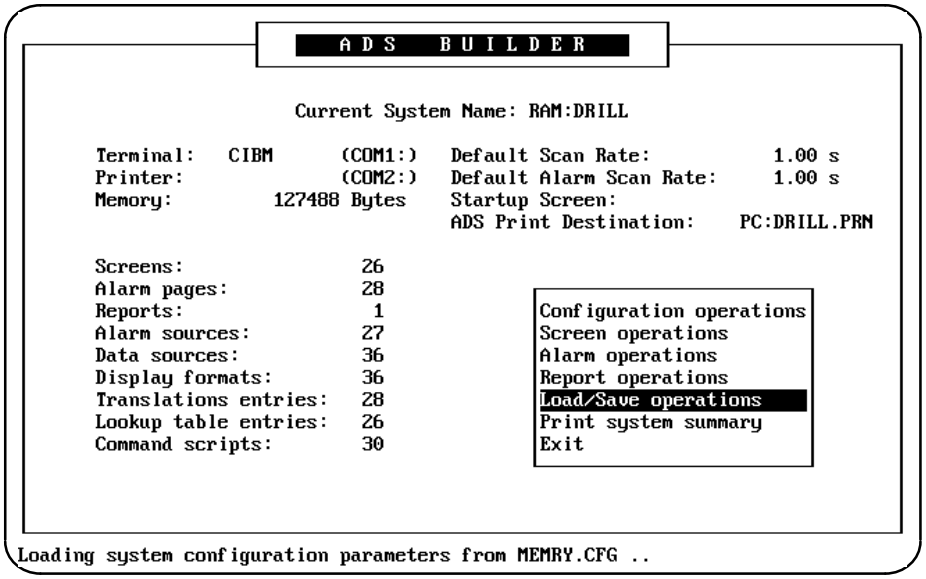
If the specified system is not found on either the RAM: or PC: disk, the error message

`Error reading system configuration file PC:<system name>.CFG`

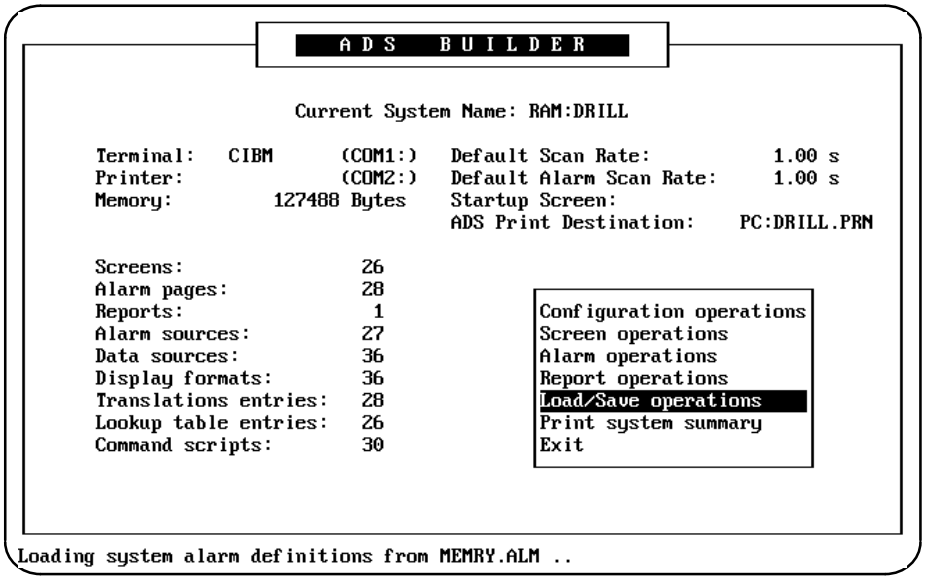
will be displayed on the prompt/message line (where <system name> is the name of the system requested to be loaded); the system name will be set to the reserved empty system named NULL.

You can explicitly indicate where the ADS Builder is to look for the system by prefacing the system name with *RAM:* if the system is located on the RAM: drive or by prefacing the system name with *PC:* if the system is located on the PC: disk (see statement above concerning the PC: disk).

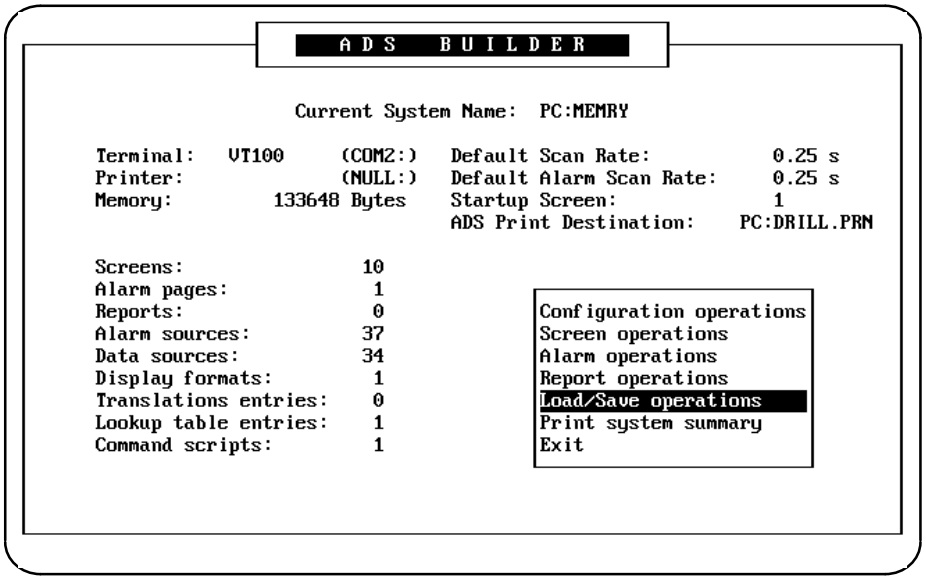
The following example screens show the sequence of loading a system. When the [Enter] key is pressed, the specified system named MEMRY is located on the PC: disk. A message is displayed on the prompt / message line indicating that the system configuration file MEMRY.CFG is being loaded into the ADS Builder .



Next, a message is displayed on the prompt / message line indicating that the alarm definition file MEMRY.ALM is being loaded into the ADS Builder.



When the system load has been successfully completed, the screen status information is updated to reflect the system just loaded.

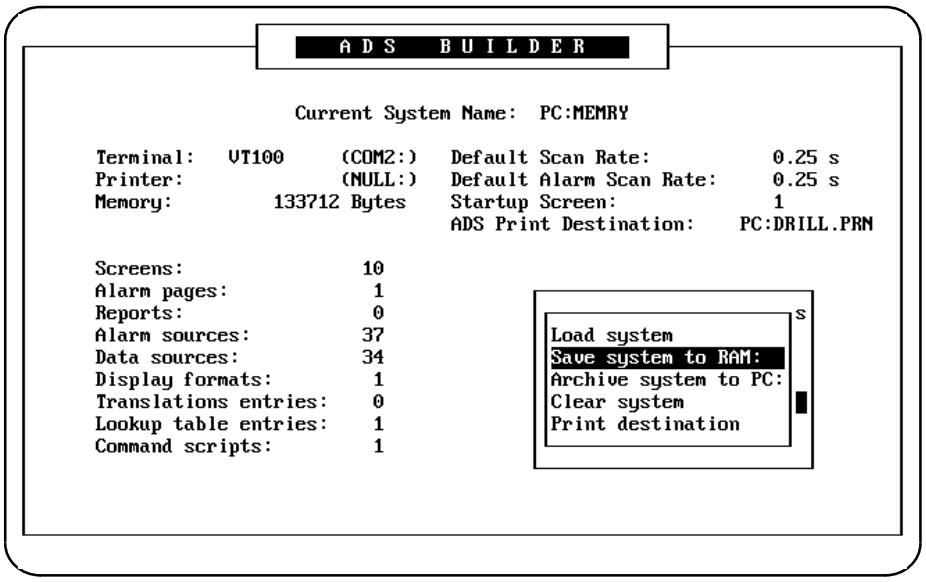


At this point only the system configuration parameters and alarm definitions files are actually loaded. The associated screen and report files are loaded only when an edit operation is attempted on a particular screen or report. Once a system has been loaded you may proceed to edit the system as required. Any changes are stored in the working memory of the ADS Builder. To actually save the changes, a system save or system archive operation must be executed.

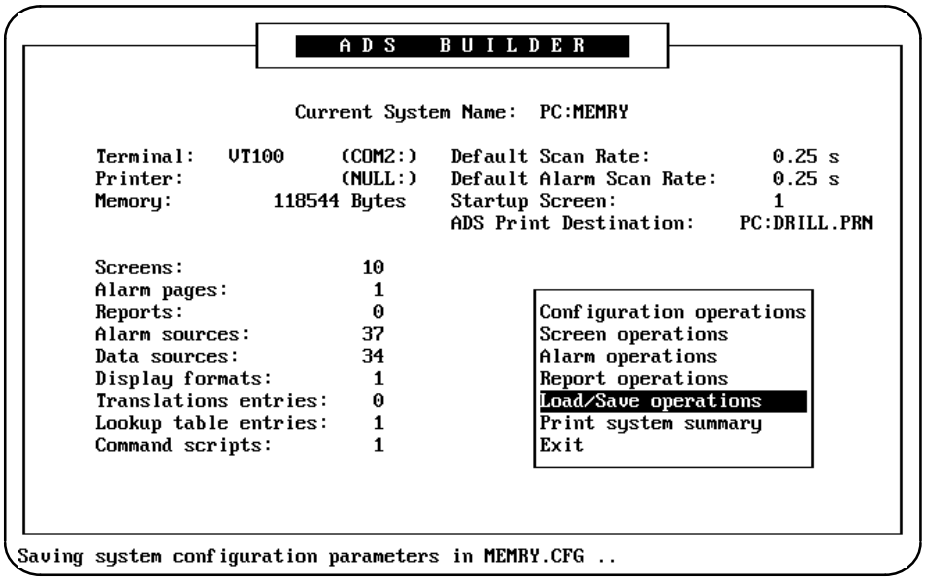
Section 2: Save System to RAM:/Disk

The system currently loaded in the ADS Builder may be stored to the ADCs RAM: disk (hard disk for the PC-Based Builder) whether or not it was originally loaded from that disk.

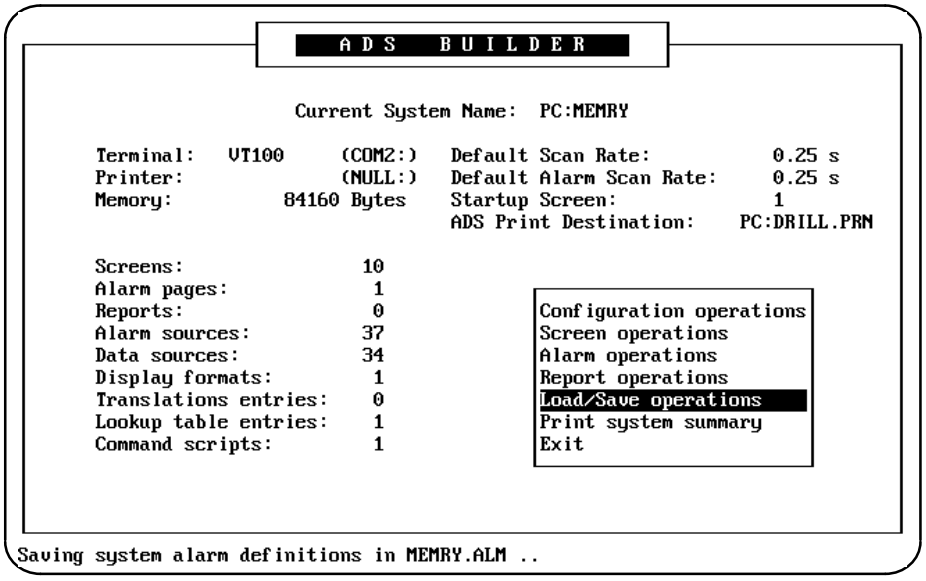
To initiate the saving of the system currently loaded in the ADS Builder to RAM: you must first select the Save System to RAM: menu option, either by cursoring to that option and then pressing the [Enter] key, or by pressing the [S] key.



When the [Enter] key is pressed, the ADS Builder immediately begins saving the currently loaded system to the RAM: disk. The first file saved is the system parameters configuration file. A message is displayed on the prompt / message line indicating that the system is currently saving the system configuration in file MEMRY.CFG.

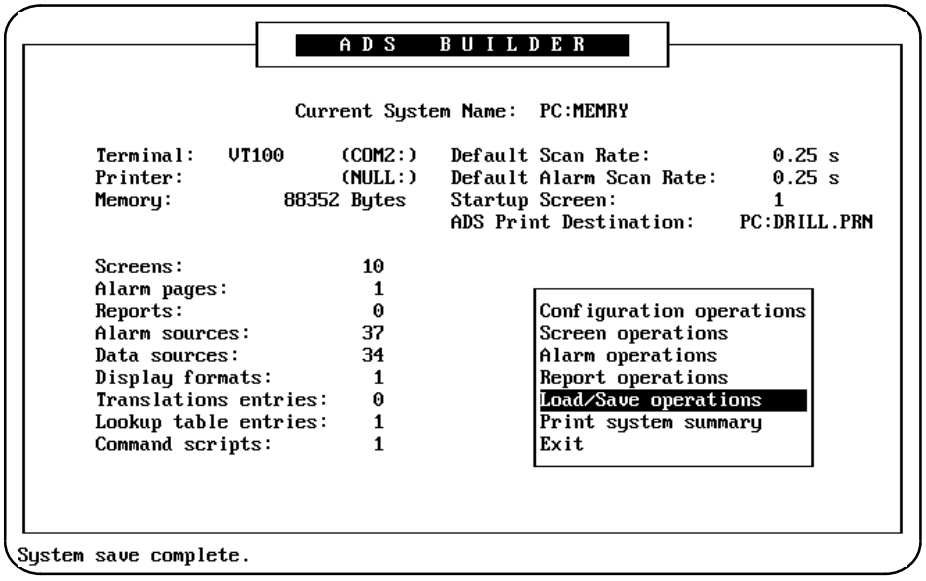


The second file saved is the alarm definitions file. A message is displayed on the prompt / message line indicating that the system is currently saving the alarm definitions in file MEMRY.ALM.



The ADS Builder will now save each of the screen files and then the report files. A message will be displayed on the prompt / message line indicating which file is currently being saved. If a screen or report file has not been loaded into the ADS Builder's working memory prior to invoking the save operation, it will be loaded first and then written out to ensure that all files making up the system are actually written to the RAM: disk (the system could have been loaded from PC: or the system name could have been changed from what was originally loaded).

After all files have been saved to the RAM: device, a message is displayed on the prompt / message line to indicate that the save operation has been completed.



Section 3: Archive System to PC:

The system currently loaded in the ADS Builder may be stored to the PC: disk (currently selected folder on an attached computer running TERMF or just the currently selected folder for the PC-based Builder) whether or not it was originally loaded from that disk.

To initiate the saving of the system currently loaded in the ADS Builder to PC: first select the Archive System to PC: menu option, either by cursoring to this option on the menu and then pressing the [Enter] key, or by pressing the [A] key.

When the [Enter] key is pressed, the ADS Builder immediately begins saving the currently loaded system to the PC: disk. As noted previously, you must have selected the appropriate folder for the system archive and be running TERMF on the host computer prior to beginning the archive operation. The first file saved is the system parameters configuration file. A message is displayed on the prompt / message line indicating that the system is currently saving the system configuration in file <system>.CFG.

The second file saved is the alarm definitions file. A message is displayed on the prompt / message line indicating that the system is currently saving the alarm definitions in file <system>.ALM.

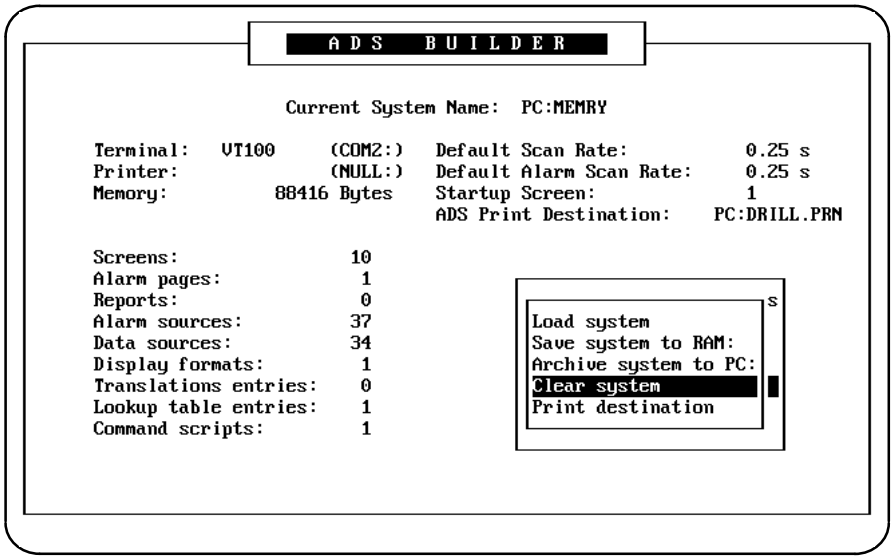
From this point the ADS Builder will save each of the screen files and then the report files. A message will be displayed on the prompt / message line indicating which file is currently being saved. If a screen or report file has not been loaded into the ADS Builder's working memory prior to invoking the save operation, it will be loaded first and then written out to ensure that all files making up the system are actually written to the PC: disk (the system could have been loaded from RAM: or the system name could have been changed from what was originally loaded).

After all files have been archived to PC:, a message is displayed on the prompt / message line to indicate that the save operation has been completed.

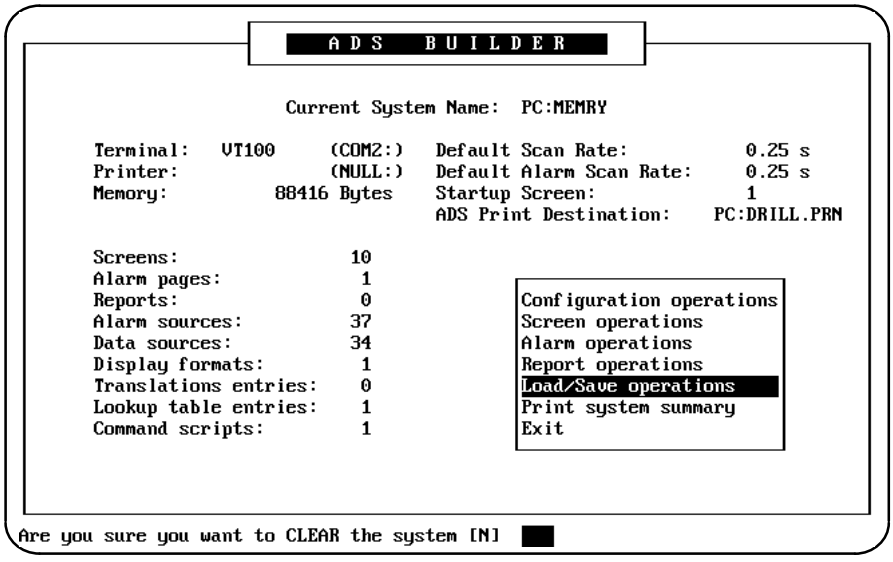
Section 4: Clear System

The currently loaded system may be cleared from the ADS Builder's working memory. When this option is executed, the working memory is re-initialized to the NULL empty system. Note that clearing the ADS Builder's working memory does NOT affect any system by the same name either on the RAM: or the PC: disk.

To initiate clearing of the system currently loaded in the ADS Builder first select the Clear System menu option, by cursoring to the desired option and pressing the [Enter] key, or by pressing the [C] key.



When the [Enter] (or [C]) key is pressed, the ADS Builder prompts you to confirm that you really do want to clear the system.



By default the ADS Builder initializes this response to N - to not clear the system. If, at this point, you decide that the system should not be cleared, press the [Enter] key to cancel the system clear operation. If you decide that the system should be cleared, press the [Y] key then the [Enter] key to initiate the system clear.

Note

Be aware that once a system is cleared from the ADS Builder's working memory, all changes made to the system since it was loaded will be lost and cannot be recovered.

As noted above, clearing a system from the ADS Builder's working memory does not affect any system located on either the RAM: or PC: disk. If you want to actually delete a system from either RAM: or PC:, you must use the PCM programming software, PCOP (the Delete Files option on the Utility Functions menu).

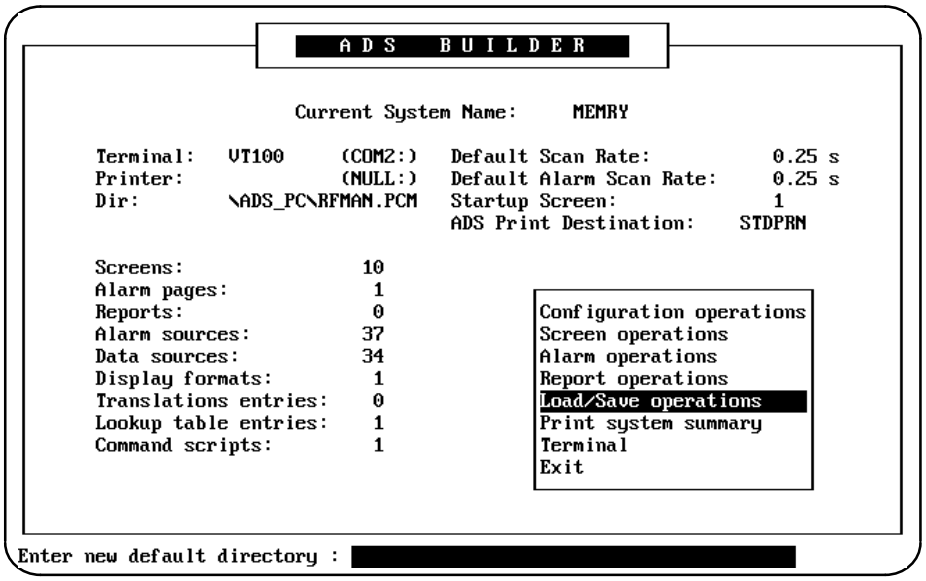
Note

A hard reset of the ADC will be needed before the PCOP software can communicate with the ADC.

Refer to the beginning of this chapter for details on the file naming conventions followed in naming a system. You should refer to that information in order to properly identify what files must be deleted to completely delete a system from either the RAM: or the PC: disk.

Section 5: Modify Current Directory

To change the default directory used by ADS to load and save systems, select the modify current directory option (PC-based Builder) by cursoring to that option and pressing the [Enter] key, or by pressing the [M] key. At the prompt, enter the required device and directory specification.



Note

In general, you should only select directories that are PCM compatible folders so that a system saved in it may be accessed later using PCOP.

Section 6: Print Destination

Print Destination for ADS Builder on ADC Module

By default, the print output from the ADC-based Builder is directed to PC: (attached computer running TERMF), and will be stored in the file <system_name>.PRN. This is represented by the ADS Print Destination field.

The ADC Builder supports the following print destinations:

- *A printer attached to COM1:*
- *A printer attached to COM2:*
- *A file located on ADC RAM:*
- *A file located on the attached PC (PC:)*

File output is directed to a file located on the specified device. The name of the file is <system_name>.PRN. The print output for a system called MIX would be found in the following file:

```
MIX.PRN
```

To choose one of the print destinations, select the print destination option and respond to the prompt.

Caution

You should not choose PC: for the print destination in either of the following two situations:

1. **Your system is located on the PC: drive rather than the RAM: drive.**
2. **You specified either the CIBM or MIBM terminal table on the ADS menu program screen before executing the ADS Builder**

Print Destination for PC-Based Builder

By default, The IBM Builder directs its print output to the standard printer device (which is, LPT1). This is represented by the ADS Print Destination displayed in the top right-hand corner of the front screen.

The IBM PC-Based Builder supports two destinations for print output.

```
STDPRN (the standard printer device)
File output
```

File output is directed to a file located in the default directory. The name of the file is <system_name>.PRN. For example, the print output for a system called MIX, located in a directory named \MIX.PCM, would be found in the following file:

```
\MIX.PCM\MIX.PRN
```

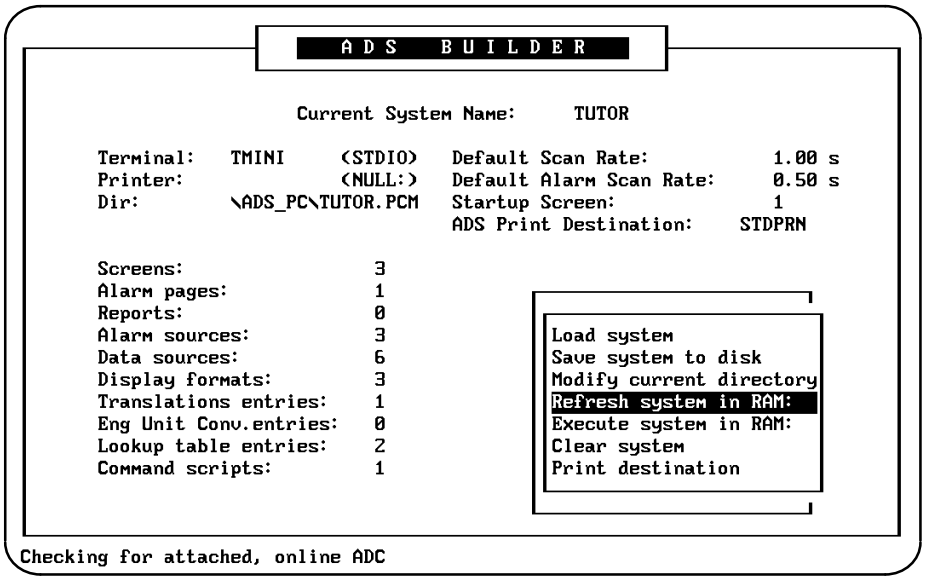
To choose either the standard printer or file destination, select the Print destination option and respond to the prompt.

Section 7: Refresh System in RAM

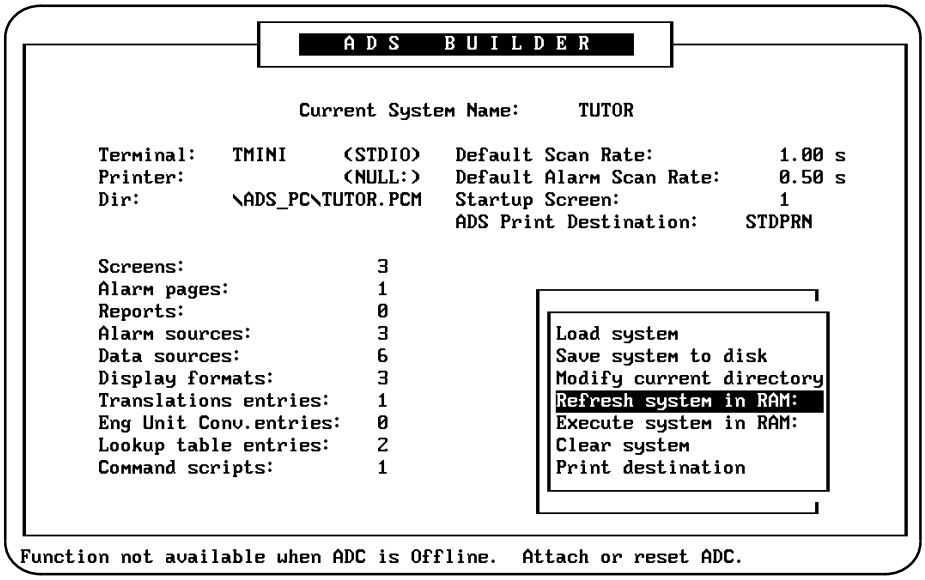
The current system may be copied, or "refreshed", to the ADC module's RAM: disk via the "Refresh system in RAM:" menu option. You may either cursor to that item and press the [Enter] key or just press the [R] key to initiate the refresh operation.

As you build your system, the Builder will maintain a list of the system files which have been added or modified since the system was last refreshed to the ADC module. Each time you first enter the Builder, it assumes that all files need refreshing. In addition to the system's configuration file (.CFG), alarm file (.ALM), screen files (.SCN) and report files (.REP), the Builder will also refresh the system's help file (.HLP) and the PID module's definition (.PID) and startup (.STR) files, if present.

After initiating the refresh operation, the Builder will first check that an ADC module is attached and online such that it may be communicated with.



Should the Builder be unable to communicate with the ADC module, you will be informed of this fact and will be prompted to correct the situation and to attempt the operation again.

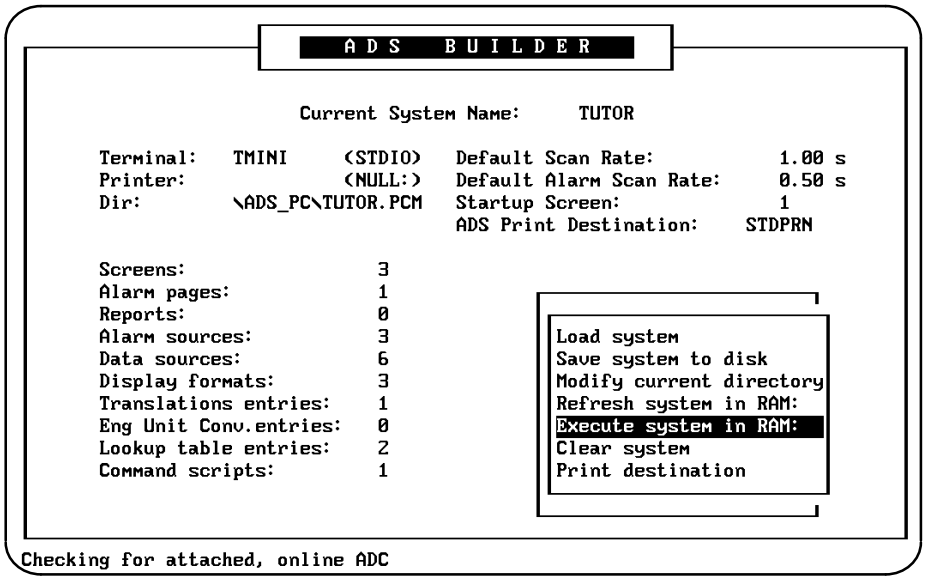


While the refresh operation is proceeding you will be informed as to which file is being loaded to the ADC module via a ”Loading <filename>” message. Upon successful completion of the refresh operation, you will see the message ”Refresh complete”.

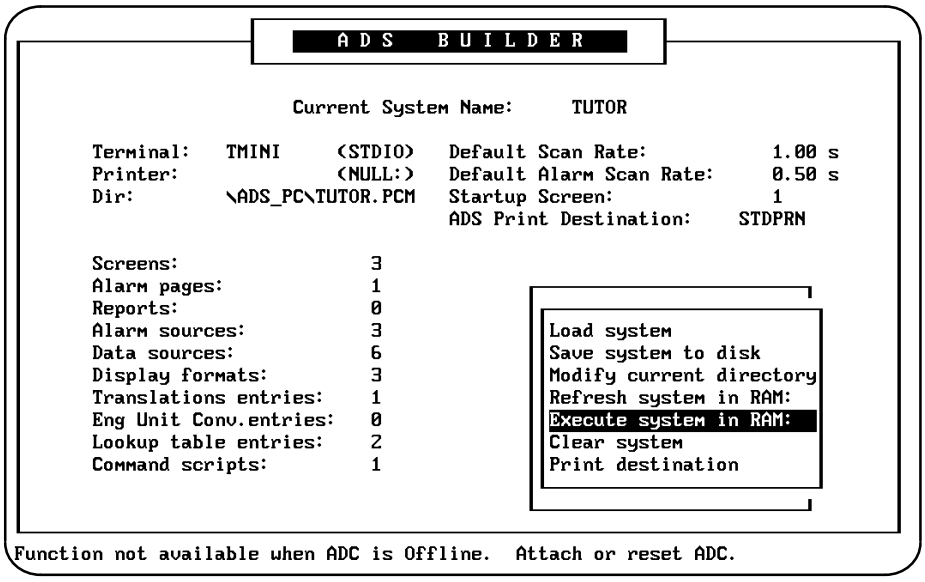
Section 8: Execute System in RAM

The system specified the last time the ADS software was installed on the ADC module may be executed via the "Execute system in RAM:" menu option. You may either cursor to that item and press the [Return] key or just press the [E] key to initiate the refresh operation. This menu option is meant to be used in conjunction with the "Refresh system in RAM:" menu option (see Section 7).

After initiating the execute operation, the Builder will first check that an ADC module is attached and online such that it may be communicated with.



Should the Builder be unable to communicate with the ADC module, you will be informed of this fact and will be prompted to correct the situation and to attempt the operation again.



If the Builder is able to communicate with the ADC module, the Terminal screen will be displayed and the ADC module will automatically be soft reset. Refer to Chapter 12 in this manual for a discussion of the Terminal screen.

Error Messages for Load/Save Operations

Error messages and their causes for load / save operations are listed below.

All changes to the current system will be lost - continue (Y/N)? [N]:

> The requested operation will irrevocably lose all changes to the system since it was last saved. You are prompted to confirm that the operation should continue.

Could not verify system structures prior to save - check system configuration

> Some component of the system (e.g., a display format) which is referenced by a dynamic object on a screen or report has been deleted.

Error opening system configuration file XXXX

> The typical cause of this error is attempting to load a system ”XXXX” that does not exist in the currently selected folder.

Invalid file structure in system alarm file XXXX

> The alarm (.ALM) file for system ”XXXX” in the currently selected folder has been corrupted.

Invalid file structure in system configuration file XXXX

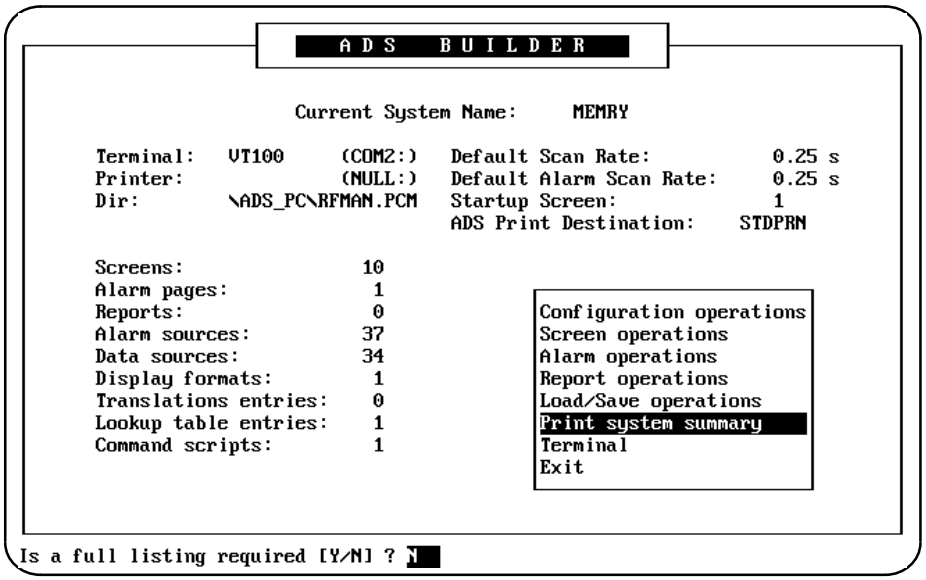
> The configuration (.CFG) file for system ”XXXX” in the currently selected folder has been corrupted.

Chapter 10

Print System Summary

The Print System Summary menu option provides the capability of printing out your entire system database, or only the statistics concerning the system. To initiate the printing of your system first select the Print System Summary menu option, either by cursoring to that option on the menu and then pressing the [Enter] key, or by pressing the [P] key.

The ADS Builder will prompt you for whether or not a full listing is required.



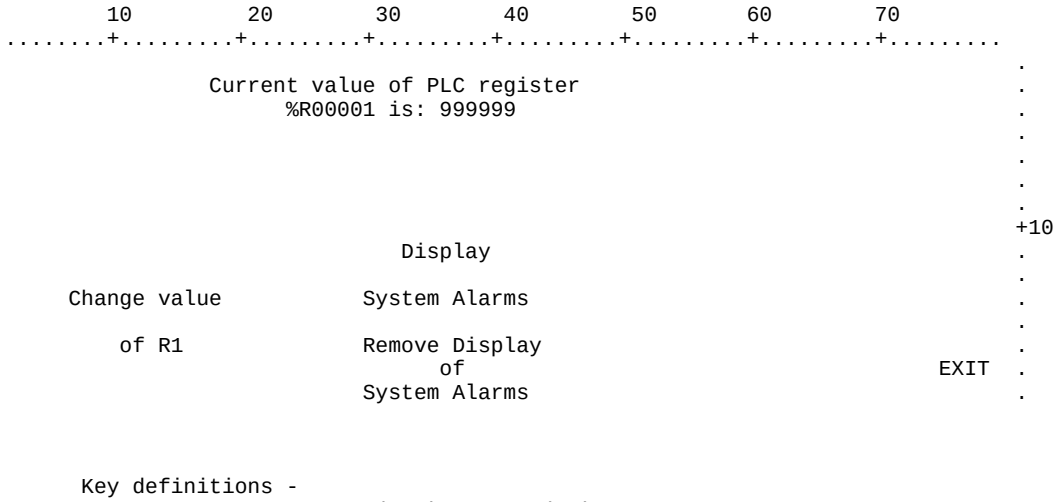
Responding "N" to this prompt results in only a header page outlining the major statistics concerning the database. A reply of "Y" results in not only a header page, but also the entire contents of your database.

The listing will be directed to the Print Destination specified by way of the Load / Save Operations menu (see Chapter 9).

A sample full listing appears on the next several pages.

```
                SYSTEM SUMMARY LISTING
                ======================

      System Name : TUTOR             Path :  \ADS_PC\TUTOR.PCM
                                   Terminal :  TMINI on COM2:
                                    Printer :        on NULL:

                          Default Data Scan :     1.00  sec
                         Default Alarm Scan :     1.00  sec

                             Startup Screen :  1

                                    Screens :  3
                                Alarm Pages :  1
                                    Reports :  0

                               Alarm Sources :  1
                                Data Sources :  1

                             Display Formats :  0
                           Translation Tables :  0
                                Lookup Tables :  0
                             Command Scripts :  0
```

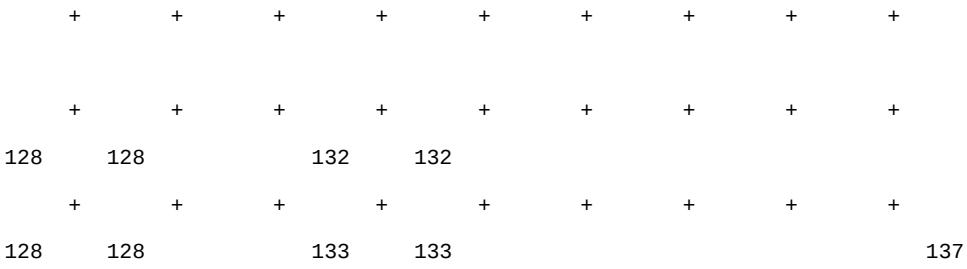
```
             SCREEN DETAILS LISTING
               ======================

Screen Number : 1       REG_ONE


                           Start Row : 1           End Row :  15
                        Start Column : 1        End Column :  80

                               Image : NORMAL

                          Background : BLACK    Foreground :  WHITE


       Dynamic Object : R1_DISPLAY

                           Start Row : 3           End Row :  3
                        Start Column : 35       End Column :  40

                         Data Source : R1_VALUE
                   Additional Calc. :
                        Data Format :
                       Display Value : Yes  ( Left_justify )
                       Avail for Edit: No
```



Key definitions -

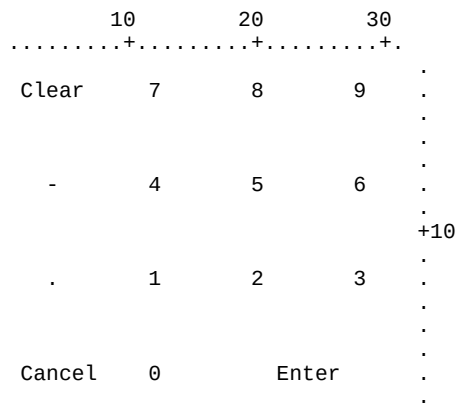
```
AK1  : PSHSCN(999) PLCSETI(R1)
AK2  :
AK3  :
AK4  :
AK5  : PSHSCN(998) PSHALM(1)
AK6  : POPALM(1)
AK7  :
AK8  :
AK9  :
AK10 : EXIT()
AK11 :
AK12 :
AK13 :
AK14 :
AK15 :
```

Touch point Definitions



```
Screen Number : 998     ALR_KYPD

                           Start Row : 1          End Row :  15
                        Start Column : 57      End Column :  80

                               Image : NORMAL

                          Background : BLACK    Foreground :  WHITE


       10        20
   .........+.........+...
            ↑             .
            |             .
            |             .
                          .
                          .
  <──────         ──────> .
                          .
                          +10
            |             .
            |             .
            ↓             .
                          .
                          .
    EXIT        ENTER     .
                          .

          Key definitions -
                AK1  :
                AK2  :
                AK3  :
                AK4  :
                AK5  :
                AK6  :
                AK7  :
                AK8  :
                AK9  :
                AK10 : POPSCN(998)
                AK11 :
                AK12 :
                AK13 :
                AK14 :
                AK15 :
                             Touch point Definitions
                                                         184

   +       +       +       +      +       +      +       +      +

                                                  180              182

   +       +       +       +      +       +      +       +      +

                                                         178

   +       +       +       +      +       +      +       +      +

                                                  137    13        13
```

```
Screen Number : 999     NUM_KYPD

                        Start Row : 1          End Row :  15
                      Start Column : 49      End Column :  80

                             Image : NORMAL

                        Background : BLACK    Foreground :  WHITE
```




```
      Key definitions -
            AK1  :
            AK2  :
            AK3  :
            AK4  :
            AK5  :
            AK6  :
            AK7  :
            AK8  :
            AK9  :
            AK10 : POPSCN(999)
            AK11 :
            AK12 :
            AK13 :
            AK14 :
            AK15 :

                       Touch point Definitions
                                                  24      55      56      57

   +       +       +       +       +       +       +       +       +

                                                  45      52      53      54

   +       +       +       +       +       +       +       +       +

                                                  46      49      50      51

   +       +       +       +       +       +       +       +       +

                                                  137     137     13      13
```

```
                ALARM PAGE LISTING
                ==================


        Alarm Page :    1       SYS_ALRM


                   Start Row : 1           End Row :  8
                Start Column : 6        End Column :  45
                  Foreground : WHITE    Background :  BLACK
                     Heading : System Alarms
```

```
                ALARM SOURCE LISTING
                ====================

       Alarm Source : Q1_Q433_ON          Data Type : WORD
                                           Location : Q1;Q433
                                          Scan Rate : *
                                  Additional Calc. :

                              Alarm Pages : 1

                                    Flags : Notify Timestamp

           Range : 3                 Text : Q1 and Q433 both ON
                                   Action :

           Range :                   Text :
                                   Action :

           Range :                   Text :
                                   Action :

           Range :                   Text :
                                   Action :
```

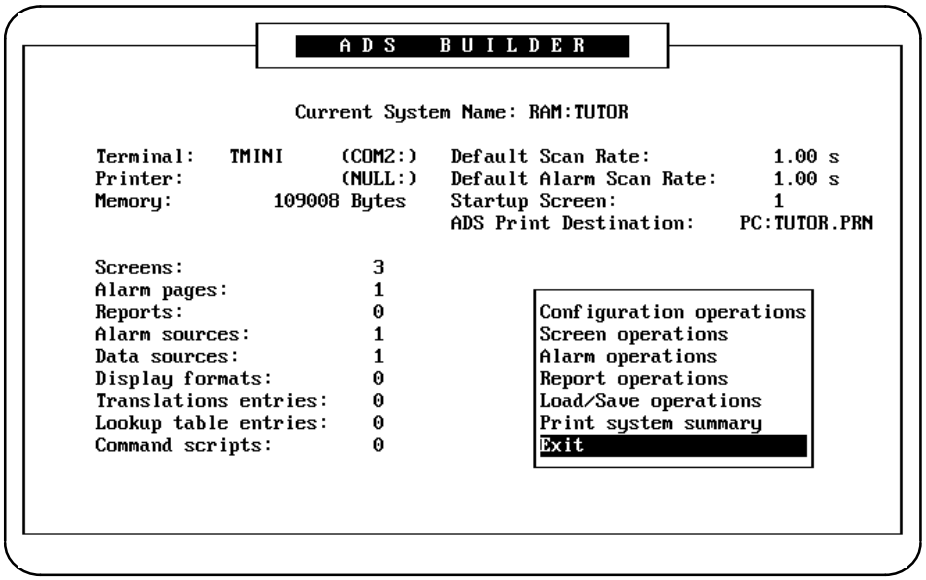
```
                DATA SOURCE LISTING
                ===================

      Data Source : R1_VALUE          Data Type : SIGNED WORD
                                       Location : R1
                                      Scan Rate : 00:00:00.50
                                Additional Calc. :
```

Chapter 11

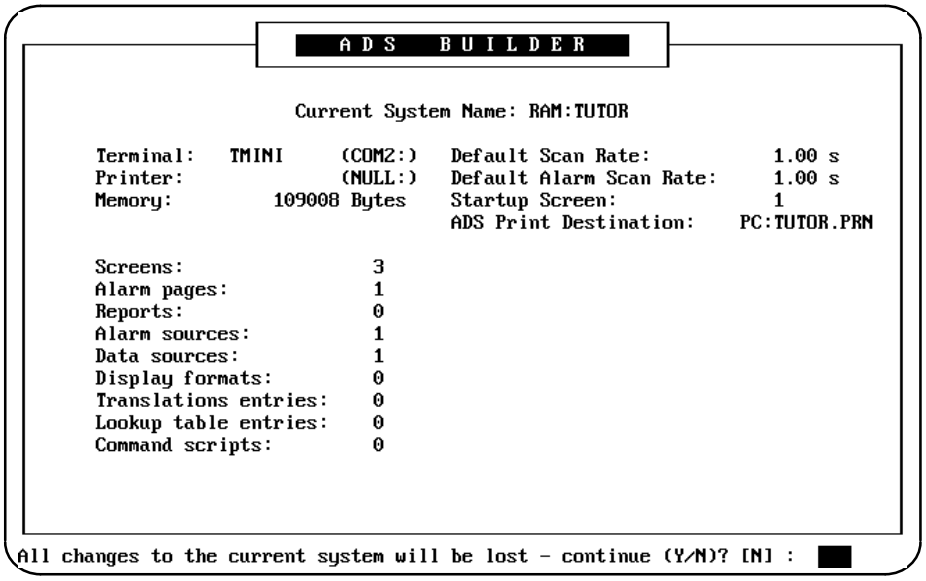
Exiting the ADS Builder

After you have completed building an operator interface system or modified an existing system, you must exit the ADS Builder program in order to run the ADS Executor. This is done with the Exit function.

To initiate an exit of the ADS Builder you must first select the Exit menu option, either by cursoring to the Exit option on the menu and then pressing the [Enter] key, or by pressing the [E] key.



When the [Enter] key is pressed, the ADS Builder will immediately exit the program unless you have modifications to the system currently loaded in the ADS Builder's working memory since it was last saved to either RAM: or PC:. If unsaved modifications have been made, the ADS Builder prompts you to confirm that the exit should continue.



By default the ADS Builder initializes the response to the prompt to N (don't exit the Builder). If you decide that the ADS Builder should not be exited at this time, press the [Enter] key to cancel the exit request. If you are sure that the ADS Builder should be exited, press the [Y] key and then the [Enter] key to initiate the exit from the ADS Builder.

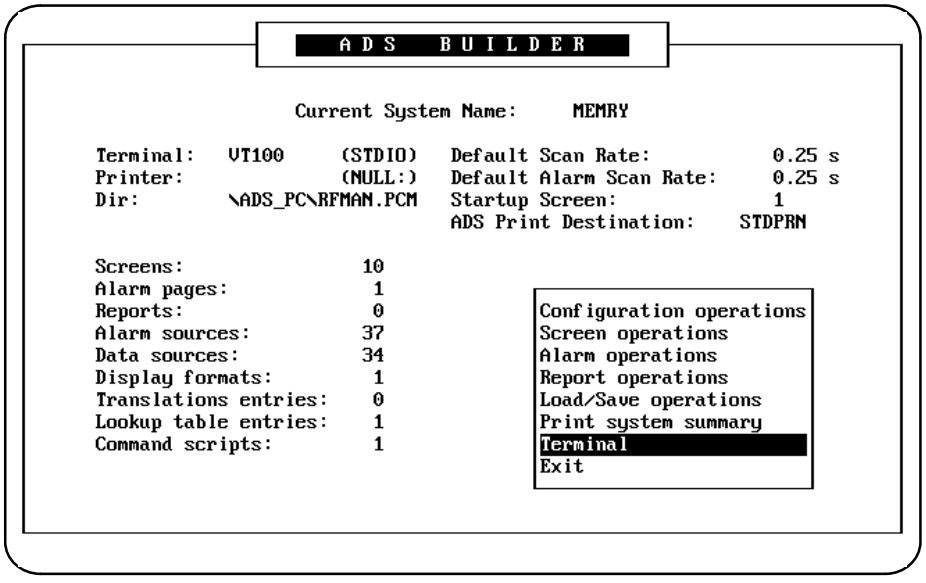
Note

It is important to note that once the ADS Builder is exited with unsaved modifications in the ADS Builder's working memory, all changes made to the system since it was last loaded (or saved) will be lost, and can not be recovered.

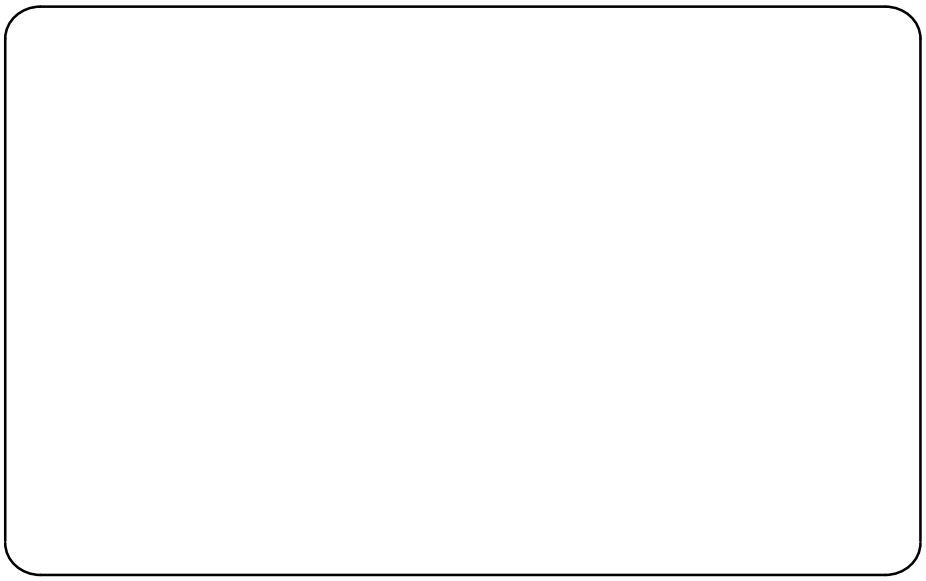
Chapter 12 Terminal (ADS Off-line, PC-Based Builder Only)

The Terminal menu option gives you access to the TERMF terminal emulator and file server software without leaving the PC-based Builder. (See Chapter 8 of the CIMPLICITY 90-ADS Alphanumeric Display Systems User's Manual for more details on the PC-based Builder.) This functionality is useful when you are building your system totally off-line on an attached computer, but want to periodically execute the system on the target terminal. The following must be performed in order for the Terminal function to work properly.

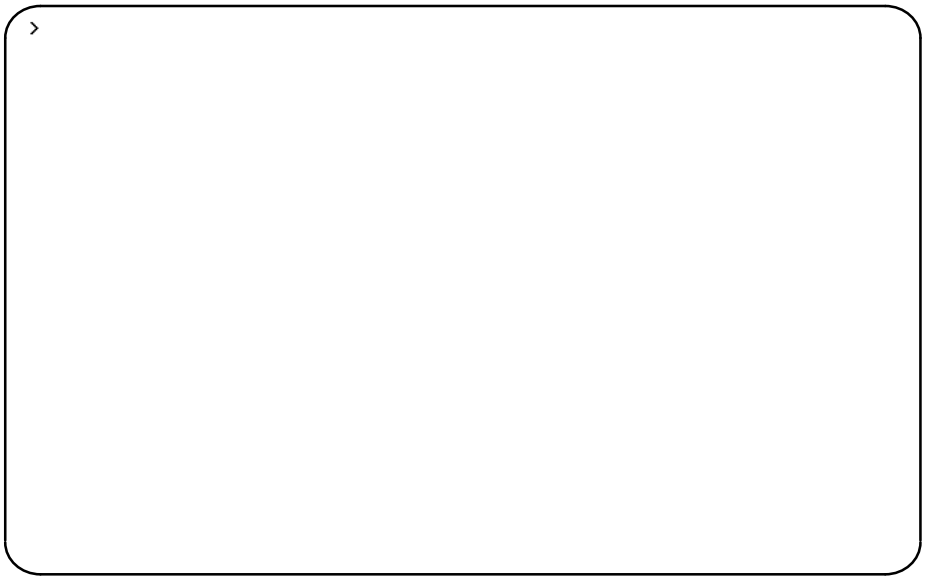
1. You must use the ADS Setup Utility (see Chapter 9 of the CIMPLICITY 90-ADS Alphanumeric Display Systems User's Manual) to define the *target terminal* appropriately.
2. The ADS Execute - Only environment must be installed on the ADC module.
3. Begin with the ADC module hard reset.
4. Execute the ADS Builder, selecting the system referenced in step 2 above. If the indicated system has not yet been created, you should do so. The system should be saved to disk (see Chapter 9, Load / Save Operations) prior to accessing the Terminal menu option. Select the Terminal menu option, either by cursoring to that option on the menu and then pressing the [Enter] key, or by pressing the [T] key.



Initially upon entering the Terminal screen, only a blank screen will be observed.



Press the [Enter] key. If the ADC module has been hard reset, you should see a ”>” character in the upper left-hand corner of the screen. If you do not, hard reset the ADC module again.



To start your ADS system executing on the target terminal, press the [Alt]-[E] key (hold down the [Alt] key while pressing the [E] key). After a short delay, you will see various startup information displayed on the target terminal’s screen. If your system is present only on your computer you should also see that your hard disk is being accessed, indicating that the system is being loaded from the PC: drive by the ADS Executor.

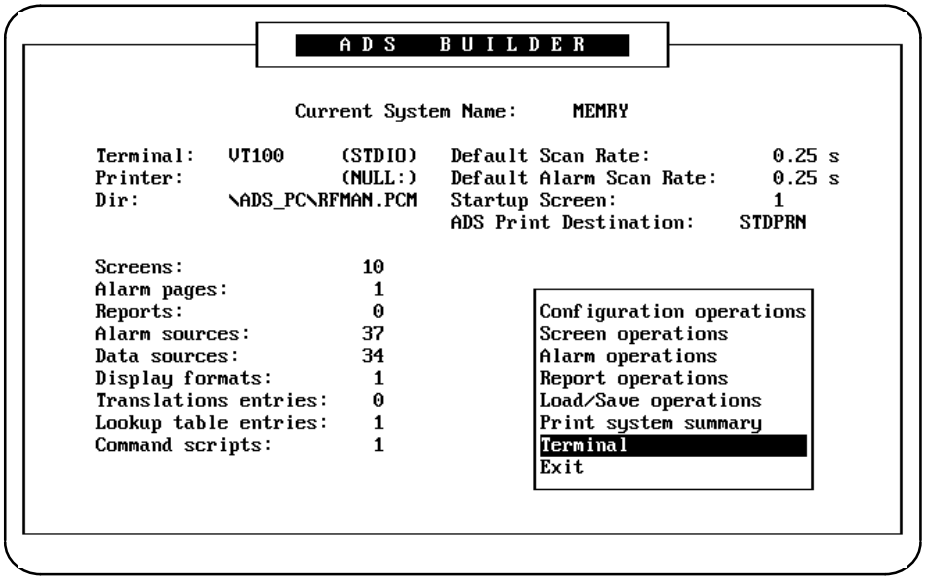
After the system's .CFG and .ALM files have been loaded, you should see your system beginning to execute on the target terminal.

```
>MBX Driver installed
ADS Shareable Image Driver installed
ADS device installation completed successfully
(c)1989,1990 GE FANUC AUTOMATION, NORTH AMERICA, INC.
ADS shareable images successfully installed
(c)1989,1990 GE FANUC AUTOMATION, NORTH AMERICA, INC.
ADS FAULT TABLE shareable images successfully installed
(c)1989,1990 GE FANUC AUTOMATION, NORTH AMERICA, INC.
PRINT SPOOLER Started

(c)1989,1990   GE FANUC AUTOMATION, NORTH AMERICA, INC.
PLC is currently executing task 'ADS'
```

When you are ready to make changes to the system again, exit the ADS Executor (see Chapter 14). After a short pause, you should see the "->" characters displayed on your computer's TERMF screen, indicating that the ADC module has been hard reset (via exiting the Executor, not by pressing the reset button).

```
ADS EXECUTOR exiting ...

DATA MANAGER exiting ...
->
```

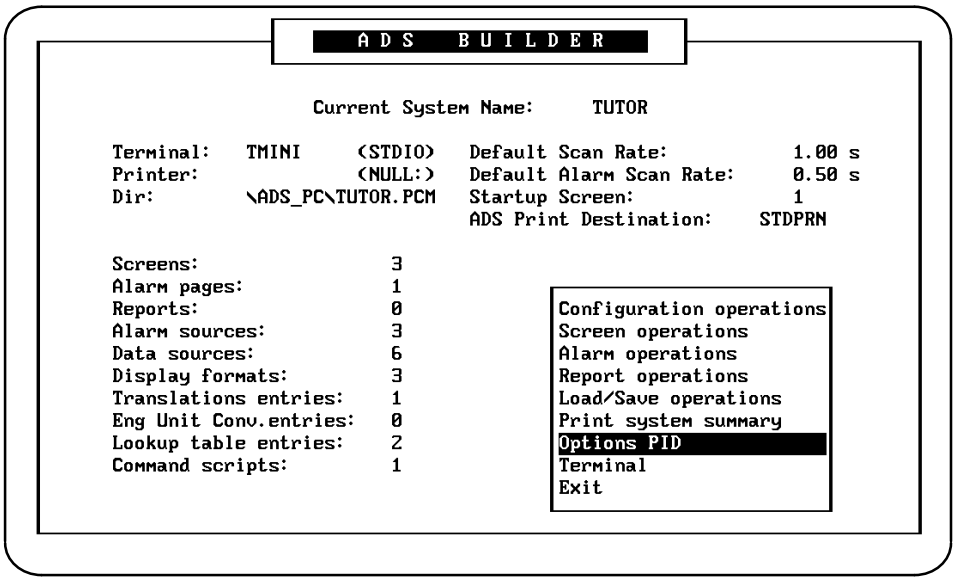
Pressing the [ALT]-[Z] key at this point will return you to the ADS Builder's main menu screen.



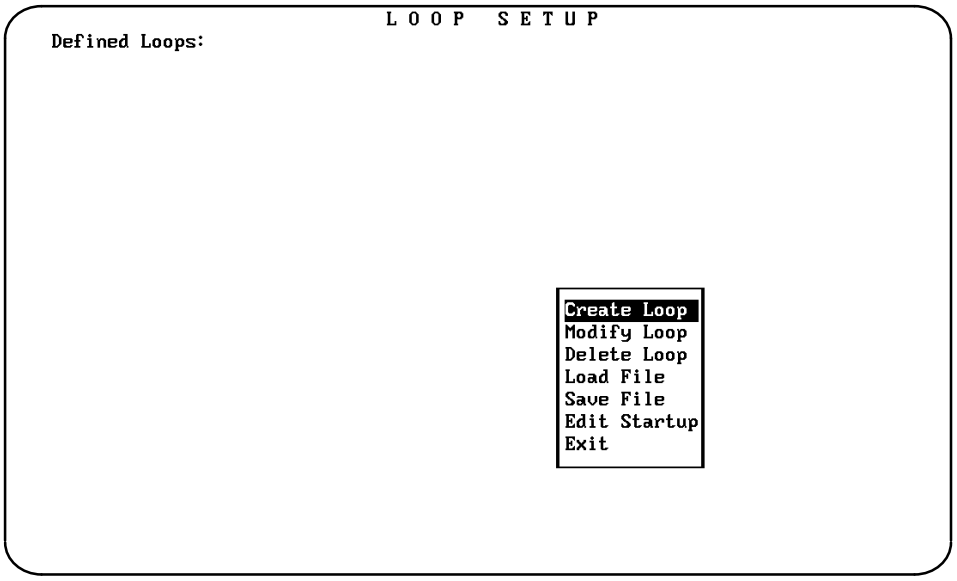
Chapter 13

Options PID

The ”Options PID” menu option gives you the ability to configure your PID module information without needing to use the PID option module’s built-in setup screen. In addition you may indicate which loops are to be initially selected when the PID module is first executed on the ADC module. Note that you must select and install the PID option module onto the ADC module in order to use it.

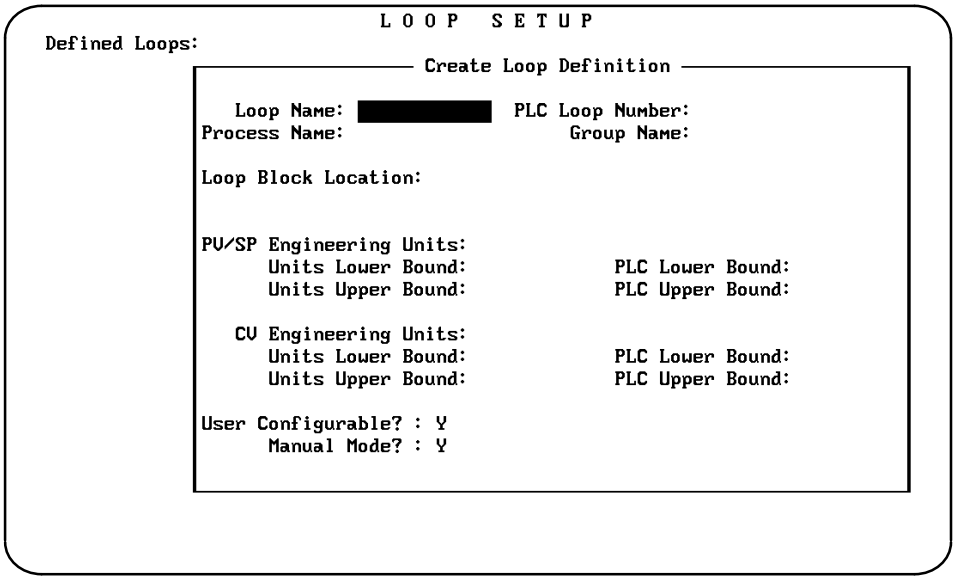


To select the ”Options PID” menu item, either cursor to it and press the [Enter] key or press the [O] key. The Builder’s PID menu screen will be displayed. A list of currently defined loops is displayed on the left hand side of the screen. A menu of available setup functions, *Create Loop*, *Modify Loop*, *Delete Loop*, *Load File*, *Save File*, *Edit Startup* and *Exit*, is displayed in the lower right hand side of the screen.



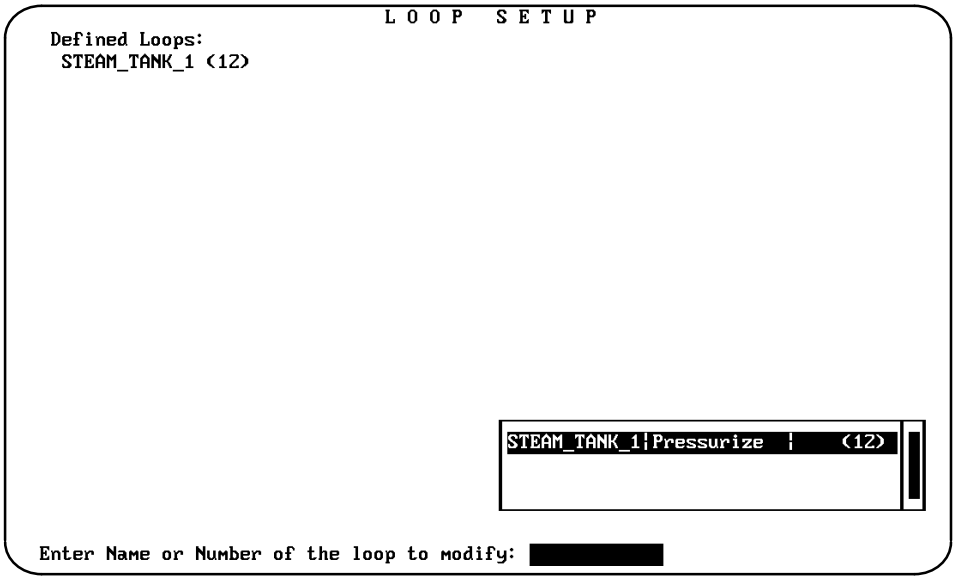
Create Loop

Selecting the ”Create Loop” menu option results in the loop creation data entry form being displayed. Refer to ”Create a Loop Definition” in Chapter 16, PID Templates Module, for details on the data entry form.



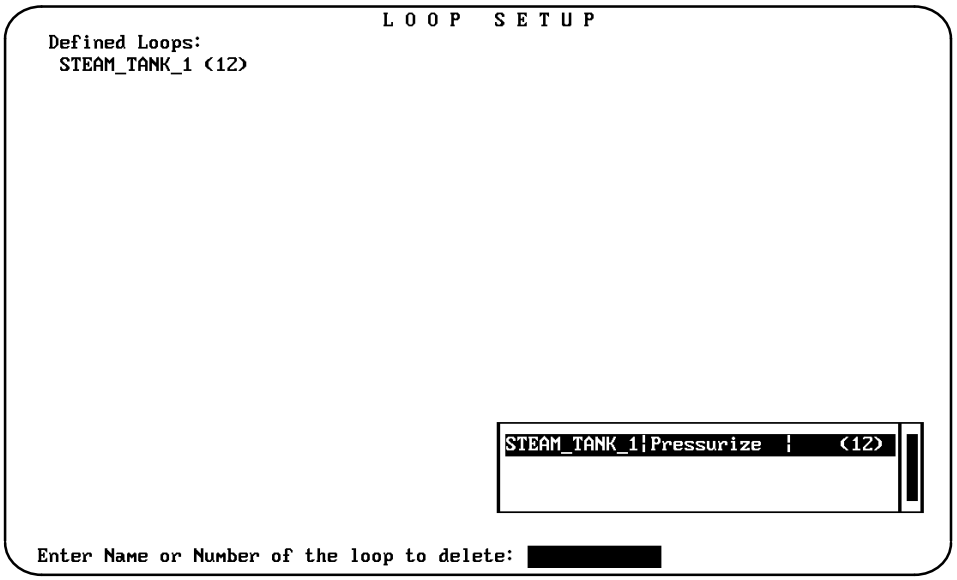
Modify Loop

Selecting the ”Modify Loop” menu option results in a prompt for the loop to modify. Refer to ”Modify a Loop Definition” in Chapter 16, PID Templates Module, for details on modifying a loop definition.



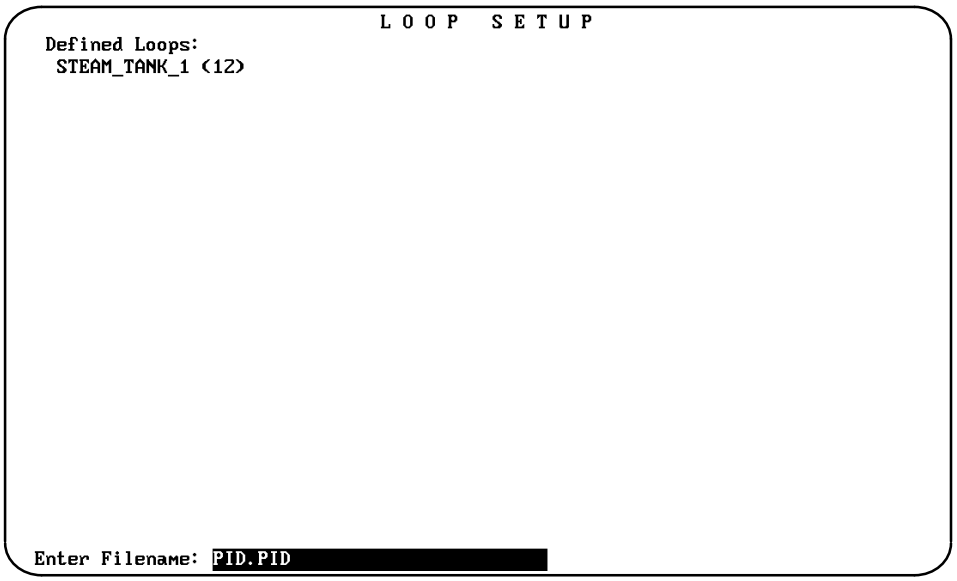
Delete Loop

Selecting the ”Delete Loop” menu option results in a prompt for the loop to delete. Refer to ”Delete a Loop Definition” in Chapter 16, PID Templates Module, for details on deleting a loop definition.



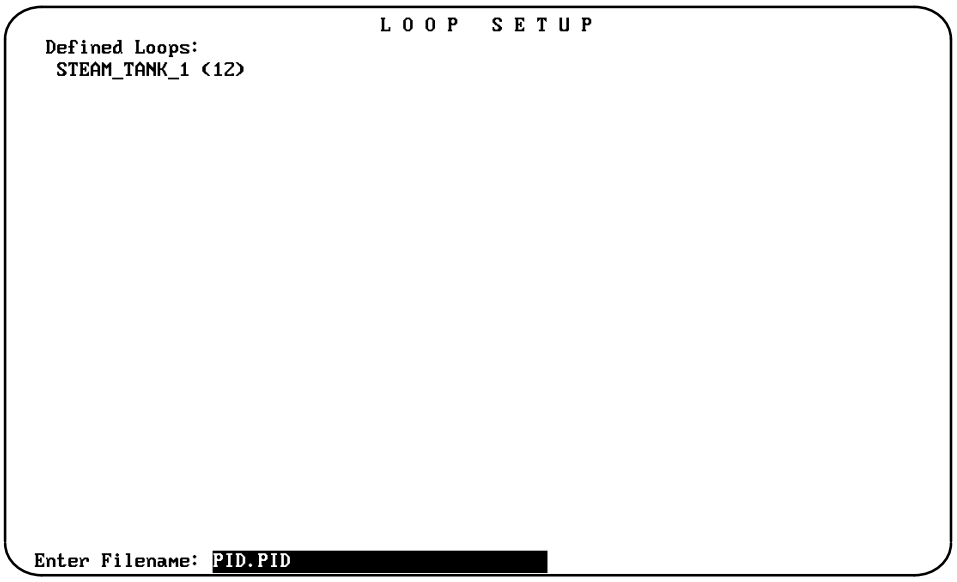
Load File

Previously defined loop definitions may be loaded from a loop setup file if desired. By default, the ”Options PID” menu looks for the file ”PID.PID” in the currently selected folder and, if found, loads it automatically. A different file may be manually loaded via the ”Load File” menu item. Note that the PID option module on the ADC will look for one of only two possible setup file names. It will look first for the file <system_name> .PID, and if not found, it will then look for PID.PID. You are encouraged to use the file PID.PID whenever possible as it is not system name dependent.



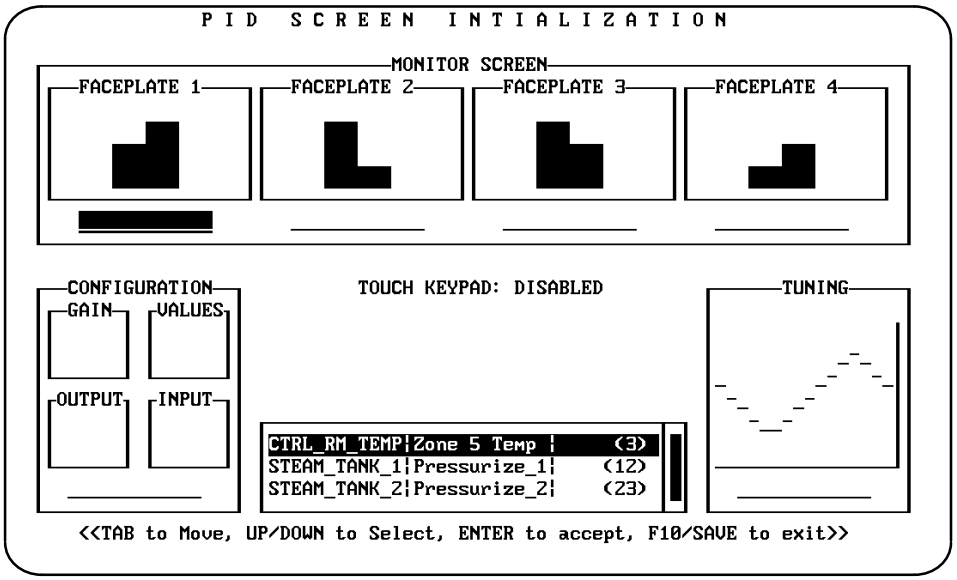
Save File

Loop definitions must be saved to a loop setup file for later retrieval by the PID option module on the ADC. A saved setup file will be stored in the currently selected folder. Note that the PID option module on the ADC will look for one of only two possible setup file names. It will look first for the file <system_name>.PID, and if not found, it will then look for PID.PID. You are encouraged to use the file PID.PID whenever possible as it is not system name dependent.

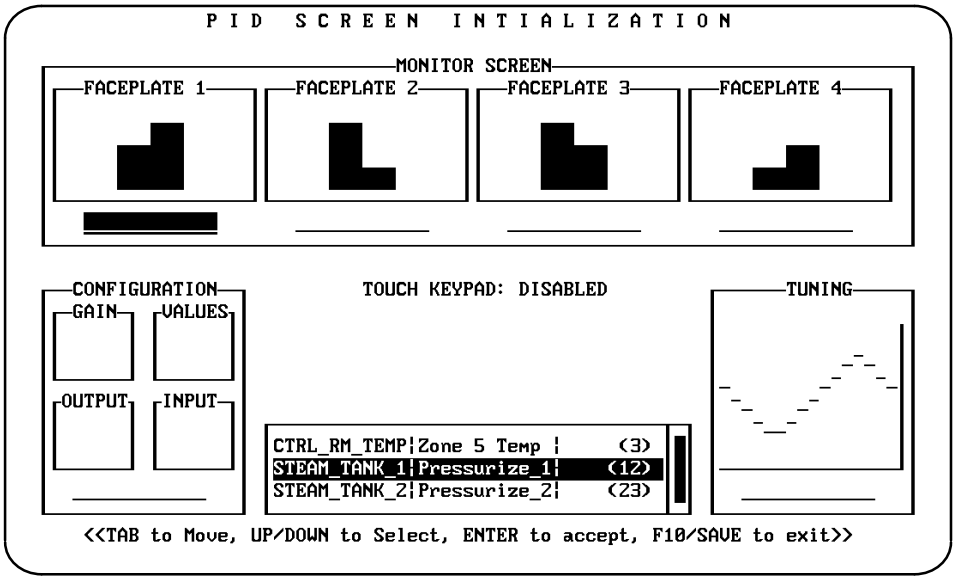


Edit Startup File

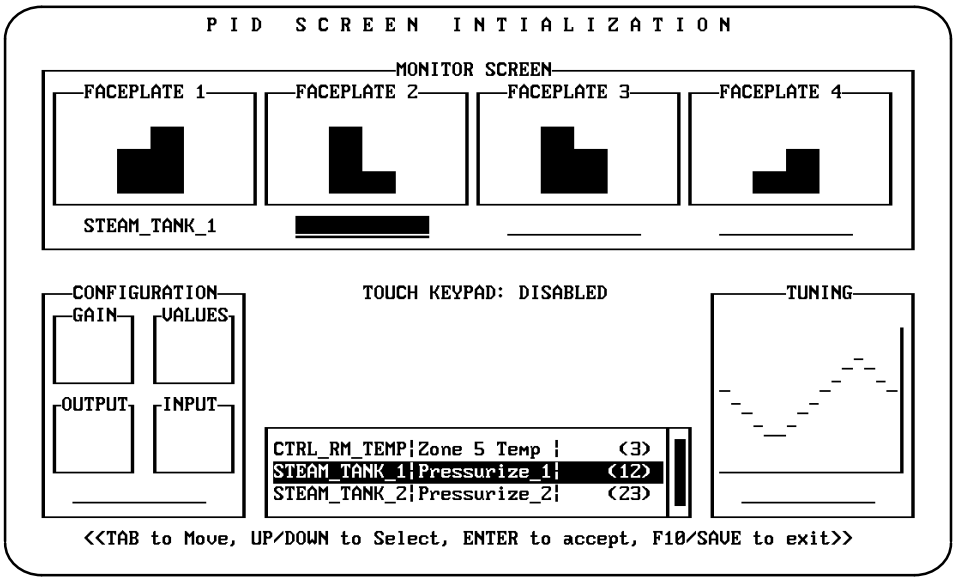
Upon executing the "Edit Startup" menu option, you are placed in the PID screen initialization editor. You are presented with three major groups of selections, one for each of the three runtime screens of the PID option module (*MONITOR screen*, *CONFIGURATION* screen and *TUNING* screen), as well as the designation as to whether or not a touch keypad should be displayed for touch screen terminals. You should refer to Chapter 16, PID Templates Module, for a discussion of the three runtime screens. Also, in that same chapter you should refer to "PID Startup File" for a further discussion of the startup file.



A loop may be selected by scrolling through the loop definition list via the [↑] and [↓] cursor keys.



Pressing the [Enter] key selects the highlighted loop definition and enters it into the current initialization field. The next field is automatically selected. The [Tab] key may be used to skip a field without selecting any definition for it.



The [Alt-F10] key may be used to SAVE the current selections to the PID startup file, PID.STR, and return you to the menu screen Pressing the [Esc] or [F10] key will return you to the menu screen without saving any changes you might have made.

Exit Options PID Screen

The ”Exit” menu option returns you to the Builder main menu screen.

Chapter 14

Running an ADS System: Starting the ADS Execution

An operator interface system can be executed by the ADS Executor software. The ADS Executor may be accessed either through the ADS Menu program if the ADS Development software is installed or directly if the ADS Execute-Only software is installed. The name of an existing system must be specified to the ADS Executor or it will immediately terminate execution.

The location of keys that may be used with the valid terminal types during execution of a system are listed in the following table.

Table 14-1. Key Functions for System Execution

Key Function	Terminal		
	MOIT/COIT TMOIT/TCOIT MINI/TMINI	**VT100**	**MIBM/CIBM †**
Exit system execution	^E	^E	^E
Clear field	^X or Home	^X	^X
Pop topmost alarm page	^O	^O	^O
Refresh screen	^W	^W	^W
Pop topmost screen	^P	^P	^P
User defined function key AK1	F1	KP1	F1 or KP1
User defined function key AK2	F2	KP2	F2 or KP2
User defined function key AK3	F3	KP3	F3 or KP3
User defined function key AK4	F4	KP4	F4 or KP4
User defined function key AK5	F5	KP5	F5 or KP5
User defined function key AK6	F6	KP6	F6 or KP6
User defined function key AK7	F7	KP7	F7 or KP7
User defined function key AK8	F8	KP8	F8 or KP8
User defined function key AK9	F9	KP9	F9 or KP9
User defined function key AK10	F10	KP0	F10 or KP0
User defined function key AK11	F11	PF1	F11 or Insert
User defined function key AK12	F12	PF2	F12 or Home
User defined function key AK13	F13	PF3	F13 or Delete
User defined function key AK14	F14	PF4	F14 or End
User defined function key AK15	F15	KPENTER	F15 or KP*

† Num Lock must be set to OFF for 83-key keyboard; F11 and F12 keys on enhanced AT and PS/2 style keyboards cannot be used (user SHIFT-F1 and SHIFT-F2).

1. For those keyboards which only support function keys F1 through F10, F11 through F15 may be generated by pressing SHIFT-F1 through SHIFT-F5.
2. Keys marked as ^x refer to a combination of the control key and a letter (Ctrl key held down while simultaneously pressing the appropriate key).
3. Keys marked as KPx refer to the appropriate numeric key on the numeric keypad (normally found on the right-hand side of the keyboard).
4.. F11, F12, and F13 are not available for use with the PC-based Builder.

Section 1: Initial Startup

When the ADS Executor is initially started the named system to be executed is searched for first on the RAM: device; if not found there it is then searched for on the PC: device (unless you have explicitly specified either RAM: or PC:). Once the system is found, the various files making up the system are then individually loaded into the ADS Executor's working memory. Each file is verified as it is loaded to ensure that it has not somehow been corrupted. Once all the files have been loaded into the ADS Executor, the initial screen (as described in Chapter 1, ADS Main Menu) is displayed. Only data sources connected to the dynamic objects (if any) on the initial screen are scanned at their defined rates; all alarm sources are scanned at their defined rates. The function key assignments associated with the initial screen are the ones initially put into effect.

Depending on what other modules are installed in the PLC along with the ADC module, the ADC may be ready to execute before the CPU is ready to communicate with it. If this occurs, the message "Waiting on Data Manager to Complete Initialization" will be displayed for several seconds on the terminal screen. If the ADC is unable to communicate with the CPU for approximately one minute, the ADS software will stop trying to execute. If this happens, you should verify that the ADC module is still properly configured, and that the CPU module is OK. Correct whatever problem is found and soft reset the ADC module.

Section 2: Viewing Data on a Screen

When the system is operating, you can view the animation for all dynamic objects appearing on a displayed screen. The ADS system allows you to stack many screens on the terminal display, one on top of the other. The data sources associated with any screen on the display, not just those associated with the topmost screen, are scanned at their defined rates. Thus, if a screen not at the top of the stack is not completely covered, all the dynamic objects on it still visible can still be seen animated.

If you have specified a field width for a dynamic object which is too small for the display of the actual value, the field will be filled with a string of asterisks rather than a shortened form of the value. Any dynamic objects with animation that include movement may disappear from the screen if the movement calculation places the object off of the terminal display.

The ADS software remembers what has previously been written to the terminal screen and only updates sections of the screen which periodically change. If the terminal is power cycled, you will see only sporadic writes to the screen. Pressing either the <Refresh screen> key or a function key to which the REFRSH command is attached will restore the display. The ADC module may also be soft reset, but all alarm entries on all alarm pages will be lost. Also, the initial screen (Menu program opening screen or the system's initial screen depending on which environment is installed on the ADC) will be displayed on the terminal.

Section 3: Operator Prompts and Messages

During execution of a system the bottom line of the terminal display is used for operator prompts, alarm messages and system messages. The operator prompts require some type of action by the operator, such as confirming a previous keystroke or entering some required data in a field. The messages can require an action by the operator, or may simply be informative.

Section 4: Alarm Handling During System Execution

During system execution there are two classes of alarms to be considered:

- *alarms not associated with alarm pages, and*
- *alarms associated with one or more alarm pages.*

The reason for this distinction is that the ADS Executor provides a standard mechanism for dealing with alarm pages which is not user configurable. Alarms that are associated with alarm pages will always be dealt with in the same way, regardless of how you have configured other parts of the system.

Alarms Not Associated with Alarm Pages

Alarms that are not associated with alarm pages (i.e., no alarm pages defined for alarms to be displayed on) follow a simple set of rules during system execution.

When it is detected for a particular alarm source that there has been a transition into one of the four possible alarm states, the ADS Executor carries out any actions that are defined for that particular alarm state.

If the NOTIFY flag for the alarm source is set, the TEXT defined for the alarm state is displayed to the operator on the bottom line of the terminal display. The TEXT is not timestamped, regardless of the setting of the TIMESTAMP flag. When there is a transition out of the alarm state, the operator prompt is erased from the bottom line of the terminal display.

If the LOG TO PRINTER flag is set, the TEXT defined for the alarm state will be printed to the defined printer. If the TIMESTAMP flag is set, the TEXT will be preceded on the same line of the printout with a time and date stamp (the time and date as maintained in the Series 90 CPU).

For alarms that are not associated with alarm pages the LATCHED flag is ignored.

Alarms Associated with Alarm Pages

The rules followed by alarms associated with alarm pages are the same as those for alarms not associated with alarm pages, plus the alarm TEXT will be logged in its

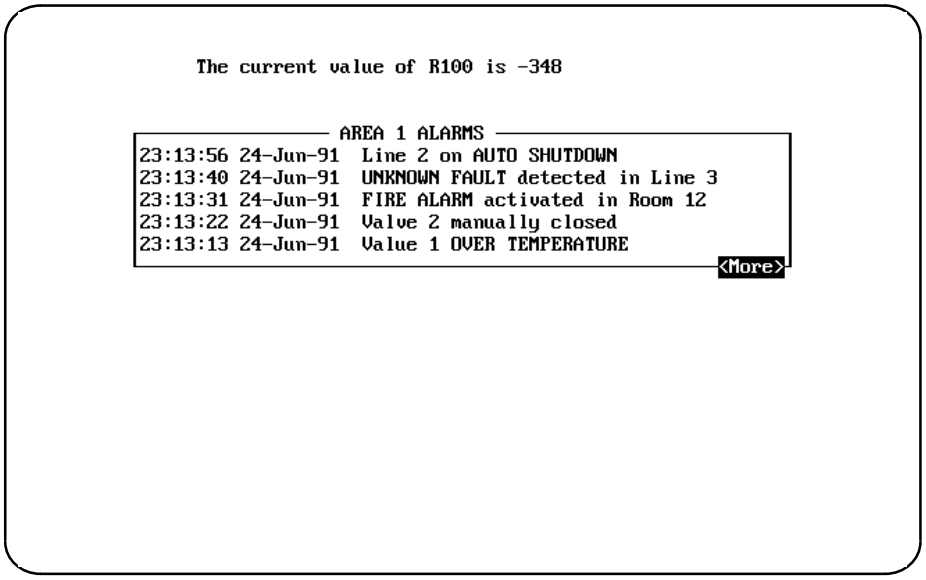
associated alarm page (or pages) if one (any) have been associated with it. If the TIMESTAMP flag is set, the TEXT will be preceded on the same line by a time and date stamp.

An alarm page is constructed as a stack. When a new alarm is logged to an alarm page it becomes the topmost entry on the page; existing alarm entries are pushed down on the page. There is no preassigned limit on the number of alarm entries that can be logged in a particular alarm page. Each occurrence of an alarm requires that a small amount of available memory be allocated to store the information concerning the alarm. When all available memory has been used, the system will continue to execute but no new entries will be added to any alarm page (all other actions associated with the alarm source will still be carried out, however).

An alarm source which does not have the LATCHED flag set is added to its associated alarm page (or pages) each time there is a transition into one of the four alarm ranges defined for the alarm source. Once an alarm transition has occurred, other alarm ranges in the same alarm source cannot cause further alarms until there has been a transition into a non-alarm (normal) state. LATCHED alarms work in a similar manner except that once an alarm transition has occurred a new alarm for that alarm source cannot again be signaled until there has been both a transition into a non-alarm state *and* the alarm has been acknowledged by the operator. The procedure for acknowledging alarms is described in the following text.

Alarm Page Display

An example of an alarm page displayed on a screen is shown below.

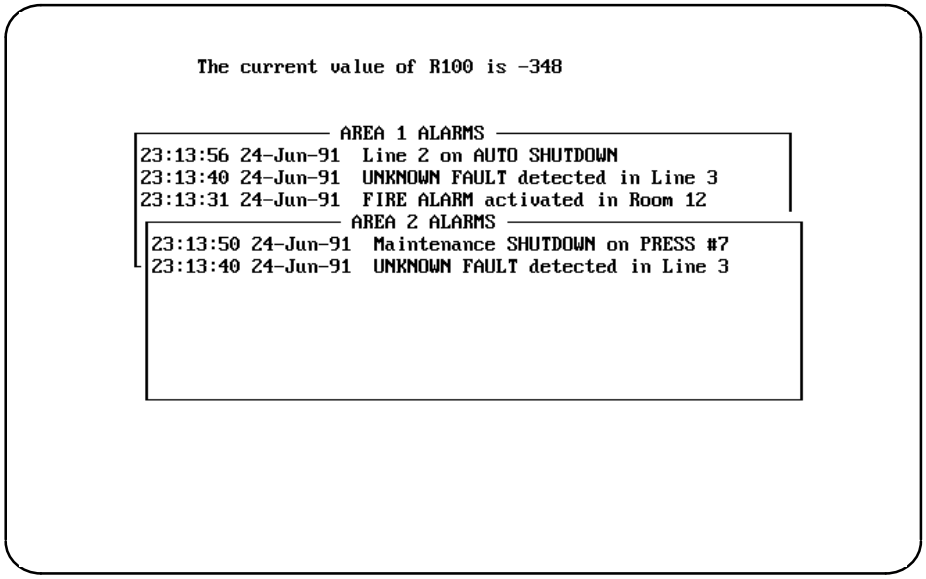


An alarm page may contain more entries than can be viewed on one screen. In this case, a **<Mor e>** indicator will be displayed on the alarm page indicating that the alarm page contains more entries than can be seen on that page.

All alarms displayed on an alarm page which have not yet been acknowledged by the operator will be blinking. A non-blinking alarm page entry indicates that the operator has acknowledged that alarm entry but that the alarm source is still in an alarm condition.

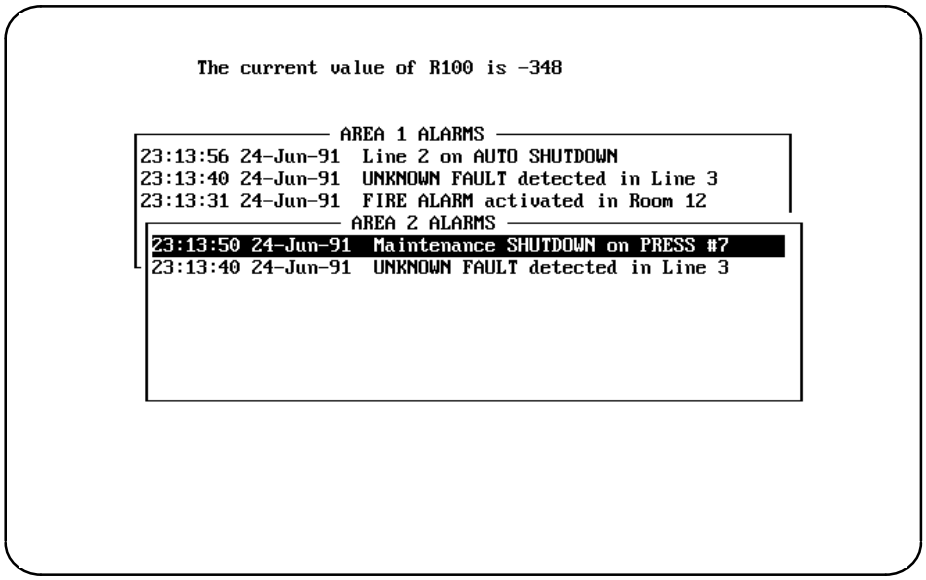
Alarm Page Display - Stacked

Alarm pages can also be displayed stacked on the screen, as shown in the following example.



Alarm Acknowledgement

An alarm may be acknowledged by the operator, whether or not it is latched. Operator acknowledgement of alarms can occur only on the topmost displayed alarm page on the terminal display, and then only on the topmost entry displayed on that page (see "Command Driven Alarm Acknowledgement" below for an alternative way to acknowledge alarms). To enter the alarm acknowledgement mode press the [‡] key. The topmost entry on the alarm page is displayed in reverse video to indicate that it may be confirmed by the operator

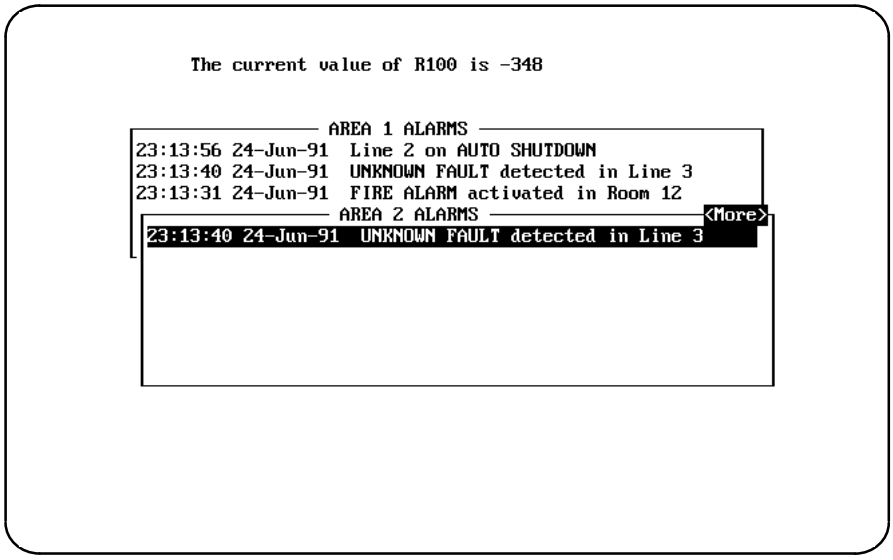


Only the topmost entry on the topmost alarm page may be confirmed. The [ ] and [–] keys are used to scroll alarm entries up and down on the alarm page so that the operator may

- *view entries not currently displayed on the alarm page and*
- *optionally confirm an entry not originally displayed at the top of the alarm page.*

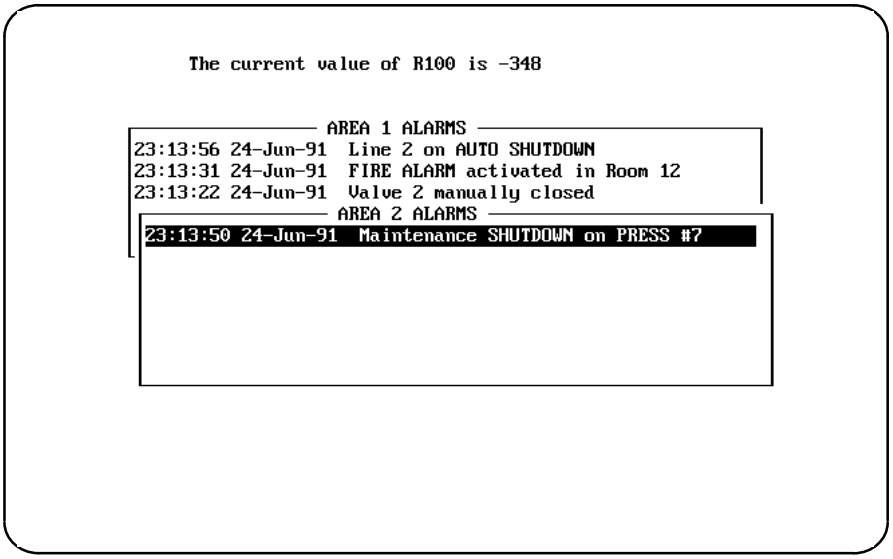
Confirming an Alarm

In the example below, assume that you want to confirm the second entry on the alarm page. Press the [–] key to position the entry at the top of the alarm page.



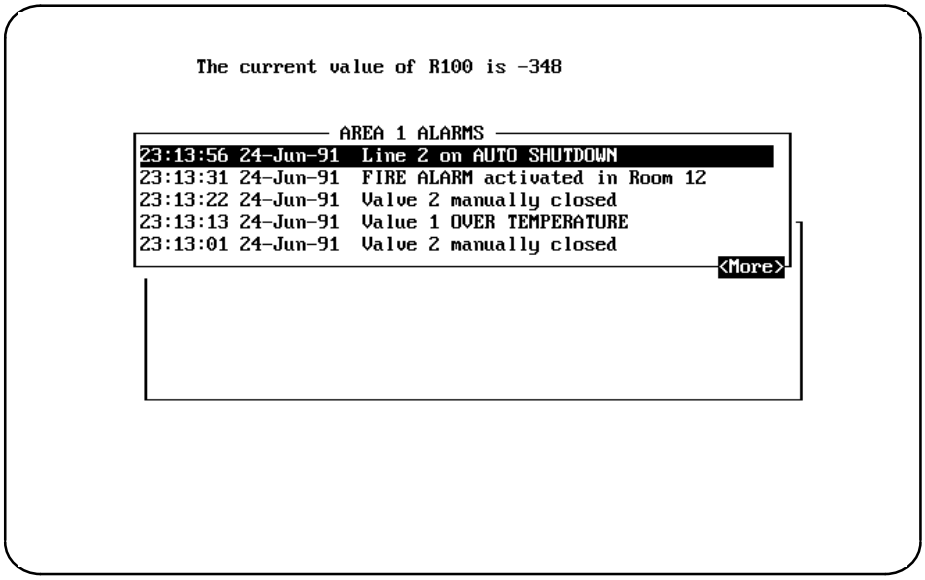
Note that a **<More>** prompt is now shown at the top of the alarm page to indicate that an entry has been scrolled off the page at the top. Additionally, note that this particular alarm is also displayed on the alarm page under the topmost one.

Press the [Enter] key to confirm the alarm. If the alarm condition no longer exists (as in this example), it will be removed from all alarm pages containing it (both pages in this example). If the alarm condition still exists after being confirmed, the entry will stop blinking and remain on all pages containing it. If this were the case, the source of the alarm condition would still need to be removed. Note that the alarm confirmation mode is still in effect.



As mentioned above, you can only confirm alarms on the topmost displayed alarm page. The stack of alarm pages on the screen can be cycled by pressing the [‡] key multiple times. This allows the operator to confirm alarms on covered alarm pages.

Continuing with our example sequence, press the [‡] key while still in confirmation mode to access the AREA 1 ALARMS alarm page.



When you want to exit the confirmation mode press the [z] key.

Command Driven Alarm Acknowledgement

The ACK_ALARM command (see table 3-23 under Command Scripts) provides an alternative method for acknowledging alarms. It can be used whether or not any alarm pages are displayed, and its three variants allow you in a single step to either: (a) acknowledge all alarms in the entire system, (b) acknowledge all alarms logged on a particular alarm page, or (c) acknowledge all alarms generated by a particular alarm source.

This command is especially useful in two different situations. First, it supports an easy method to acknowledge a number of alarms which have been logged due to a single failure without individually acknowledging each one. Second, when coupled with PLCSET commands in a command script, you can provide a mechanism whereby multiple ADS systems (running on multiple ADC modules) within the same PLC can ”inform” each other when a particular alarm has been acknowledged at one of the ”stations” (within one ADS system).

Disabling of Alarm Logging

During execution, if the total available memory on the ADC module falls below 30,000 bytes, or the largest block of contiguous bytes falls below 8,000 bytes, logging alarm text to the alarm pages is automatically disabled; alarm actions are unaffected and still occur normally. A message noting that alarm logging has been disabled will be placed on the nine lowest numbered alarm pages in the system. By acknowledging previously

acknowledged alarms memory may be freed up to re-enable alarm logging. Total available memory must increase to at least 32,000 bytes for alarm logging to be re-enabled. Again, a message will be logged to the nine lowest numbered alarm pages noting that alarm logging has been re-enabled.

Section 5: Printing Data to a Printer

All reports (see REPORT command) to be sent to a printer during system execution are processed by a print spooler. This is done so that printing may be performed in parallel with data monitoring and alarming. The print spooler can only handle five outstanding requests at any one time. If a sixth request is attempted with five outstanding requests, the ADS Executor will reject the request.

If an alarm source evaluates an alarm condition, and its "log to printer" flag is set to "Y" (see Chapter 8), the defined text for the alarm condition and the time the alarm occurred (if enabled) will be sent to the printer. As alarms have priority over reports, an alarm log may occur while a report is being printed.

Section 6: Exit Executor

You can exit a system in one of two ways.

1. First, and most frequently used, a function key can be pressed to which the EXIT() command has been assigned (refer to the discussion on Key Assignments and Command Scripts in Chapter 3 for details).
2. The second way to Exit a system is to press the <Exit system execution> key from any screen.

Error Messages for Running an ADS System: Starting the ADS Execution

Error messages and their causes for running an ADS system and starting the ADS execution are listed below.

Cannot pop the top screen

If only a single screen is currently displayed on the terminal display, it may not be popped. This error will also occur if you attempt to pop a screen that does not exist or is not currently displayed.

Could not clear fault table

A clear fault table command was rejected by the CPU either because of a privilege level violation, or (for Series 90-30 only) the Logicmaster 90-30 software is actively communicating with the CPU.

ENTRY ERROR :: value outside range for dynamic object XXXX

While editing dynamic object "XXXX" a value was entered outside the defined min / max range for that object; the edit remains active.

Error loading system (XXXX)

Some error, typically identified by a previously displayed error message, occurred while attempting to load system "XXXX".

Error verifying screen file XXXX.n

While loading screen file number "n" for system XXXX, an error was detected. Typically, this error is caused by deleting some component of the system (e.g., a display format) which is referenced by a dynamic object on the screen. The same error message will be seen if the screen file is found to be corrupted.

Fault option module is not installed

One of the fault modules access commands was executed without the fault module being installed on the ADC module.

Initializing physical display failed [-10] ...

When the ADS execute-only environment was installed onto the ADC module, the specified terminal table did not exist on the ADC module. Include the required terminal table via the ADS Setup Utility and then reinstall the execute-only environment on the ADS module.

Insufficient memory (Data Manager)

The total available memory on the ADC module dropped to below 17,000 bytes while the Data Manager (part of the ADS Executor) was attempting to allocate memory. Typically, this is not a fatal error; however, data being displayed on the screen may cease to be updated. Acknowledging alarms not previously acknowledged may help correct this situation; otherwise, a soft reset of the ADC module will be required.

Insufficient memory to load system

Not enough free memory exists on the ADC module to load the system into the Executor with the current selection of options.

MEMORY LEVEL CRITICALLY LOW

The amount of free memory on the ADC module has dropped to below 30,000 bytes. As a consequence, logging to alarm pages has automatically been disabled. Additional screen pushes, reports, etc. may fail to execute; no fatal error has occurred upon receiving this message, however.

PID option module is not installed

One of the PID module access commands was executed without the PID module being installed on the ADC module.

PLC comms failure for alarm source YYYY

PLC comms failure for object XXXX

The PLC location referenced in the data source attached to dynamic object ”XXXX”, or the PLC location referenced in alarm source ”YYYY”, does not exist in the PLC.

Waiting on data manager to complete initialization

The CPU is not communicating with the ADC module. Typically, this is due to the ADC module not being configured properly with the Logicmaster 90 configuration software.

Chapter 15 Fault Tables Module

The ADS Fault Tables module provides an interface to the CPUs PLC fault table and I/O fault table in a manner consistent with that provided by the Logicmaster™ 90 programming and configuration software packages.

The ADS Fault Tables module is an optional software module that you can install on the ADC board. Once loaded on the board, the Fault Tables module can be accessed as a stand alone system (i.e., without using an ADS system) or as a set of predefined screens which can be invoked by commands within an ADS system.

Overview of the Fault Tables Module

For information on how to install the Fault Tables module, refer to Sections 4 and 5 in Chapter 7 - ADS Setup Utility, in the CIMPLICITY 90-ADS User's Manual.

Running the Fault Tables Module in Stand Alone Mode

The Fault Tables module can be executed in stand alone mode only when the ADS Software Development Environment has been installed on the ADC module. The Fault Tables module must have been included into the development environment via the ADS Setup Utility.

When the Fault Tables module is correctly installed on the ADC board, the ADS Menu Program will indicate that the module is "Loaded".

On the ADS menu screen, first specify an appropriate terminal type for the current display device (e.g., COIT), then select option 6 (Run ADS Fault). A message "Fault Tables Module Starting" will be displayed, followed by the CIMPLICITY 90-ADS copyright screen. Upon pressing the [Enter] key, the PLC fault table screen will initially be displayed.

Pressing the <Exit> function key will return you to the ADS Menu Program Screen.

Accessing the Fault Module From an ADS System

The Fault Tables module may be accessed from within an ADS system when either the Development or the Execute-Only environment is installed on the ADC. In either case, the Fault Tables module must have been included in the applicable environment via the ADS Setup Utility.

When you are in an ADS system, the Fault Tables module is accessed by one of two commands:

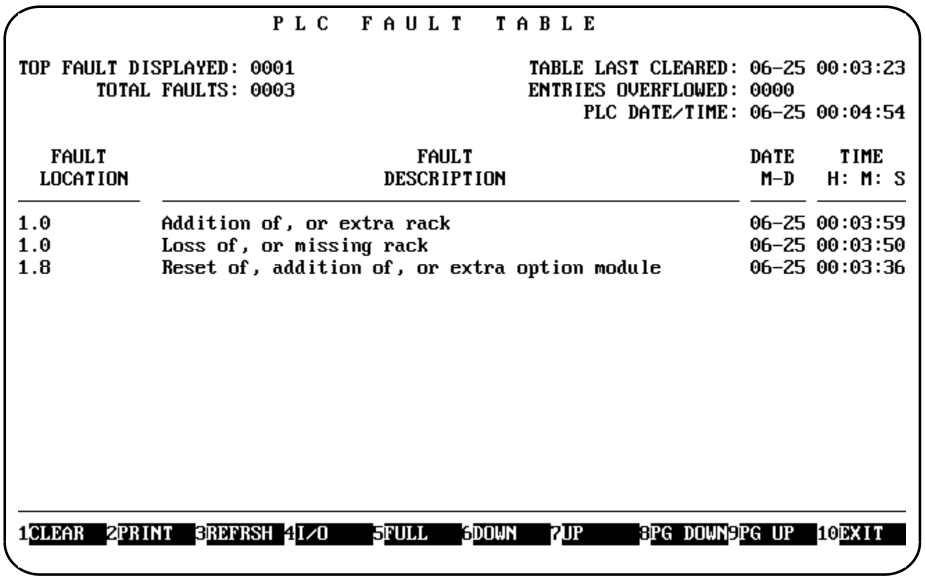
```
PLC_FAULT( )
IO_FAULT ( )
```

These commands are more fully described in Chapter 3, Command Scripts. The PLC_FAULT command causes the PLC fault table screen to be displayed, while the IO_FAULT command causes the I/O fault table screen to be displayed.

Pressing the <Exit> function key returns you to the ADS screen from which the command was invoked.

Using the Fault Tables Module

The next two screens show the PLC and I/O fault table screens respectively.

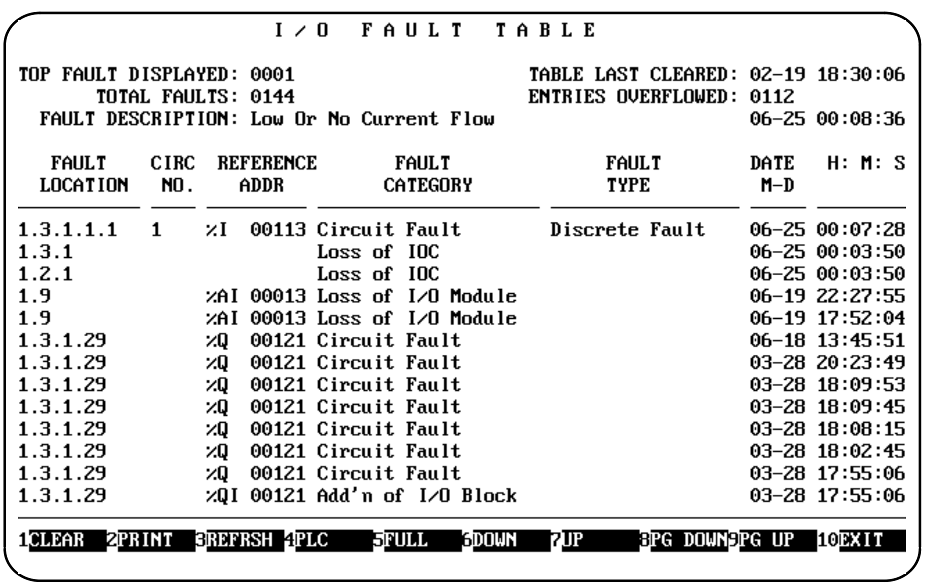


P L C F A U L T T A B L E

TOP FAULT DISPLAYED: 0001 — TABLE LAST CLEARED: 06-25 00:03:23
TOTAL FAULTS: 0003 — ENTRIES OVERFLOWED: 0000
PLC DATE/TIME: 06-25 00:04:54

FAULT LOCATION	FAULT DESCRIPTION	DATE M-D	TIME H: M: S
1.0	Addition of, or extra rack	06-25	00:03:59
1.0	Loss of, or missing rack	06-25	00:03:50
1.8	Reset of, addition of, or extra option module	06-25	00:03:36

1CLEAR 2PRINT 3REFRSH 4I/O 5FULL 6DOWN 7UP 8PG DOWN 9PG UP 10EXIT



I / O F A U L T T A B L E

TOP FAULT DISPLAYED: 0001 — TABLE LAST CLEARED: 02-19 18:30:06
TOTAL FAULTS: 0144 — ENTRIES OVERFLOWED: 0112
FAULT DESCRIPTION: Low Or No Current Flow — 06-25 00:08:36

FAULT LOCATION	CIRC NO.	REFERENCE ADDR	FAULT CATEGORY	FAULT TYPE	DATE M-D	H: M: S
1.3.1.1.1	1	%I 00113	Circuit Fault	Discrete Fault	06-25	00:07:28
1.3.1			Loss of IOC		06-25	00:03:50
1.2.1			Loss of IOC		06-25	00:03:50
1.9		%AI 00013	Loss of I/O Module		06-19	22:27:55
1.9		%AI 00013	Loss of I/O Module		06-19	17:52:04
1.3.1.29		%Q 00121	Circuit Fault		06-18	13:45:51
1.3.1.29		%Q 00121	Circuit Fault		03-28	20:23:49
1.3.1.29		%Q 00121	Circuit Fault		03-28	18:09:53
1.3.1.29		%Q 00121	Circuit Fault		03-28	18:09:45
1.3.1.29		%Q 00121	Circuit Fault		03-28	18:08:15
1.3.1.29		%Q 00121	Circuit Fault		03-28	18:02:45
1.3.1.29		%Q 00121	Circuit Fault		03-28	17:55:06
1.3.1.29		%QI 00121	Add'n of I/O Block		03-28	17:55:06

1CLEAR 2PRINT 3REFRSH 4PLC 5FULL 6DOWN 7UP 8PG DOWN 9PG UP 10EXIT

The same set of function keys is provided for each of the two screens. Each of the keys is discussed below.

The <Clear> function key is assigned to the [F1] key. It is used to clear the displayed fault table (only) in the PLC. If the table is cleared successfully, all the displayed entries will be removed from the screen. Should the clear fail, an error message will be displayed at the bottom of the screen (failure may occur due to the CPU being password protected, etc.).

Note

Fault tables in the Series 90-30 CPU may not be cleared when the Logicmaster 90 software is running on a computer attached to the CPUs programming part.

The <Print> function is assigned to the [F2] key. It is used to print an ASCII representation of the current display to an attached printer. Use of this function requires that the Print Spooler be installed on the ADC module. The <Print> function key will not be available when the Fault Tables module is run from the Menu program in development mode.

The <Refrsh> function key, assigned to [F3] is used to repaint the display.

Access to the fault table screen not currently displayed is provided via the [F4] key. It will always be labeled with the fault table screen you would access if the key were pressed.

The <Full> ([F5] key) function key provides additional encoded information concerning the currently highlighted fault entry. Consult your Logicmaster 90 or 90-30 / 90-20 Reference Manual for details on how to decode this information.

The <Down>, <Up>, <Pg Down>, and <Pg Up> function keys ([F6], [F7], [F8], and [F9], respectively) are used to scroll through the fault table entries and to highlight a specific fault table entry.

The <Exit> function key, assigned to the [F10] key, is used to exit the Fault Tables module.

Chapter 16 PID Templates Module

The ADS PID module provides a complete interface to the Series 90 PID loops allowing you to configure, monitor and tune loops that have been established in ladder logic.

The ADS PID module is an optional software module that you can install on the ADC board. Once loaded on the board, the PID module can be accessed as a stand alone system (i.e., without using an ADS system) or as a series of predefined screens which can be invoked by commands within an ADS system.

Note

The PID module may NOT be executed on either the GE Fanuc Mini or Touch Mini OIT terminal. It can be run on all other supported terminals.

Overview of the PID Module

For information on how to install the PID module, refer to Sections 4 and 5 in Chapter 7 - ADS Setup Utility, in the CIMPLICITY 90-ADS User's Manual. Also, refer to Chapter 13, Options PID, in this manual for information on using the PC-Based Builder to create the necessary loop definitions for the PID option module.

Running the PID Module in Stand Alone Mode

The PID module can be executed in stand alone mode only when the Development environment of the ADS software has been installed on the ADC module. The PID module must have been included in the Development version via the ADS Setup Utility.

When the PID module is correctly installed on the ADC board, the ADS Menu Program will indicate that the module is LOADED.

From the ADS Main Menu, select an appropriate terminal type for the current display device (e.g. COIT). Select option 7 from the menu (Run ADS PID). A message "PID Module Starting" will be displayed, followed by the CIMPLICITY 90-ADS copyright screen.

If a PID setup file is located (see "Save Loop Definitions to File" below) it will be restored at this time and a message will be displayed to indicate that this is the case. If a PID startup file is located (see "PID Module Startup File" below) this information will also be loaded and an appropriate message will be displayed. After the PID startup file information has been loaded, the PID Configuration screen will be displayed with the information for the loop specified in the startup file for the configuration screen (providing the loop name specified is a valid one).

If no PID startup file is located, an appropriate message is displayed and the first loop located in the PID setup file is displayed on the PID Configuration Screen.

If no PID setup file is located, an appropriate message is displayed to indicate this. In this case, the first screen displayed is the PID Loop Setup Screen.

Pressing the Exit function key will return you to the menu program.

Accessing the PID Module From an ADS System

The PID module can be accessed from within an ADS system when either the Development or the Execute-Only ADS environment is installed on the ADC. In either case, the PID module must have been included in the applicable environment via the ADS Setup Utility.

When you are in an ADS system, the PID module is accessed by one of four commands:

```
SETUP_LOOP()
CONFIGURE_LOOP()
MONITOR_LOOP()
TUNE_LOOP()
```

These commands are more fully described in Chapter 3 (Command Scripts). Each of the above commands causes one specific screen to be displayed (e.g., the CONFIGURE_LOOP command causes the PID Configuration Screen to be displayed). Once the screen has been displayed, you can move freely between the other screens that make up the PID modules.

Note

For security reasons, when the PID module is accessed from an ADS system, the Loop Setup screens cannot be accessed from any other PID screen; it can only be accessed from a SETUP_LOOP() command.

The functionality of the SETUP_LOOP screen will not be accessible if the PID module was installed without the Loop Setup screen. See the Setup Screen discussion below and Sections 4 and 5 in Chapter 7 - ADS Setup Utility, in the ADS User's Manual, GFK-0499, for more information on the installation of the PID module with and without Setup functionality.

Pressing the EXIT function key (F10) returns you to the ADS screen from which the command was invoked.

General Operation of the PID Module

Using the PID module consists of a number of basic steps:

- *Setup loop definitions*
- *Configure individual loops*
- *Monitor and tune loops*

Loops must be setup prior to using them. In the setup phase, you have to indicate certain basic information about the loop (such as its address in PLC memory, etc.).

Once loops are setup, they can be configured (if this has been permitted in the setup phase). Configuration allows you, at run time, to alter the fundamental operating parameters for a loop, which determines its mode of operation. To assist in loop configuration, the PID module provides monitoring and tuning screens.

In the monitoring screen, you can examine the instantaneous relationship between the loop setpoint and process variables as well as drive the loop in a manual mode (if this has been permitted in the setup phase). This information is displayed using the "pid faceplate".

In the tuning screen, you can examine the relationship between the loop setpoint, process variable and control variable over time. You can also select the sampling rate being used. This information is displayed as a three-line trend.

PID Startup File

The PID startup file is a file that retains the screen configurations of the last execution of the PID module. This allows the PID module to begin in the same state that it was last executed.

Note

It is recommended that you use the PC-Based Builder to manage the initialization of the PID startup file. Refer to Chapter 13, Options PID, in this manual for more information.

During execution of the PID module, whenever a loop is selected on either of the three screens or deleted on the setup screen, certain information describing the currently selected loops for each screen will be saved to a PID.STR file. Each time the PID module is entered, either a *system_name*.STR or the PID.STR file will be read to determine which loops the configuration, monitor, and tuning screens should use at their startup. The PID module will look first for the *system_name*.STR file, if it does not exist then the module will use the PID.STR file. The .STR file may contain startup information for none, some or all screens. The configuration screen will always be the first one shown when entering the module from the ADS menu; when entering the module from an existing system, the appropriate screen, based on the function call, will startup using the *system_name*.STR or PID.STR file.

If there are loop names in the .STR file that do not exist in the PID.PID or *system _name*.PID file, these loops will be ignored. If there is no .STR file or there is no startup information for a particular screen, that screen will begin without any currently selected loop.

You can read and edit the .STR files. An example is shown below.

```
Configuration        PRESSURE
Monitor (1)          MAIN_LOOP
Monitor (2)          TEMP_MONITOR
Monitor (3)          DRIVE_MOTOR
Monitor (4)          PRESSURE
Tuning               MAIN_LOOP
```

Note

The PID module will only look for startup files in the RAM memory of the ADC module. If you want to create a permanent startup file, you will need to:

1. Set the screens of the PID module up the way that you want the module to startup each time.
2. Exit the PID module.
3. Copy the PID.STR file from the ADC module to the PC using PCOP.
4. Edit the file (this is only necessary if the PID screens were not setup in the desired position before exiting the system).
5. Rename the PID.STR file as *system_name*.STR.
6. Copy the new file from the PC to the ADC module.

Now when the PID module starts-up it will always read the *system_name*.STR file, and when it exits it will still write the PID.STR file.

PID Module Screens

The ADS PID module consists of four screens:

- *PID Loop Setup*
- *PID Loop Configuration*
- *PID Loop Monitoring*
- *PID Loop Tuning*

All of the screens have a set of soft key definitions displayed at the bottom of the screen. Function keys F1 to F4 and F10 are defined the same on all screens:

- *F1 takes you to the Setup Screen*
- *F2 takes you to the Configuration Screen*
- *F3 takes you to the Monitor Screen*
- *F4 takes you to the Tuning Screen*
- *F10 exits the PID module*

When you are in a particular screen, the soft key that takes you to that screen is unavailable. The other soft keys vary from screen to screen.

Note

If you are operating the PID module with touch screens you will have access to one additional soft key on the Configuration, Monitor, and Tuning screens. The F9 key toggles between "KYPD EN" and "KYPD DS" and is used to turn the touch keypad on and off as required. On all non-touch terminals the F9 sofkey is inactive on the three screens mentioned above.

Setup Screen

The Setup Screen provides the mechanism for defining loops under the PID module. The information provided allows you to access the loop in PLC memory, enforce user access limitations, set engineering scales, etc. Loops must be defined in the Setup Screen prior to using them. The PID Setup Screen is accessed from all other screens by pressing F1 (only when the PID module is run stand alone).

Note

It is recommended that you use the PC-Based Builder to create and modify the loop definitions. Refer to Chapter 13, Options PID, in this manual for more information.

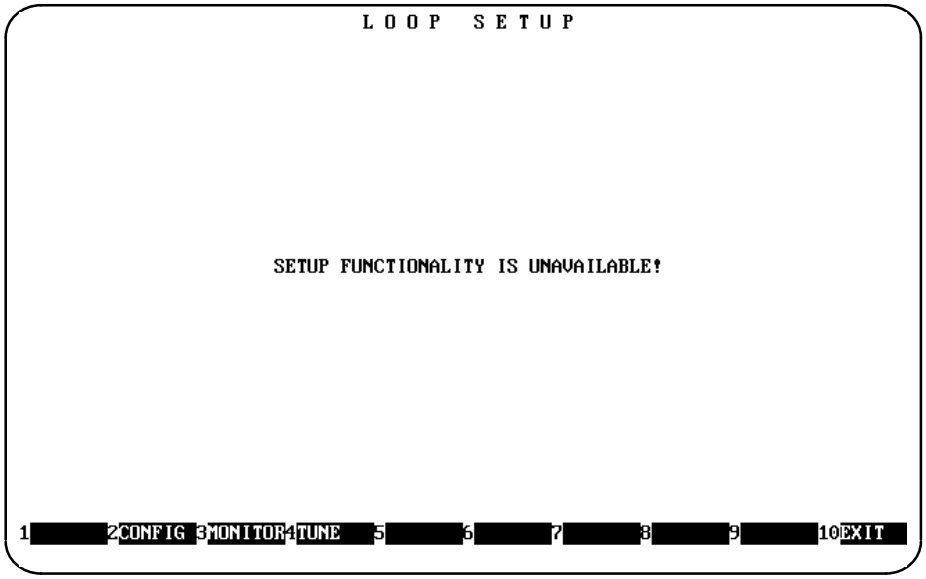
The PID module can be installed with or without the functionality of the Setup Screen. As a system is being developed there may be frequent and necessary use of the functionality presented by the Loop Setup screen, but after a system has been developed there is usually no need to change the definitions of the loops. In most cases, in an executing system, access to the PID loops through the Loop Setup screen is restricted. Therefore, you are allowed to choose whether or not to install the PID module with or without Loop Setup functionality.

Installing the PID module without the Loop Setup Screen will save approximately 25K bytes of internal memory on the ADC module. This may prove to be useful for systems which have been completely developed and are in critical memory situations. For more information on installing the PID module, see Sections 4 an 5 in Chapter 7 (ADS Setup Utility) in the ADS User's Manual, GFK-0499.

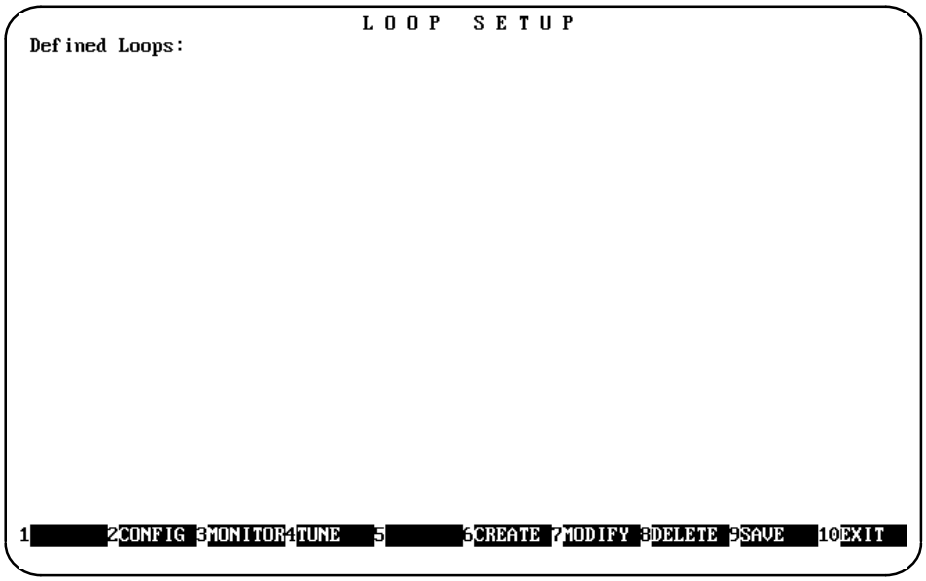
Note

This installation option is only available in the Execute-Only ADS environment.

If you try to access the Setup Screen when the PID module is installed *without* the Setup Screen, the following screen will be displayed.



If the PID module has been installed *with* the PID module, and you try to access the Setup Screen, the following screen will be displayed and the functionality described below will be available.



The PID Setup Screen provides four basic functions:

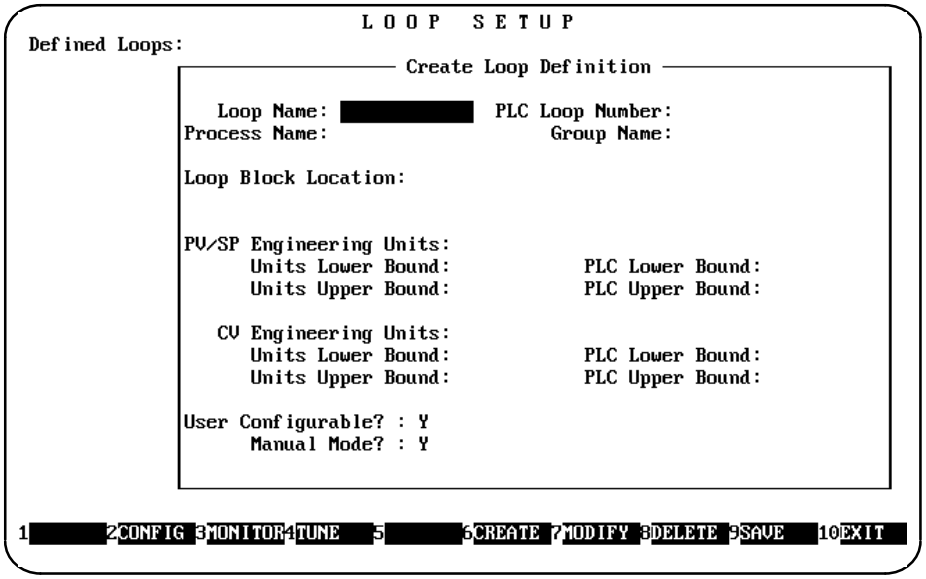
- *Create a loop definition*
- *Modify a loop definition*
- *Delete a loop Definition*
- *Save loop definitions to file*

Create a Loop Definition

Note

Prior to creating a loop definition, you need to know the address of the PID Loop in PLC memory and the required engineering units used. If a valid loop is not located at the specified memory address or the engineering units are invalid, erratic data will be displayed.

On the left-hand side of the screen is a list of currently defined loops (sorted alphabetically by name). To create a loop definition, press F6. A loop definition data entry window is then displayed.



To move between fields in the data entry window, press the [Return] key (to move to next field) or use the [–] and [ ] keys to move to the next and previous fields, respectively.

The first field contains the name of the loop. This is a name that you select and can be up to 12 characters long. The loop name must be unique among the currently defined loops listed on the left side of the screen. If the entered name is not unique, an error will be reported. The loop name should convey some information about the loop allowing it to be easily identified.

The second field contains the loop number. The loop number must also be unique. If a duplicate number is entered, an error will be flagged.

The Process Name and Group Name fields allow you to enter information about the loop which help identify the part of the process that the loop belongs to. These fields are

optional and can contain any information desired. Up to 12 characters can be entered in each field. Note that the data is not forced into upper case - it is displayed exactly as you enter it. The Process Name entry can also serve as a more detailed description of the functionality of the loop than only the loop name. The Process Name is displayed beside the loop name in the PID loop selection menu.

The Loop Block Location specifies the address of the loop in PLC memory. This address specifies a block of information pertaining to the loop. For more details refer to Chapter 11 of the Logicmaster 90 Programming Software Reference Manual, GFK-0265; Series 90-30 users refer to Chapter 10 of the Series 90-30 / 90-20 Programmable Controllers Reference Manual, GFK-0467.

An invalid location is indicated by an error message.

Note

When Loops are setup in PLC ladder logic, the maximum control over the loop can be obtained by ensuring that the PV and SP locations point to the PV and SP values contained in the loop block. This prevents SP adjustment being automatically overridden by the PLC when the loop is placed back into automatic mode (see Loop Monitoring for details).

Two sets of engineering units can be entered - PV / SP units and CV units. Both are optional and both operate in the same manner.

Where PV / SP units are specified, all values relating to the Setpoint and Process variables (including values such as DEADBAND) are scaled using this set of units. If the CV units are NOT specified, all CV related values (including, for instance, CLAMP) are scaled using the PV / SP units.

If CV units are specified, all CV related values will be scaled using these units regardless of whether or not PV / SP units have been specified. Engineering units consist of four values:

- *unit lower and upper bound (ul and uu)*
- *PLC lower and upper bound (pl and pu)*

For a given value in the PLC (C), the resultant value in the specified engineering units (E) is derived using the following formula:

$$E = (uu - ul / \frac{pu - pl}{C - pl}) + ul$$

Note that the PLC lower and upper bounds act as value limiters such that:

if (C w pu) then E = uu
if (C v pl) then E = ul

The Engineering Units field is a text description of the units that are displayed after any values that have been scaled to the specified units. For instance, if the values are being scaled to represent degrees centigrade, an appropriate unit description may be DEGC. Some form of description must be entered if engineering units are to be used.

The Units Lower and Upper Bounds represent the minimum and maximum values to be represented in the desired engineering units. These values are signed floating point numbers in the range of –9999999.99 to +9999999.99.

The PLC Lower and Upper Bounds represent the minimum and maximum values to be used in the PLC. These values are signed integer values in the ranges –32768 to +32767 (this being the permitted range of values in the PLCs PID Loops).

Note

While it is not necessary, it is highly desirable that the range of both units and PLC values move uniformly from negative to positive values (particularly for CV values). That is, if negative values are used as the PLCs values, the unit values should also contain negative values.

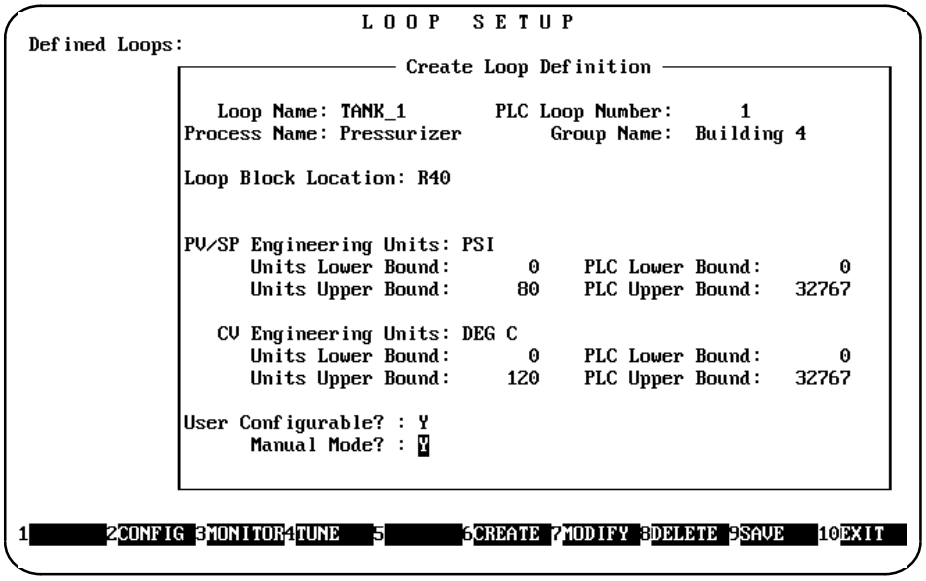
The last two fields control the actions that you may perform on the loop at run time. The User Configurable flag determines whether you are permitted to alter loop configuration values (using the configuration screen). Either "Y" or "N" must be entered in this field. Note that the default value allows you to configure the loop.

The Manual Mode flag controls whether or not you are permitted to set the loop into manual mode (and control the values of CV and SP directly). Either "Y" or "N" must be entered. Note that the default value allows you to control the loop manually.

The "Y" and "N" values of the User Configurable and Manual Mode flags can be toggled between the two valid choices by pressing the [SPACEBAR] or the [.] key.

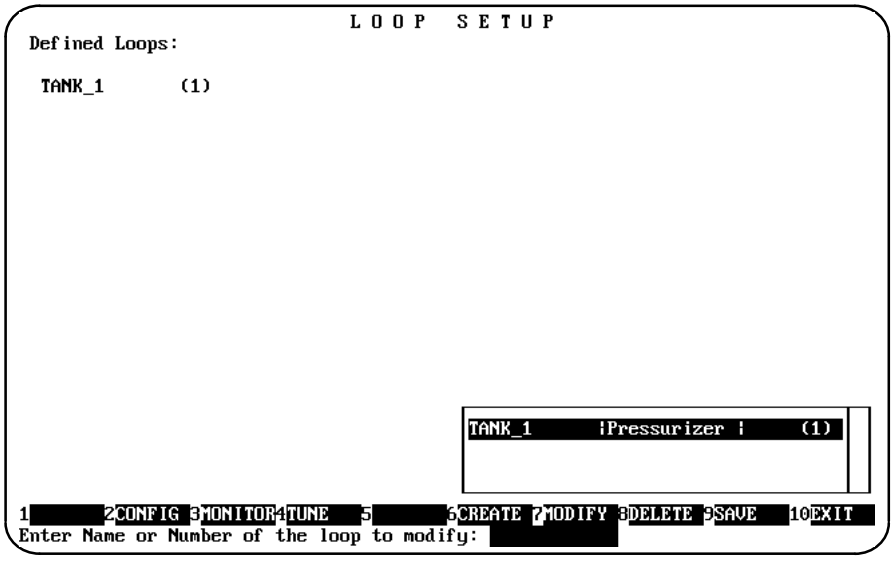
When all of the required information has been entered, press <Save> or [Return] when positioned on the last field. The values entered will be checked and, if valid, the new loop information stored. The list of defined loops displayed on the Setup screen will be updated to include the new loop.

An example loop definition is shown below.



Modify a Loop Definition

To modify the definition of a previously defined loop, press F7. A prompt is displayed on the bottom line of the screen requesting that you enter the name or number of the loop to be modified. A loop selection menu which contains all of the currently existing loop names is also displayed.



Note

The example shown above shows the LOOP CONFIGURATION screen, but the same Loop Selection functionality is also available for the MONITOR and TUNING screens.

To select a valid loop, the Loop Name or the Loop Number of the desired loop can be entered by typing-in the name or number, or the [ ] and [–] keys can be used to move the selection bar of the Loop Selection Menu over the desired choice in the menu. The <GOLD> [ ] and <GOLD> [–] keys can be used to page through the menu if there is more than one window of loop names. <GOLD> [T] and <GOLD> [B] will advance the loop selection menu cursor to the top and bottom lines, respectively. Pressing the [Return] key once the desired loop name has been highlighted will select that loop.

If any characters have been entered into the prompt field at the bottom of the screen, they will be accepted as the loop name instead of the highlighted entry in the Loop Selection menu. If a valid name or number has been specified, the data entry window will be displayed with the information from the loop entered into the fields. The initial field for editing is set to the loop number.

All fields, except the loop's name, can be modified (refer to the previous discussion on Creating Loops for details of the fields).

When the required modifications have been made, press <Save> (or [Return] on the last field) to retain the modifications. If the modifications are not required to be saved, press <Quit> at any time.

Delete a Loop Definition

To delete (irrevocably) a loop definition, press the F8 key. A prompt will be displayed requesting the name or number of the loop to be deleted. A loop selection menu that contains all of the currently existing loop names is also displayed. (See "Modify a Loop Definition" above for information on selecting a valid loop.)

If a valid loop is specified, the loop information will be displayed in a data entry window and you will be prompted to confirm the deletion of the loop.

If the loop deletion is confirmed, the loop will be irreversibly deleted from the current list of loops. The list of defined loops will be updated to reflect the change.

Save Loop Definitions to File

Pressing the F9 key allows you to save the current set of loop definitions to a file. PID.PID will be displayed as the default name on the screen. The loop definitions may be saved to a file of any name, but the PID module only looks for certain files as it starts up. If PID is called stand alone, the file PID.PID is loaded automatically. For PID calls from an ADS system, an attempt is made to load the <system_name>.PID file. If that fails, the file PID.PID will be loaded.

Loop Configuration Screen

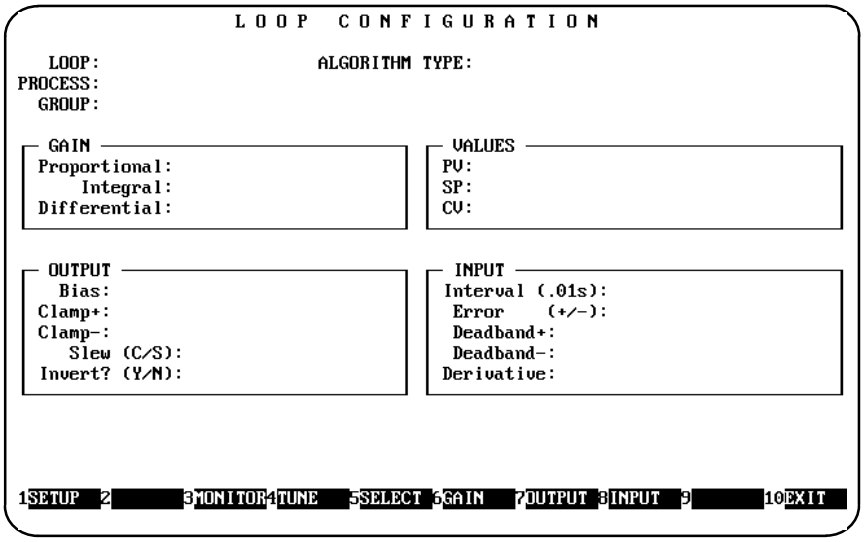
The Loop Configuration screen allows you to set fundamental values that determine how a loop will operate. Loop configuration parameters can only be changed if the Loop Definition has the User Configurable flag set to "Y". Regardless of the value of this flag, you can view the configuration screen.

The Loop Configuration screen is accessed from all other screens by pressing the F2 key. The Loop Configuration screen consists of five sections:

- *Loop Identification*
- *Current Loop SP, PV, CV values*
- *Loop GAIN parameters*
- *Loop OUTPUT parameters*
- *Loop INPUT parameters*

Of these five sections, three (GAIN, OUTPUT, and INPUT) may be modified by the user (if the User Configurable flag is set). The other two sections are for information only.

The values in all sections (except for Loop Identification) are updated once per second from the PLC to ensure that the data is up to date. Updates are suspended for a section being modified. You should understand the various loop configuration parameters before attempting to modify them. Refer to the Series 90-70 Programmable Controller Reference manual for details.



Selecting a Loop to Configure

Upon entry to the Configuration screen, the current loop's information will be displayed. The current loop is either:

- the first loop located in the Loop Setup file,
- the loop specified in the PID startup file, or
- the last modified loop

The current loop can be selected by pressing F5 (Select). You will then be prompted for the name or number of the loop to be configured, and a loop selection menu that contains all of the currently existing loop names is also displayed. Upon entry of a valid name or number, the selected loop information will be displayed. (See "Modify a Loop Definition" above for information on selecting a valid loop).

Modifying Loop Configurations

When a portion of the loop configuration is selected for modification the first field is presented in reverse video with the value left justified. To move to the next field, press the [Return] or [–] key. To move to the previous field, use the [ ] key. Fields are arranged in a circular fashion such that pressing the [–] key when you are on the last field will cause a move to the first field in the section. To save values, press the [Return] key while positioned on the last field. To abandon changes to the current section, press the <Quit> key.

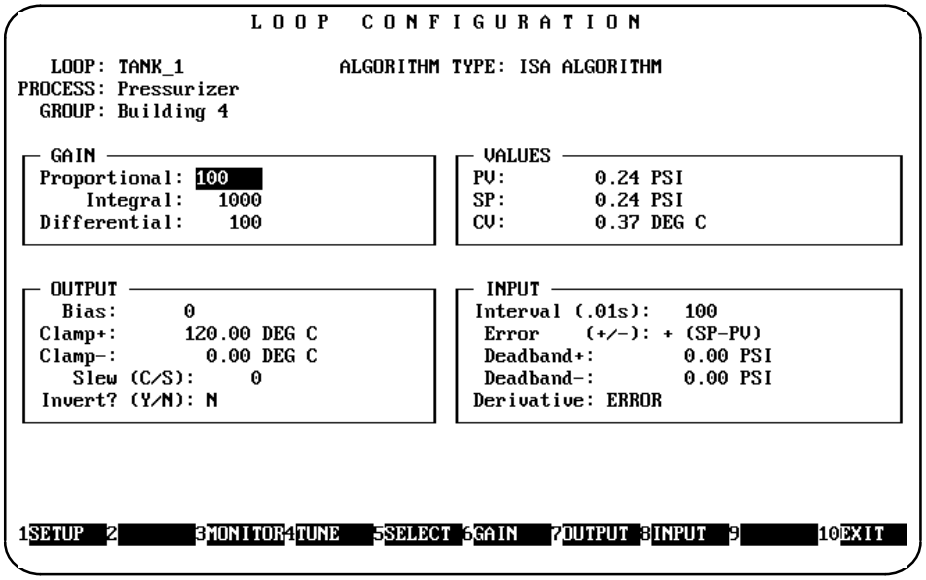
If values are saved, they are written to the loop configuration block in the PLC. If Quit was used. the original values in the PLC are returned at the next 1 second scan.

Configuring the Loop Gain

Pressing the F6 key places the gain section of the Loop Configuration into edit mode. While in edit mode, updates of the gain section from the PLC are suspended. Three values constitute the gain section:

- Proportional Gain
- Integral Gain
- Differential Gain

All values are displayed "raw" from the PLC (i.e., without scaling) and have different meanings within the PLC. For instance, the Proportional Gain figure represents an interval expressed in units of .01 seconds.



Configuring the Loop Output

Pressing the F7 key places the output section of the Loop Configuration into edit mode. While in edit mode, updates of the output section from the PLC are suspended. The output section consists of five values:

- *Bias (as a raw value)*
- *Clamp upper (in engineering units for CV)*
- *Clamp lower (in engineering units for CV)*
- *Slew (as a raw value, counts per second)*
- *Invert Output (Y or N)*

The Invert Output value can be toggled between "Y" and "N" by pressing the [SPACEBAR] or by pressing the [.] key.

Note that the clamp outputs are entered in engineering units which are then automatically converted back into PLC values prior to being written to the PLC.

Configuring the Loop Input

Pressing the F8 key places the input section of the Loop Configuration into the edit mode. While in the edit mode, updates of the input section from the PLC are suspended. The input section consists of five values:

- *Interval (as a raw value, units of .01 seconds)*
- *Error (+ or –) - see note 1*
- *Deadband+ (in engineering units for PV/SP) - see note 2*
- *Deadband- (in engineering units for PV/SP)*
- *Derivative (ERROR or PV) - see note 3*

1. An error value of + indicates that the error term of the loop is calculated by SP – PV. A value of – indicates that the sign of the error is negated by using the calculation PV – SP.
2. The deadband values are entered in engineering units which are then automatically converted back into PLC values prior to being written to the PLC.
3. A derivative value of ERROR indicates that the derivative is based on the error term of the loop. A value of PV indicates that it is based on the process variable value.
4. The Error and Derivative values can be toggled by pressing the [SPACEBAR] or the [.] key.

Note

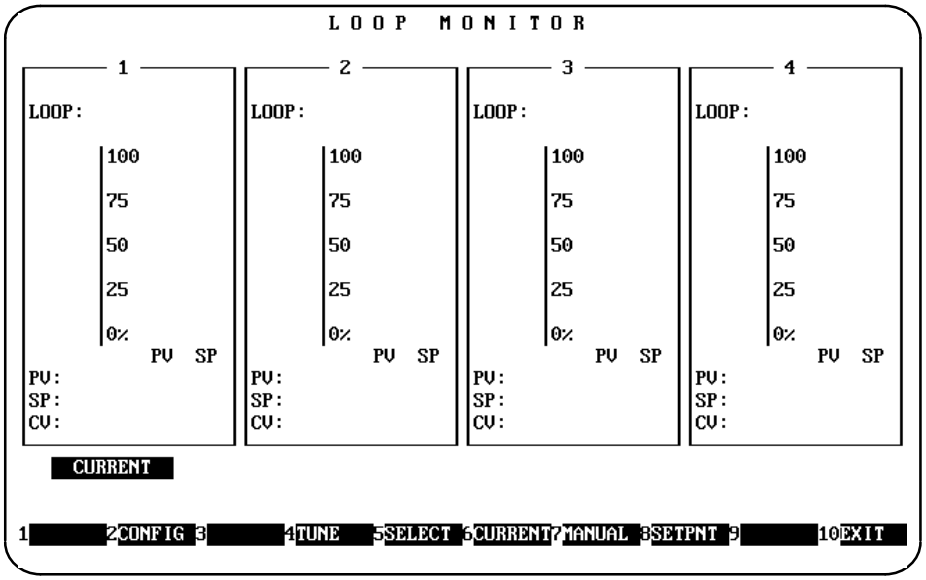
A [+] key is not available on the front panel of the GE Fanuc OIT terminals, nor the Nematron OptiTOUCH terminals. The [.] or the [SPACEBAR] key will function as a toggle between the [+] and [-] keys.

Loop Monitoring Screen

The Loop Monitoring Screen provides a mechanism for viewing the behavior of selected loops in real time as well as controlling the loop (if allowed in the loop setup). Regardless of the loop setup, you can always select and monitor loops.

The Loop Monitoring Screen is accessed from all other screens by pressing the F3 key. The Loop Monitoring Screen consists of four loop faceplates which display the current PV and SP values as bar charts that are scaled from 0 to 100% of value. In addition, each faceplate displays the current values of PV, SP, and CV scaled in their respective engineering units.

In addition, options are available which allow you (if the loop setup permits it) to set the loop into manual mode (in which the CV value can be controlled directly) and to adjust the setpoint value.



Selecting the Current Faceplate

At any one time, one of the loop faceplates is identified as the CURRENT faceplate. The current faceplate is the faceplate that is the target of the loop monitor screen's operations. Note that loop monitoring continues regardless of whether or not a faceplate is selected as being current; the bar charts and values continue to be updated on the screen.

To select the current faceplate, press F6 and enter a number from 1 to 4 at the prompt. The selected faceplate will then be identified as the current faceplate.

Selecting a Loop to Monitor

Once the desired faceplate has been identified as the current faceplate, a loop can be selected for display on that faceplate. To select the loop to be displayed, press F5. A prompt will appear requesting the name or number of a loop to be monitored on the current faceplate. A loop selection menu which contains all of the existing loop names is also displayed.

Upon entry of a valid loop name or number, the current faceplate will be updated to show:

- *the name of the loop*
- *the engineering units for the PV and CV values*
- *the current PV, SP, and CV values scaled to their engineering units*
- *the current PV and SP values as bar charts scaled to represent a value between 0 and 100% of the designated engineering units*

See "Modify a Loop Definition" above for information on selecting a valid loop.

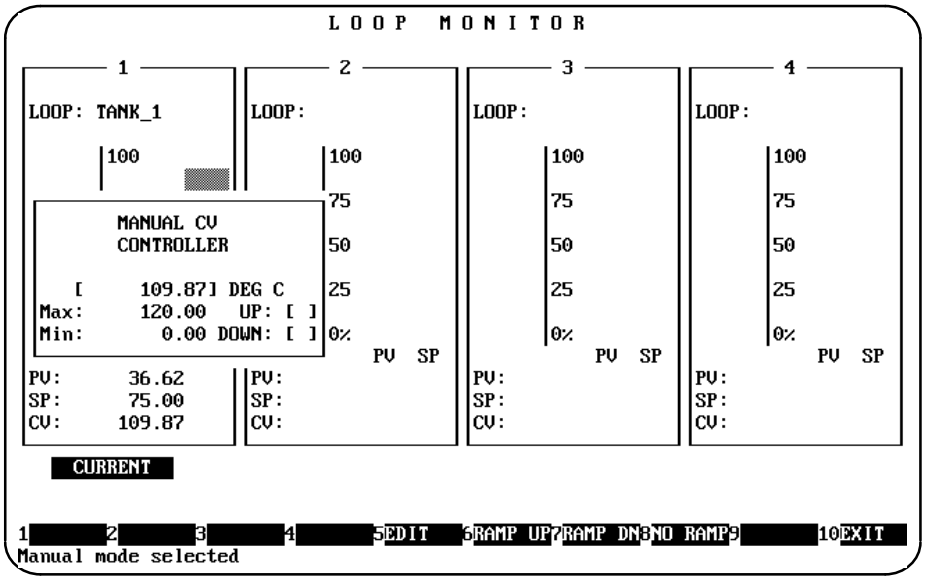
If a 0 (zero) is entered for a loop number, the loop that is being displayed in the current faceplate will be erased and that faceplate will be left blank.

The loop faceplates are updated every one second with fresh data from the PLC.

Using Manual Mode for a Loop

Manual mode can only be used if the loop setup allows manual mode operation. That is, the Manual Mode flag has been set to Y. Placing a loop in manual mode lets you adjust the value of the CV directly without the value being affected by the loop itself. For further details on the effects of manual mode on the loop, refer to the Logicmaster 90 (for 90-70) or Series 90-30 / 90-20 Programmable Controllers Reference Manual.

To place a loop in manual mode, first select the required faceplate as the current faceplate, then press F7. When the loop has been placed into manual mode a small window is placed over part of the faceplate:



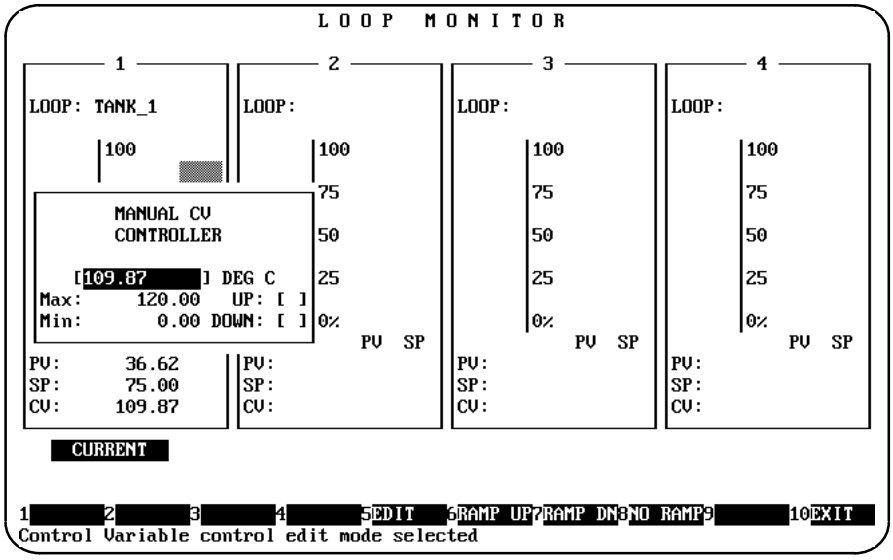
Two other changes will occur once the manual mode window has been placed:

- *the CV value (if it has been changing) will remain at its last value;*
- *the soft keys at the bottom of the screen will change to reflect available functionality while in manual mode.*

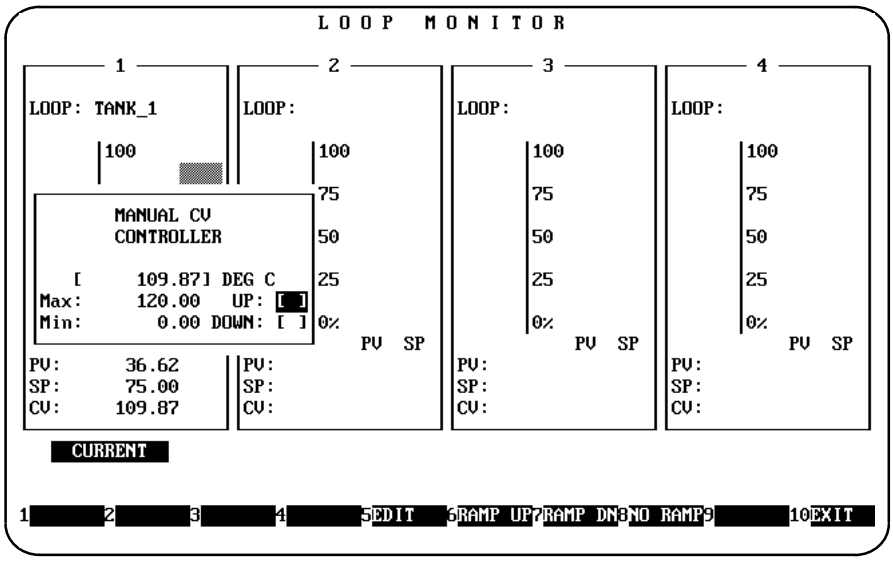
To edit the current CV value press the [F5] key. This will highlight the CV value and place the cursor in that field. Enter the desired value and press [Return]. This causes the new value to be written to the PLC. A message is displayed informing you that the CV value has been modified.

Note

The CV value may not be able to adjust immediately to the entered value. Depending on how the loop has been configured it may be necessary for the loop to incrementally change at some defined maximum value until it reaches the desired value.

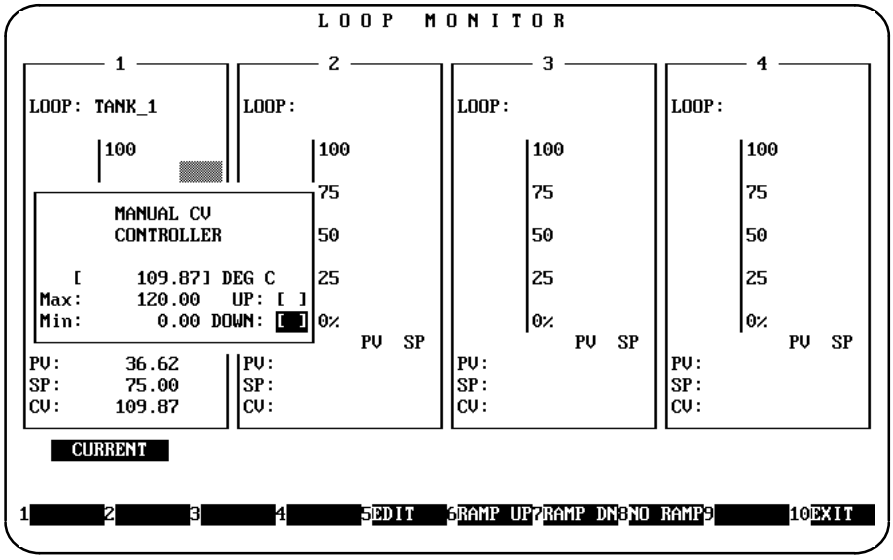


To adjust the value of CV upward (i.e., to increase the value), press the [ ] or [F6] key. This causes the manual mode window to appear as:



The [ ] or [F6] key acts as a toggle switch; when you press it again, it causes the CV to stop incrementing. While the UP indicator is set, the value of CV continues to increment.

To adjust the value of CV downward (i.e., to decrease the value), press the [–] or [F7] key. This causes the manual mode window to appear as:



The [–] or [F7] key acts as a toggle switch; when you press it again, it causes the CV to stop decrementing. While the DOWN indicator is set, the value of CV continues to decrement.

Pressing the [F8] "NO RAMP" key will cause incrementing or decrementing to stop. If neither the UP nor DOWN fields have been selected, pressing the [F8] key will have no effect.

1. Because the CV value is displayed in engineering units, the rate of change will depend on the degree of scaling being used. Within the PLC, the value of CV is incremented by 1 each loop solution time (i.e., the value displayed as LOOP INTERVAL on the loop configuration screen).

To remove the manual mode window (and place the loop back into automatic mode) press the <Quit> key. The manual mode window is then removed and the soft key options revert back to what they were before.

Using Setpoint Control for the Loop

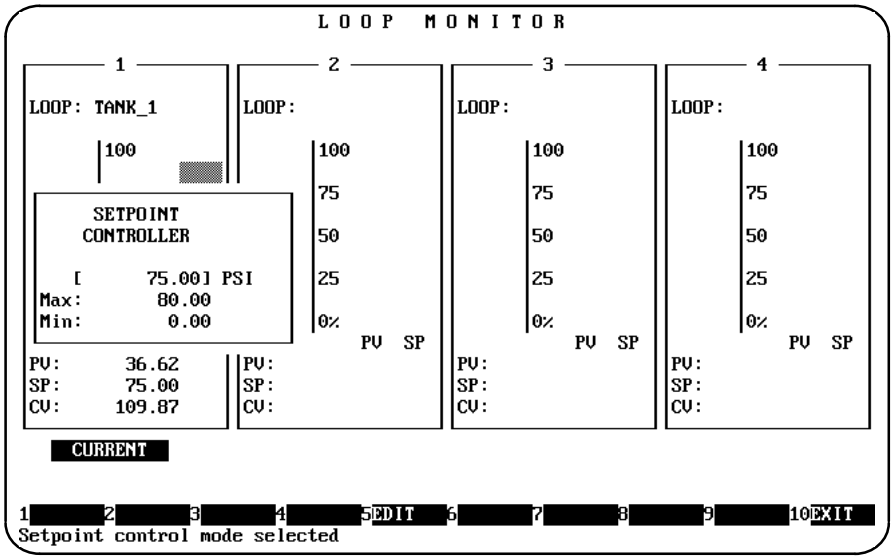
Setpoint control can only be used if the loop setup allows manual mode operation (Manual Mode flag has been set to Y). Setpoint control lets you enter setpoint values directly; overriding the normal setpoint value in the PLC. For further details on the effects of setpoint control, refer to the applicable Logicmaster 90 Software Programming Reference Manual.

Note

The Setpoint Controller causes the PLC to stop taking its setpoint value from the specified location for the loop. Instead, the value is taken from the setpoint location within the loop control block.

When the setpoint controller is exited, the PLC commences to take the setpoint value from the specified location again; effectively causing any modification to the setpoint value made in the setpoint controller to be overwritten. To prevent this (if desired), the setpoint location should be specified as being the location within the loop control block.

To use the setpoint controller, first select the required faceplate as the current faceplate - then press F8. A small window is placed over part of the selected current faceplate and the soft keys are updated.



While in setpoint control mode, a value entered into the controller field is written to the PLCs loop control block as the new setpoint value.

To set a new value, press the [F5] key, enter the required value into the setpoint controller's field and then press [Return]. This causes the new value to be written to the PLC. A message is displayed telling you that the setpoint has been modified. A new setpoint value will appear in the setpoint field and the bar chart will change to reflect the new value. Values may be continually entered. Press the <Quit> key to get out of EDIT mode.

To exit the setpoint controller, press <Quit>. This will cause the window to be removed from the screen and the loop placed back into its normal mode of operation.

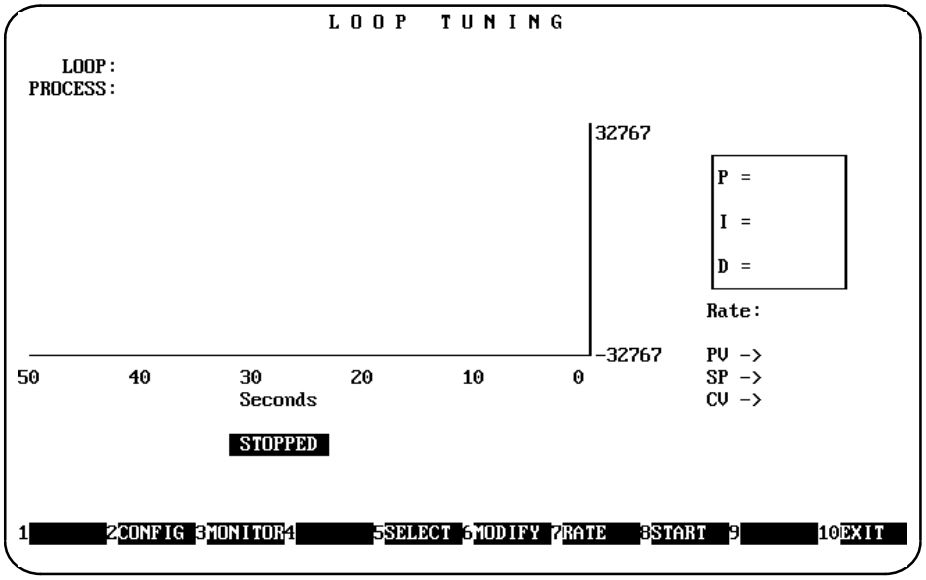
Loop Tuning Screen

The Loop Tuning Screen lets you view the behavior of a selected loop over a defined period of time that you specify; thereby allowing the loop to be fine tuned.

In addition, the key gain values can be adjusted for the loop (i.e., the Proportional, Integral, and Differential terms) to let you view the effects of changes to these values. Note that the loop setup must specify that the loop is user configurable for this feature to be used.

The Loop Tuning Screen is accessed from all other screens by pressing the F4 key. The Loop Tuning Screen consists of a trend graph displaying the values of the PV, SP, and CV parts of the loop over time. The time base is displayed at the base of the chart. The values of PV, SP, and CV are also displayed.

A separate area of the screen displays the current value of the P, I, and D terms of the loop.



Selecting the Loop to be Tuned

Pressing the F5 key allows you to enter the name or number of the loop to be tuned. Once a valid loop has been selected, the screen image is updated to display:

- *name of the selected loop*
- *process description of the loop*
- *engineering units and minimum/maximum values*
  (See "Modify a Loop Definition" above for information on selecting a valid loop.)

Note that the loop tuning is displayed as being STOPPED. This indicates that no data is being gathered for the loop.

Setting the Scan Rate for Tuning

By default, the scan rate for loop tuning is 1 second. That is, once per second, new values for the loop are obtained from the PLC and the loop tuning screen updated with the values.

Note that the time base for the trend chart is displayed in increments of 10 times the scan rate. By default, this means that the time base displays 0, 10, 20 ..... 50. This indicates that the trend chart is displaying the last 50 seconds worth of data from the loop.

To select a new time base for the trend, press F7.

Note

The loop tuning does not need to be stopped for this operation.

When F7 is pressed, you are prompted for a new scan rate value to be entered. The allowed range of scan rates is 0.50 seconds to 60 seconds in 0.25 second increments.

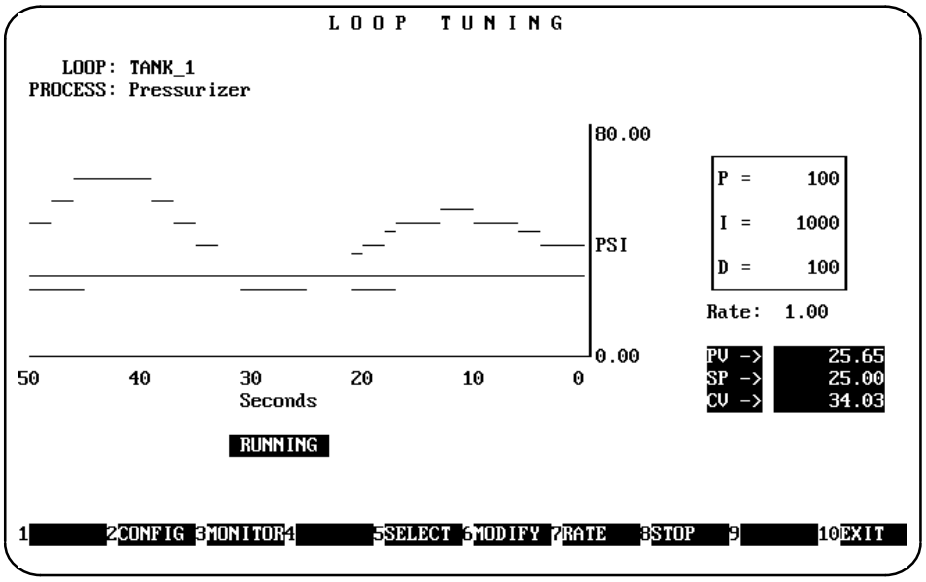
Once the new scan rate has been entered, press [Return] to save the scan rate or <Quit> to retain the existing rate. A new scan rate will cause the time base for the trend chart to be updated to reflect the new rate. For example, if a scan rate of 20

seconds is selected, the time base will change to show 0, 200, 400 ..... 1000. This indicates that the trend chart now displays up to 1000 seconds worth of loop data.

Starting Loop Trending

To begin gathering and displaying loop tuning data, press the F8 key. The screen image is updated in several ways:

- *data is now displayed*
- *the STOPPED message is changed to RUNNING*
- *the soft key for F8 is changed from START to STOP*



Stopping Loop Trending

To stop the gathering and display of data, press the F8 key. This causes the screen image to change as follows:

- *data remains displayed but is not updated*
- *the RUNNING message is changed to STOP*
- *the soft key for F8 is changed from STOP to START*

Modifying Loop Parameters

Loop parameters can only be modified if the loop setup specifies that the loop is user configurable (i.e., the User Configurable flag is set to Y). To modify the loop parameters in response to the trending information that is displayed, press the F6 key.

The first field of the parameters screen is now displayed in reverse video and you can enter new values into the fields. To move between fields, press the [Return] or [–] key to go to the next field or the [ ] to go to the previous field.

When the required values have been entered, press [Return] while positioned on the last field to save the new values. They will then be written to the PLC. To abandon any changes, press the <Quit> key. The values will revert to the original values.

Appendix A

CIMPLICITY 90-ADS Display System Builder Guide

This appendix provides a quick reference to the system parameters and entries required to build an Operator Interface System using the CIMPLICITY 90-ADS System software package. For detailed information on operations required for building an Operator Interface System, refer to the applicable chapter (Chapters 3 through 10).

ADS Menu Screen Items

```
1. Run ADS Builder                : Loaded

2. Run ADS Executor     <Debug>   : Loaded
                         (^x)
3. Set default system name        : xxxxx  (5 char max)

4. Set default terminal module    : TMINI
                                    TCOIT
                                    TMOIT
                                    COIT
                                    MOIT
                                    MINI
                                    VT100
                                    MIBM
                                    CIBM
                                    LUDCO

5. Set default printer module     : ASCII
                                    TTY
                                    PCNEC
                                    LA100
                                    Epson

6. Run ADS Fault                  : Not loaded

7. Run ADS PID                    : Not loaded

   Enter item number [1–7, 9 to exit] :
```

Configuration Operations

Modify System Parameters

```
                System Name:    xxxxx   (5 characters max)

                   Terminal:    TMINI
                                TCOIT
                                TMOIT
                                COIT
                                MOIT
                                MINI
                                VT100
                                MIBM
                                CIBM
                                LUDCO

            Terminal Device:    STDIO
                                COM1:
                                COM2:

             Printer Device:    COM1:
                                COM2:
                                PC:
                                RAM:
                                NULL:

          Default Scan Rate:    0.25 to 9999.75 seconds
    Default Alarm Scan Rate:    0.25 to 9999.75 seconds
            Startup Screen:     1 to 999
```

PLC Data Source

New/Modify Data Sources

```
                Name:     xxxxxxxxxxxx  (12 characters max)
    Source Data Type:     State;  1  (OFF/ON)
                          Byte;  8  (0 to 255)
                          Word; 16  (0 to 65535)
                          Signed Word; 16  (–32768 to +32767)
                          Longword; 32  (0 to 4294967295)
                          Signed Longword; 32  (–2147483648 to +2147483647)
                          Floating Point; 32  (–999999999.99 to 9999999999,99)

     Source Location:     I,Q,M,T,S,SA,SB,SC,G,GA,GB,GC,GD,GE,R,AI,AQ, ^P, ^L,
                          Z, DATE, TIME, PLC.ID, PLC_STATUS, PLC_ACCESS,
                          PLC_SWEEP, RACK_mm, SLOT_mn, BUS_mno, M_mnopp,
                          MEMORY, MAX_BLOCK
           Scan Rate:     leave blank or HH:MM:SS.CC

     Additional Calc:     Lookup table entry
                          Translation table entry
                          Engineering Units Conversion table entry
                          Custom translation (A*(Input Value+B)+C
```

Display Formats

New/Modify Display Format

```
            Name:    xxxxxxxxxxxx  (12 characters max)
Source Data Type:    State;  1  (OFF/ON)
                     Byte;   8  (0 to 255)
                     Word;  16  (0 to 65535)
                     Signed Word;  16  (–32768 to +32767)
                     Longword;  32  (0 to 4294967295)
                     Signed Longword;  32  (–2147483648 to +2147483647)
                     Floating Point;  32  (–999999999.99 to 9999999999.99)

           Range:    I1{:I2}  (10 max range/action pairs)
                     e.g., ON;OFF; –32768 : +32767

          Action:    Invisible; Black; MoveA(r,c)
                     Normal; Red; MoveR(r,c)
                     Bold; Green;
                     Reverse; Yellow;
                     Blink; Blue;
                     Underscore; Magenta
                                 Cyan
                                 White
                            – and or–
```

PLCGETB(loc)	SCREEN(n);	PLC_FAULT(f,b)
PLCGETBY(loc)	PSHSCN(n,r,c);	IO_FAULT(f,b)
PLCGETW(loc)	POPSCN(n);	SETUP_LOOP(f,b)
PLCGETI(loc)	REMSCN(n)	CONFIGURE_LOOP(f,b)
PLCGETL(loc)	ALARM(n);	MONITOR_LOOP(f,b)
PLCGETS(loc)	PSHALM(n);	TUNE_LOOP(f,b)
PLCGETF(loc)	POPALM(n);	ATTACH(n,o,d,c)
PLCSETB(loc,val)	REMALM(n);	DYN_EDIT(a,o,v)
PLCSETBY(loc,val)	CLRALM( );	SCN_EDIT(n,v)
PLCSETW(loc,val)	ACTION_OFF( )	WAIT_DATA(n,o)
PLCSETI(loc,val)	ACTION_ON( )	LOGTTM(x)
PLCSETL(loc,val)	ACK_ALARM( )	LOGMES(x)
PLCSETS(loc,val)	ACK_ALARM(<page number>)	REPORT(n)
PLCSETF(loc,val)	ACK_ALARM(<alarm source>)	HELP(n)
		TTDUMP( )
		REFRESH( )
		PORTW(p,t)
		EXIT( )

Translation Table

New/Modify Translation

```
                Name:   xxxxxxxxxxxx  (12 characters max)
               A:B:C:   New Value = (A*(Input Value + B))+C
 Specify Data Types     State;
       Input/Output:    State;  1  OFF/ON
                        Byte;  8  0 to 255
                        Word; 16  0 to 65535
                        Signed Word; 16  –32768 to +32767
                        Longword; 32  0 to 4294967295
                        Signed Longword; 32  –2147483648 to +2147483647
                        Floating Point; 32  –999999999.99 to 9999999999.99*
                          *Only 7 digits of precision.
```

Lookup Table

New/Modify Lookup Table Entry

```
                Name:   xxxxxxxxxxxx  (12 characters max)
   Input Data Type:     State;   1  (OFF/ON)
                        Byte;  8 (0 to 255)
                        Word;  16  (0 to 65535)
                        Signed Word;  16  (–32768 to +32767)
                        Longword;  32  (0 to 4294967295)
                        Signed Longword;  32  (–2147483648 to +2147483647)
                        Floating Point;  32  (–999999999.99 to 9999999999.99)

  Output Data Type:     State;   1  (OFF/ON)
                        Byte;  8 (0 to 255)
                        Word;  16  (0 to 65535)
                        Signed Word;  16  (–32768 to +32767)
                        Longword;  32  (0 to 4294967295)
                        Signed Longword;  32  (–2147483648 to +2147483647)
                        Floating Point;  32  (–999999999.99 to 9999999999.99)
                        String  (1 to 19 ASCII characters)

     Input Range:       I1{:I2/}     (10 max input/output pairs)
                        e.g., ON, OFF, –32768 : +32767

    Output Range:       ON, OFF, Value, or text string
```

Engineering Units Conversion Table

New/Modify Unit Conversion

```
                Name:   xxxxxxxxxxxx  (12 characters max)

                          (Xi–Il) (Ou–Ol)
                     Xo = ---------------- +O1
                               Iu–Il

                     Xo = Output value, Xi = Input value
                     Il = Input value low, Iu = Input value high
                     Ol = Output value low, Ou = Output value high

      Specify Data Types State;
        Input/Output:   State;  1  OFF/ON
                        Byte;  8  0 to 255
                        Word; 16  0 to 65535
                        Signed Word; 16  –32768 to +32767
                        Longword; 32  0 to 4294967295
                        Signed Longword; 32  –2147483648 to +2147483647
                        Floating Point; 32  –999999999.99 to 9999999999.99*
                          *Only 7 digits of precision.
```

Command Scripts

New/Modify Script

```
    Name: xxxxxxxxxxxx  (12 characters max)
Commands: PLCGETB(loc)        SCREEN(n);                 PLC_FAULT(f,b)
          PLCGETBY(loc)       PSHSCN(n,r,c);             IO_FAULT(f,b)
          PLCGETW(loc)        POPSCN(n);                 SETUP_LOOP(f,b)
          PLCGETI(loc)        REMSCN(n);                 CONFIGURE_LOOP(f,b)
          PLCGETL(loc)        ALARM(n);                  MONITOR_LOOP(f,b)
          PLCGETS(loc)        PSHALM(n);                 TUNE_LOOP(f,b)
          PLCGETF(loc)        POPALM(n);                 ATTACH(n,o,d,c)
          PLCSETB(loc,val)    REMALM(n);                 DYN_EDIT(n,o,v)
          PLCSETBY(loc,val)   CLRALM( );                 SCN_EDIT(n,v)
          PLCSETW(loc,val)    ACTION_OFF( )              WAIT_DATA(n,o)
          PLCSETI(loc,val)    ACTION_ON( )               LOGTTM(x)
          PLCSETL(loc,val)    ACK_ALARM( )               LOGMES(x)
          PLCSETS(loc,val)    ACK_ALARM(<page number>)   REPORT(n)
          PLCSETF(loc,val)    ACK_ALARM(<alarm source>)  HELP(n)
                                                         TTDUMP( )
                                                         REFRESH( )
                                                         PORTW(p,t)
                                                         EXIT( )
```

Screen Operations

New/Modify Screen

```
  Screen Name:    xxxxxxxx   (8 characters max)
Screen Number:    1 to 999

    Start Row:    1 to 23
         Rows:    23 to 1

 Start Column:    1 to 80
      Columns:    80 to 1
        Image:    N, R, T

   Foreground:    Black
                  Red
                  Green
                  Yellow
                  Blue
                  Magenta
                  Cyan
                  White

   Background:    Black
                  Red
                  Green
                  Yellow
                  Blue
                  Magenta
                  Cyan
                  White
```

Key Assignments

```
Unique for each screen

AK1 through AK15  (F1 through F15)

Command Script
   – and or –
```

PLCGETB(loc)	SCREEN(n);	PLC_FAULT(f,b)
PLCGETBY(loc)	PSHSCN(n,r,c);	IO_FAULT(f,b)
PLCGETW(loc)	POPSCN(n);	SETUP_LOOP(f,b)
PLCGETI(loc)	REMSCN(n);	CONFIGURE_LOOP(f,b)
PLCGETL(loc)	ALARM(n);	MONITOR_LOOP(f,b)
PLCGETS(loc)	PSHALM(n);	TUNE_LOOP(f,b)
PLCGETF(loc)	POPALM(n);	ATTACH(n,o,d,c)
PLCSETB(loc,val)	REMALM(n);	DYN_EDIT(n,o,v)
PLCSETBY(loc,val)	CLRALM( );	SCN_EDIT(n,v)
PLCSETW(loc,val)	ACTION_OFF( )	WAIT_DATA(n,o)
PLCSETI(loc,val)	ACTION_ON( )	LOGTTM(x)
PLCSETL(loc,val)	ACK_ALARM( )	LOGMES(x)
PLCSETS(loc,val)	ACK_ALARM(<page number>)	REPORT(n)
PLCSETF(loc,val)	ACK_ALARM(<alarm source>)	HELP(n)
		TTDUMP( )
		REFRESH( )
		PORTW(p,t)
		EXIT( )

Report Operations

New/Modify Report

```
  Report Name:    xxxxxxxx   (8 characters max)
Report Number:    1 to 999
    Start Row:    1
         Rows:    1 to 99
 Start Column:    1
      Columns:    1 to 200
```

Screen/Report Editing

Cursor Moving

Table B-1. Cursor Keys Supported by Screen/Report Editor

Key	Resulting Action
[↑]	Move cursor up one row within the current column
[↓]	Move cursor down one row within the current column
[←]	Move cursor left one column within the current row
[→]	Move cursor right one column within the current row
<GOLD> [↑]	Move cursor to topmost row within the current column
<GOLD> [↓]	Move cursor to bottommost row within the current column
<GOLD> [←]	Move cursor to leftmost column within the current row
<GOLD> [→]	Move cursor to rightmost column within the current row
[TAB]	Move cursor to next tab stop within the current row
[Enter]	Move cursor down one row and to leftmost column of the new row

Screen Attributes

Table B-2. Key Functions for System Building

Key Function	Terminal		
	MOIT/COIT TMOIT/TCOIT MIBM/CIBM†	VT100	MPC/CPC EIBM/VIBM‡
GOLD	F11	PF1	Insert
Help	F12	PF2	Home
Quit	F10	KP0	Esc or F10
Save	GOLD F10	GOLD KP0	Alt-F10
Object list	GOLD S	GOLD S	Alt-S
Refresh screen	^W	^W	^W
Clear field	^X	^X	^X
Beginning of line	GOLD ←	GOLD ←	GOLD ←
End of line	GOLD →	GOLD →	GOLD →
Top of screen	GOLD ↑	GOLD ↑	GOLD ↑
Bottom of screen	GOLD ↓	GOLD ↓	GOLD ↓
Video select	F1	KP1	F1
Video clear	GOLD F1	GOLD KP1	Alt-F1
Color Black, red, green, Yellow, Blue, Magenta, Cyan, White	F4	KP4	F4
Character set Normal, Alternate Set, Character Set 2, Character Set 3	GOLD F4	GOLD KP4	Alt-F4
Double wide	GOLD W	GOLD W	Alt-W
Double size	GOLD D	GOLD D	Alt-D
Draw toggle (non-rectangular objects or lines)	GOLD F5	GOLD KP5	Alt-F5
Draw area (rectangular and straight lines)	F5	KP5	F5
Delete line	F14	PF4	End
Undelete line	GOLD F14	GOLD PF4	GOLD END
Select toggle	F3	KP3	F3
Cut area	F6	KP6	F6
Paste area	GOLD F6	GOLD KP6	Alt-F6
Start dynamic / predefined object	GOLD F7	GOLD KP7	Alt-F7
End dynamic object	F7	KP7	F7
End predefined objects	GOLD F2	GOLD KP2	Alt-F2
Delete dynamic object	GOLD F8	GOLD KP8	Alt-F8
Modify dynamic object	F8	KP8	F8
Copy dynamic object	F9	KP9	F9
Paste dynamic object	GOLD F9	GOLD KP9	Alt-F9
Touch screen grid	F13	PF3	Delete
Touch screen assignments	GOLD F13	GOLD PF3	GOLD Delete

† Num Lock must be set to OFF for 83-key keyboard; F11 and F12 keys on the enhanced AT and PS / 2 style keyboards cannot be used (use SHIFT-F1 and SHIFT-F2).
‡ The MPC, CPC, EIBM, and VIBM terminal tables are used for the PC-based Builder only.

1. Keys marked as Alt-x refer to the appropriate alternate key (Alt key held down while simultaneously pressing the appropriate key).
2. Keys marked as ^x refer to the appropriate control key (Ctrl key held down while simultaneously pressing the appropriate key).
3. Keys marked as GOLD xxx refer to the two-key sequence of the GOLD key followed by the appropriate key.

Create Dynamic Object

```
                    Name:    xxxxxxxxxxx (12 Max)
        Data Source Name:    PLC Data Source

  Additional Calculation:    Leave blank or
                             Lookup table entry
                             Translation table entry
                             Engineering Units Conversion table entry
                             Custom translation
                               (A*(Input Value * B)*C
          Display Format:    Leave blank or Display format
           Display Value:    Y or N
    Hexadecimal Notation:    Y or N
            Left Justify:    Y or N
               Zero Fill:    Y or N
                     Min:
                     Max:
         Immediate Write:    N
```

Alarm Operations

New/Modify Alarm Page

```
              Report Name:    xxxxxxxx   (8 characters max)
                   Number:    1 to 999

             Starting Row:    1 to 20
                     Rows:    23 to 3

          Starting Column:    1 to 60
                  Columns:    80 to 10
               Foreground:    White
               Background:    Black
                  Heading:    xxx....xxx   (40 characters max)
```

Alarm Sources

New/Modify Alarm Sources

```
                Name:   xxxxxxxxxxxx   (12 characters max)

     Source Data Type:   State;   1  (OFF/ON)
                         Byte;  8 (0 to 255)
                         Word;  16  (0 to 65535)
                         Signed Word;  16  (–32768 to +32767)
                         Longword;  32  (0 to 4294967295)
                         Signed Longword;  32  (–2147483648 to +2147483647)
                         Floating Point;  32  (–999999999.99 to 9999999999.99)

        PLC Location:    AI,AQ,I,Q,M,T,S,SA,SB,SC,G,GA,GB,GC,GD,GE,^P,^L,Z,R,
                         PLC_STATUS, PLC_ACCESS, PLC_SWEEP, RACK_mm, SLOT_mn,
                         BUS_mno, M_mnopp, MEMORY, MAX_BLOCK
           Scan Rate:    * or HH:MM:SS.CC
      Additional Calc:   leave blank or
                         Lookup table entry
                         Translation table entry
                         Engineering Units Conversion table entry
                         Custom translation (A*(Input Value+B)+C

               Range:    I1{:I2}  (4 max range/action/text triples)
                         e.g.: ON, OFF, –32768 : +32767
              Action:    Command Script
                             – or –
                         Screen, PLC, Message, etc. on 5 – 205
```

PLCGETB(loc)	SCREEN(n);	PLC_FAULT(f,b)
PLCGETBY(loc)	PSHSCN(n);	IO_FAULT(f,b)
PLCGETW(loc)	POPSCN(n);	SETUP_LOOP(f,b)
PLCGETI(loc)	REMSCN(n);	CONFIGURE_LOOP(f,b)
PLCGETL(loc)	ALARM(n);	MONITOR_LOOP(f,b)
PLCGETS(loc)	PSHALM(n);	TUNE_LOOP(f,b)
PLCGETF(loc)	POPALM(n);	ATTACH(n,o,d,c)
PLCSETB(loc,val)	REMALM(n);	DYN_EDIT(a,o,v)
PLCSETBY(loc,val)	CLRALM( );	SCN_EDIT(n,v)
PLCSETW(loc,val)	ACTION_OFF( )	LOGTTM(x)
PLCSETI(loc,val)	ACTION_ON( )	LOGMES(x)
PLCSETL(loc,val)	ACK_ALARM( )	REPORT(n)
PLCSETS(loc,val)	ACK_ALARM(<page number>)	HELP(n)
PLCSETF(loc,val)	ACK_ALARM(<alarm source>)	TTDUMP( )
		REFRESH( )
		PORTW(p,t)
		EXIT( )

```
                Text:   xxx....xxx      (40 max)

      Log to Printer:   Y or N
           Timestamp:   Y or N
             Latched:   Y or N
              Notify:   Y or N
    Auto Acknowledge:   Y or N

      Output text to
         Alarm pages:   nn (up to 10 pages)
```

A

B

C

D

E

F

G

H

I

K

L

M

N

O

P

R

S

T