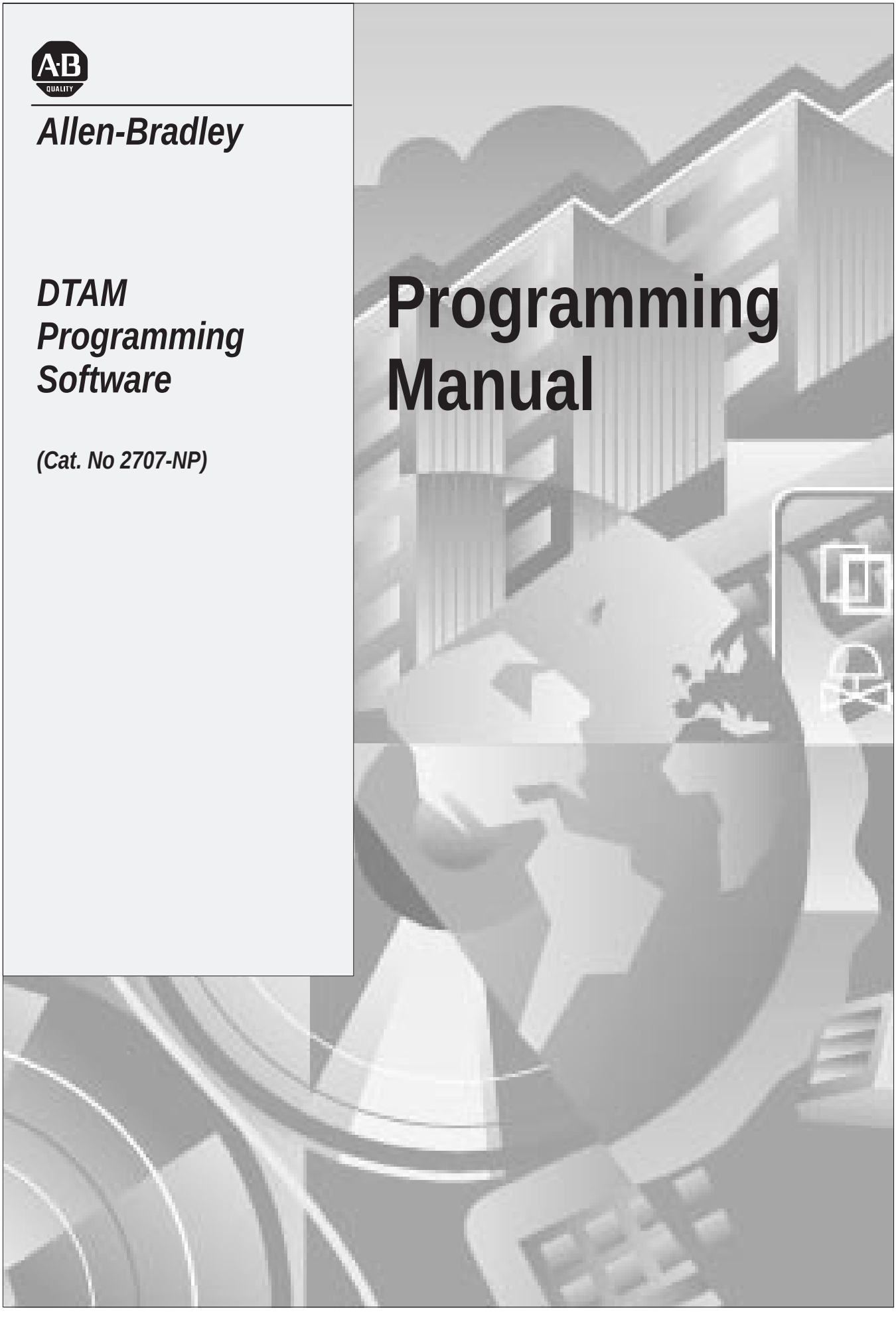
Allen-Bradley

DTAM Programming Software

(Cat. No 2707-NP)

Programming Manual



Important User Information

Solid state equipment has operational characteristics differing from those of electromechanical equipment. “Safety Guidelines for the Application, Installation and Maintenance of Solid State Controls” (Publication SGI-1.1) describes some important differences between solid state equipment and hard–wired electromechanical devices. Because of this difference, and also because of the wide variety of uses for solid state equipment, all persons responsible for applying this equipment must satisfy themselves that each intended application of this equipment is acceptable.

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Throughout this manual we use notes to make you aware of safety considerations.

ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss.

Attentions help you:

- identify a hazard
- avoid the hazard
- recognize the consequences

Important: Identifies information that is especially important for successful application and understanding of the product.

Using this Manual

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Chapter 1

Using this Manual

Objectives

Read this chapter to familiarize yourself with the rest of the manual. You will learn about:

- Contents of this manual
- Intended audience
- Conventions
- Related publications

Contents

The following table lists the contents of each chapter:

Chapter	Title	Purpose
1	Using this Manual	Provides a brief overview of the manual structure, intended use, and conventions.
2	Installing/Running DTAM Programming Software	Describes how to install DPS on your computer. Basic software operating functions are described.
3	Designing DTAM Plus and DTAM Micro Applications	Describes the differences and similarities between DTAM Micro and DTAM Plus applications.
4	Creating and Editing an Application File	Describes how to open, edit, and save new or existing application files.
5	Using Screen Builder	Describes how to use Screen Builder to create application screens.
6	Creating Menu and Sub-Menu Screens	Describes how to create menu and sub-menu displays.
7	Creating Data Display Screens	Describes how to display the actual or scaled contents of a controller address.
8	Creating Data Entry Screens	Describes how to create a screen that allows an operator to write data to a controller address.
9	Creating Security Screens	Describes how to create screens that restrict operator access to parts of an application.
10	Creating Recipe Screens	Describes how to create screens that write data to multiple controller addresses from a single screen.
11	Creating Bar Graph Screens	Describes how to create a data display using a bar graph.
12	Linking Menu and Application Screens	Describes how to link all of the application screens into a logical sequence.
13	Creating Alarm Screens	Describes how to create screens that warn an operator of abnormal operating conditions.

Chapter	Title	Purpose
14	Entering Configuration Data	Describes how to enter configuration data that allows the DTAM to communicate with a controller.
15	DTAM Plus Background Monitor	Describes how to monitor controller addresses for displaying alarm or generating printouts on the DTAM Plus.
16	DTAM Micro Function Key Builder	Describes how to assign screen navigation or bit write functions to the DTAM Micro function keys.
17	DTAM Plus Printer Form Builder	Describes how to create a DTAM Plus printer form.
18	ASCII Bar Code Input	Describes how to input data into a data entry register using a bar code scanner.
19	Transferring / Printing Application Files	Describes how to transfer applications between a personal computer and the DTAM Plus or DTAM Micro.
20	Upgrading the Operating System	Describes how to upgrade the DTAM Micro and DTAM Plus operating systems.
Appendix A	ASCII Display Characters	The character set supported by the DTAM Micro and DTAM Plus.
Appendix B	Application and Screen Worksheets	Worksheets assist in the design of an application and individual screens.
Appendix C	Using a BASIC Module With An SLC	Describes how to use the SLC BASIC module with a DTAM Plus AB BASIC operating system.
Appendix D	PLC-5 Mnemonics in DPS	Reference section for PLC mnemonic codes used for addressing.
Appendix E	Data Formats	Description of the data formats used by SLC and PLC controllers.
Index		

Intended Audience

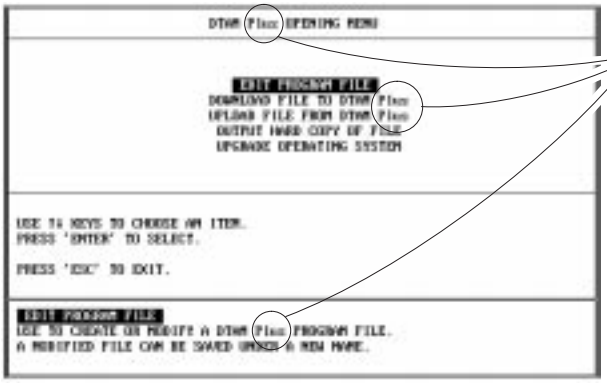
The DTAM Programming Software does not require special programming knowledge. It is menu driven and generates a DTAM Plus or DTAM Micro program based on your menu selections and data entries.

If you are creating an application for a DTAM Plus or Micro, you should be familiar with the user manuals. Refer to related publications on page 1–4.

Conventions

This manual uses the following conventions:

- Keys that you press on your personal computer keyboard are enclosed in brackets [ ].
  For example: [Esc] refers to the Escape key
- Keys that an operator would press on the DTAM Micro or DTAM Plus are also enclosed in brackets but are bold [ ].
  For example: [**F1**] refers to the F1 function key on the DTAM Micro.
- [Return] refers to the carriage return key of your computer keyboard. This key may appear on your keyboard as [Enter] or [↵].
- This manual describes how to use the DTAM programming software for both DTAM Plus and DTAM Micro applications. DTAM Plus screens are shown for most examples, these illustrations also apply to the DTAM Micro unless noted.



DTAM Plus shown but also applies to DTAM Micro.

- DPS refers to DTAM Programing Software (Catalog No. 2707-NP, Series D or later)

Related Publications

The following publications may be required for additional reference.

DTAM Plus and DTAM Micro Publications

Publication / Catalog Number	Title
2707-800	DTAM Plus User Manual
2707-803	DTAM Micro User Manual
2707-802	Getting Started With the DTAM Plus

SLC Publications

Publication / Catalog Number	Title
1747-800	SLC 500 Fixed Hardware Style Installation and Operation Manual
1747-804	SLC 500 Modular Hardware Style Installation and Operation Manual
1747-NI002	SLC Modular Hardware Style Installation and Operation Manual
1746-ND005	SLC 500 BASIC Module Design and Integration Manual
1746-NM001	SLC 500 BASIC Development Software Programming Manual
1746-NM002	SLC 500 BASIC Language Reference Manual

PLC-5 Publications

Publication / Catalog Number	Title
1785-2.1	PLC-5 Programmable Controllers System Overview
1785-5.2	1785 PLC-5 Programmable Controllers Design Worksheet
1785-6.2.1	1785 PLC-5 Programmable Controllers Design Manual
1785-6.6.1	PLC-5 Family Programmable Controllers Hardware Installation Manual
1785-6.6.1-RN1 -6.6.1-RN2 -6.6.1-RN3	PLC-5 Family Programmable Controllers Processor Release Notes
1785-7.1	PLC-5 Programmable Controllers Quick Reference

Chapter 2

Installing / Running DTAM Programming Software

Chapter Objectives

This chapter describes how to install the DPS software. Menu and screen conventions are also provided.

Introduction to DTAM Programming Software

The DTAM Programming Software (DPS) is a self-prompting, menu driven package that allows you to create and edit applications for the DTAM Plus or DTAM Micro operator terminals. DPS does not require any programming knowledge.

System Requirements

Verify your computer is properly configured with the following:

- IBM PC/AT™ or 100% compatible
- 640K RAM (minimum)
- One or two diskette drives (720K minimum)
- One fixed (hard) disk drive recommended. Required if only one diskette drive is present.
- DOS™ version 3.2 or later
- Serial communications port (COM1 or COM2)
  RS-232C or RS-485
- Monochrome or color monitor (color monitor is recommended).

Communication Cables

You need an upload/download cable (Catalog No. 2707-NC2) or (Catalog No. 2707- NC5) to connect the computer to the DTAM Plus or DTAM Micro communications port. If you have a DTAM Plus Remote I/O version with only a printer port, you will need to use cable (Catalog No. 2707-NC2) with a gender adapter. Refer to the user manuals for download/upload cabling information.

Making a Backup Copy

Make a backup copy of the DTAM programming software diskette. Insert the supplied disk into the diskette drive and use either the DISKCOPY or COPY command of your installed DOS version. Refer to your DOS manual for information and procedures regarding these commands.

After you have created a duplicate disk, store the original in a safe place and use the backup disk for normal operations.

Installation Files

The files on the installation disk are compressed and remain compressed until they are installed. Once installed, the following files are contained in the subdirectory:

DPS.EXE - DTAM Programming Software

DPS_CFG.EXE - Utility for changing software license information.

DPS_400.SLB - Operating systems for the DTAM Plus or DTAM Micro. The version noted here is 4.00. Only version 4.00 or later supports Remote I/O versions of the DTAM Plus.

Installing DTAM Programming Software

This section shows how to install the software on a personal computer with at least 1 hard disk drive and 1 floppy disk drive. The software is supplied on 3 $^{1}/_{2}$ inch disks.

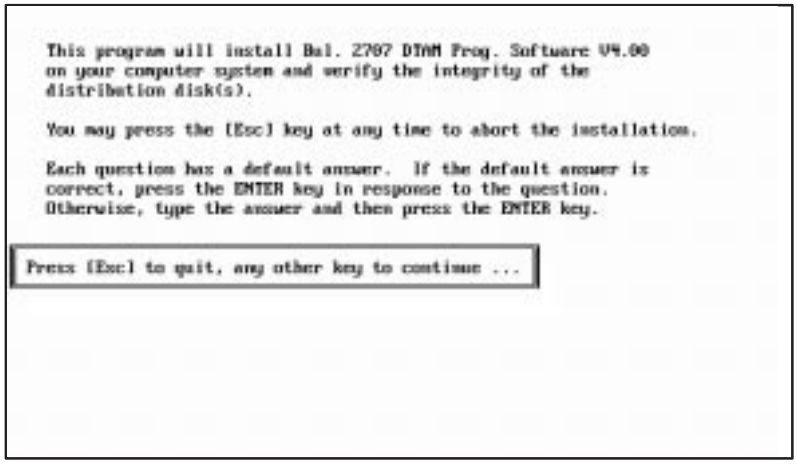
1. Turn on your computer. Your computer prompt will display the currently active drive: A:, B:, or C:
2. Insert the DPS installation disk into the floppy drive.
3. Select the drive containing the disk (**A:** or **B:**) and press [Return]. Normally this is the A: drive.

   C:> **A:** [Return]
   A:>

4. Type **install** and press [Return] to start the installation.

   A:> **install** [Return]

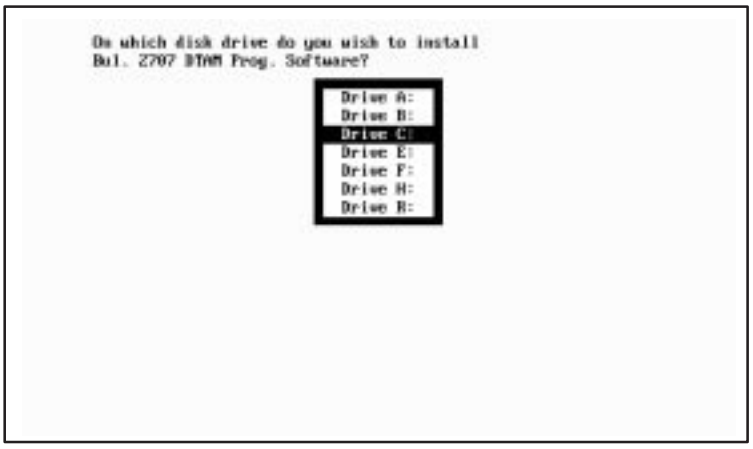
   The following screen appears:



Installing DTAM Programming Software

5. Press any key (other than [Esc]) to continue.

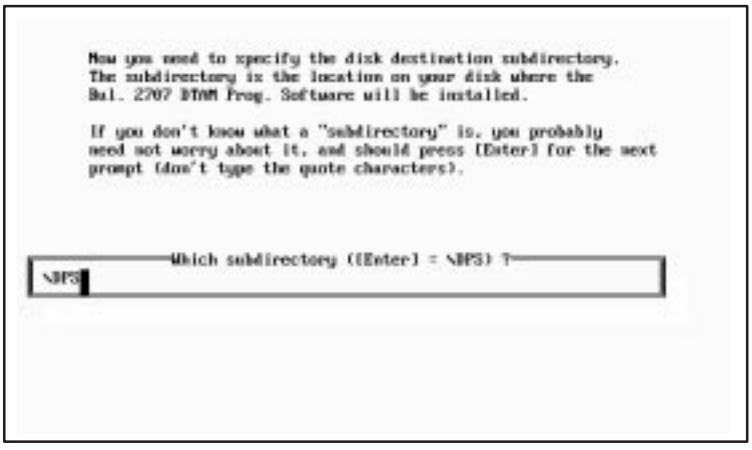
   This screen appears.



☞ *You cannot install the DPS software on the same drive on which the Install program resides.*

6. Use the [↑][↓] arrow keys to highlight the drive on which you want to install DPS and then press [Return]. The default drive is C:

   This screen appears.

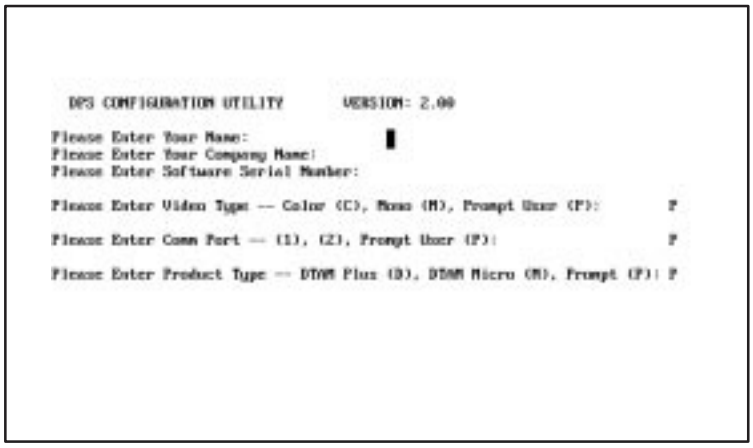


☞ *You can specify another directory. The Install program will create the directory if it does not exist.*

7. Press [Return] to install the DPS software in the \DPS subdirectory. The Install program creates the subdirectory. If you enter your own subdirectory name, the entire path name including colons, forward slash, and name should not exceed 28 characters.

   The status of the installation is displayed on the screen.

   The DPS Configuration Utility screen then appears:



☞ *Press [Return] at the Video Type and Comm Port questions to prompt the user for this information during application development.*

8. Enter your name, company name, and software serial number (on registration card). Also, enter the monitor type and communication port used by your computer.

   The software serial number is required when requesting phone support (refer to startup screen on next page).

9. After responding to the above questions, you are asked to confirm the configuration. Press [Return] to accept the configuration.

10. The installation is complete. You are returned to DOS at the new subdirectory C: \DPS>.

Running DPS

☞ *If you installed the software in another subdirectory, move to that directory.*

To run the DTAM Programming Software:

1. Verify that you are at the \DPS subdirectory where the software resides.

   If you are not, enter **cd \DPS** and press [Return].

   C:\DPS>

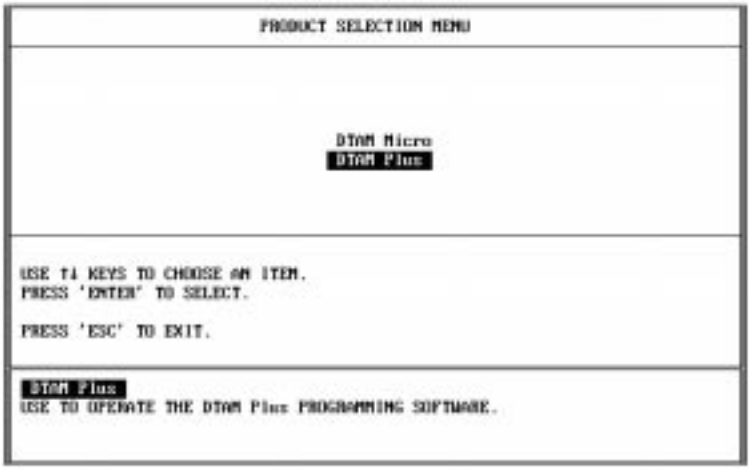
2. Type **DPS** and press [Return] to start the program.

   C:\DPS> **DPS** [Return]

3. Specify whether you are using a color monitor. Enter [Y] or [N].

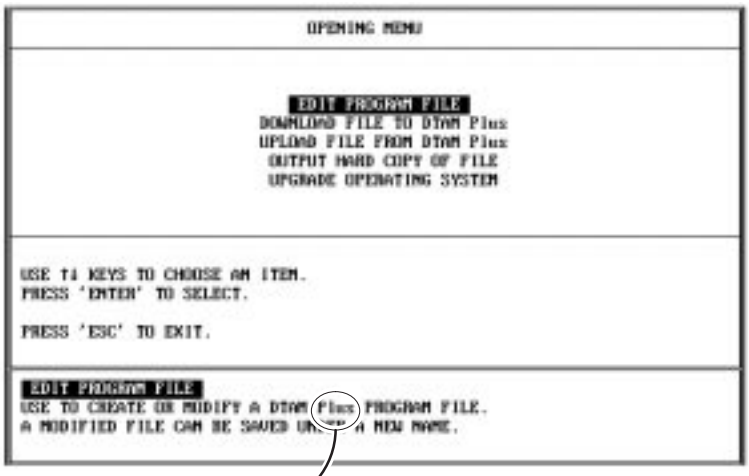
   The startup screen displays. It identifies the DPS version and licensed owner. A phone support number is provided for your assistance.

Followed by this screen.



4. Select the product type you are creating an application for (DTAM Micro or DTAM Plus) and press [Return].

   The Opening Menu appears:

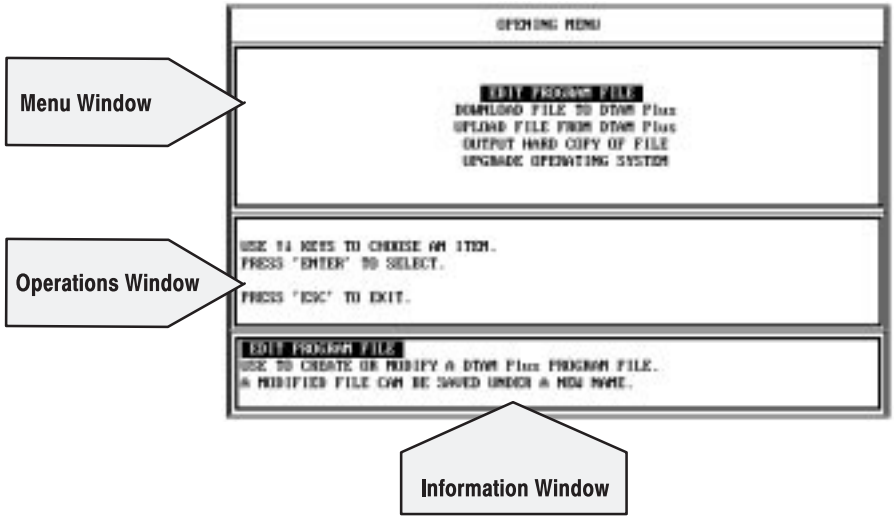


   You are now ready to create a file for your application.

Menu Conventions

Figure 2.1 shows the format of DPS menu screens:

Figure 2.1
DPS Menu Screen Format



Menu Window

The Menu Window lists operations available at the current menu. To select one of the operations, highlight the operation and press [Return].

Operations Windows

The Operations Window displays keyboard operations available at the current Menu Window.

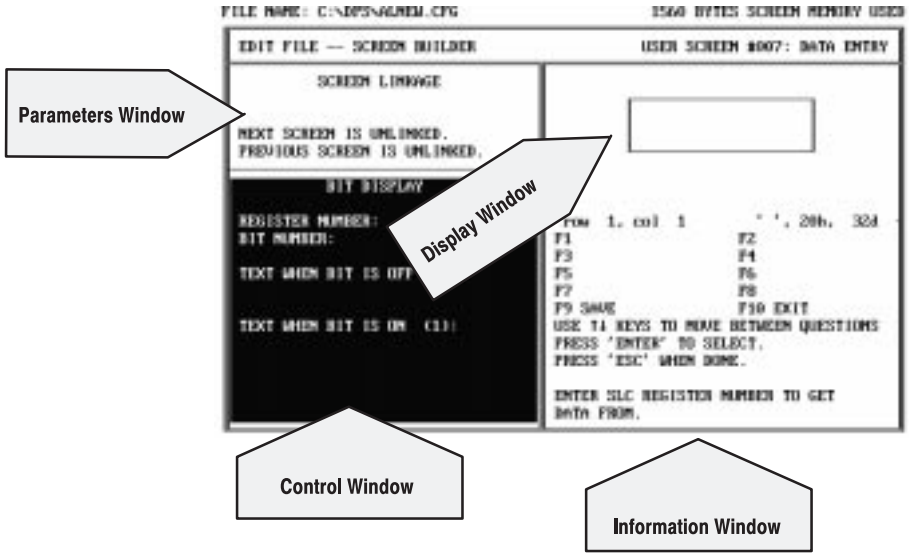
Information Window

The Information Window displays a brief explanation of each operation available for the selected menu item.

Screen Building Conventions

Figure 2.2 shows the Screen Builder format:

Figure 2.2
Screen Builder Format



There are two information lines at the top of the screen:

- The first line identifies the current program path and file name, as well as screen memory usage to help you track the size of your program file.
- The second line identifies the current DPS operating area as well as the current screen number and type.

Screen builder has four windows:

Parameters Window

The Parameters Window displays the linking definitions that have been established for the current screen.

Display Window

The Display Window simulates the DTAM Plus (4 line display) or DTAM Micro (2 line display) screen. It displays the formatted data and text as it would appear to the DTAM operator.

Control Window

The Control Window displays the available data format selection and the register information which can be defined for the current screen.

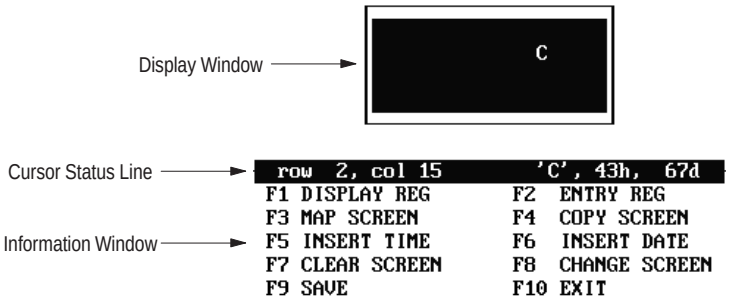
Information Window

The Information Window displays information about the function key operations available at the current screen.

Cursor Status Line

The cursor status line is located between the Display and Information windows. This line displays the current row and column of the cursor. Also listed is the character at that position along with the character ASCII code in hex and decimal formats. Confirm character codes by placing the cursor under the character and reading the code from the cursor status line.

The following example shows the character C at row 2, column 15.



Moving Around Screens

DPS uses menus to guide you through the application development process. Select a menu item and the next menu or screen is displayed. The standard keyboard operations are:

Use these keys	To
[↑][↓][←][→]	Highlight a menu selection
[Return]	Select a menu item.
[Esc]	Return to the previous menu.

Linking Application Screens

DTAM application files allow you to present screens in a meaningful sequence, a hierarchy of possible tasks and operations. To do this, you will need to specify a link for each screen.

The linking function is the basis of a DTAM operator terminal's power and flexibility. When screens are linked, the DTAM becomes an interactive operator workstation, one that can guide an operator through a hierarchy of operations. This hierarchy can be as simple or as complicated as your application requires.

Note: All application screens must be created before they can be linked.

Chapter 3

Designing DTAM Plus and DTAM Micro Applications

Objectives

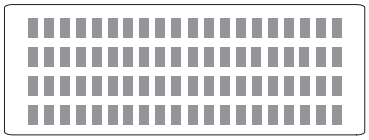
This chapter describes the differences between DTAM Micro and DTAM Plus applications. Also provided are guidelines for creating applications.

DTAM Plus / DTAM Micro Comparison

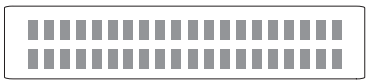
Both the applications are created using DPS. The development of applications for the DTAM Micro and DTAM Plus is very similar. This manual shows screens for DTAM Plus applications, the DTAM Micro screens are similar unless noted. The differences in application development are related to differences in the operator terminals. The following table lists these differences.

Function	DTAM Plus	DTAM Micro
Screen Capacity	Up to 240 Screens	Up to 50 Screens
Terminal Mode	**Yes**	No
Function Key Screen Selection	No	**Yes**
Alarm LED	**Yes**	No
Background Monitor	**Yes**	No
Application Upgrade / Downgrade	**Yes**	No
Contrast / Backlight Adjustment	**Yes**	No
Time / Date Functions	**Yes**	No
PID File Operations	**Yes**	No
SFC File Operations	**Yes**	No
Block Transfer File Operations	**Yes**	No
Floating Point File Operation	**Yes**	No
Bargraph Display	**Yes**	No
[Y], [N], [PREV MENU] keys	**Yes**	No
Printer Port	**Yes**	No
AB-BASIC Operating System	**Yes**	No

The main difference in designing DTAM Micro and DTAM Plus applications is the screen size.



DTAM Plus
4 Lines x 20 Characters



DTAM Micro
2 Lines x 20 Characters

DTAM Plus / DTAM Micro File Types

Both the DTAM Micro and DTAM Plus can read and write PLC and SLC controller files. Refer to the following when designing applications.

PLC-5 File Types

File Type	File Type Supported By;		Read / Write	Identifier	File Number	Element	Integer Sub-Element	Bit Number
	DTAM Plus	DTAM Micro						
Output	**Yes**	**Yes**	Read	O	0	0-277①	NA	0-17①
Input	**Yes**	**Yes**	Read②	I	1	0-277①	NA	0-17①
Status	**Yes**	**Yes**	Read / Write	S	2	0-127	NA	0-15
Bit (Binary)	**Yes**	**Yes**	Read / Write	B	3-999	0-999	NA	0-15999
Timer	**Yes**	**Yes**	Read / Write	T	3-999	0-999	PRE, ACC	EN, TT, DN
Counter	**Yes**	**Yes**	Read / Write	C	3-999	0-99	PRE, ACC	CU, CD, DN. OV, UN
Control	**Yes**	**Yes**	Read / Write	R	3-999	0-999	LEN, POS	EN, EU, DN, EM, ER, UL, IN, FD
Integer	**Yes**	**Yes**	Read / Write	N	3-999	0-999	NA	0-15
Floating Point	**Yes**	No	Read / Write	F	3-999	0-999	NA	NA
ASCII	**Yes**	**Yes**	Read	A	3-999	0-999	NA	0-15
BCD	**Yes**	**Yes**	Read / Write	D	3-999	0-999	NA	0-15
Block Transfer	**Yes**	No	Read / Write	BT	3-999	0-999	NA	NA
Message	**Yes**	**Yes**	Read	MG	3-999	0-584	ERR, RLEN, DLEN, DATA 90-51)	NR, TO, EN, ST, DN, ER, CO, EW, SD, SE
PID	**Yes**	No	Read / Write	PD	3-999	NA	NA	NA
SFC	**Yes**	No	Read / Write	SC	3-999	NA	NA	NA
ASCII String	**Yes**	**Yes**	Read	ST	3-999	0-799	LEN, CHAR	0-15

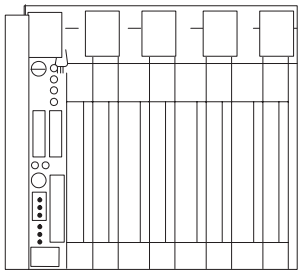
① Octal format, all other values are decimal.
② Remote I/O allows the DTAM to write it's own output words.

SLC File Types

File Type	File Type Supported By;		Read / Write	Identifier	File Number	Element	Integer Sub-Element	Bit Number
	DTAM Plus	DTAM Micro						
Output	**Yes**	**Yes**	Read	O	0	0-255	NA	0-15
Input	**Yes**	**Yes**	Read	I	1	0-255	NA	0-15
Status	**Yes**	**Yes**	Read / Write	S	2	0-82	NA	0-15
Bit (Binary)	**Yes**	**Yes**	Read / Write	B	3, 9-255	0-255	NA	0-4094
Timer	**Yes**	**Yes**	Read / Write	T	4, 9-255	0-255	PRE, ACC	EN, TT, DN
Counter	**Yes**	**Yes**	Read / Write	C	5, 9-255	0-255	PRE, ACC	CU, CD, DN, OV, UN
Control	**Yes**	**Yes**	Read / Write	R	6, 9-255	0-255	LEN, POS	EN, EU, DN, EM, ER, UL, IN, FD
Integer	**Yes**	**Yes**	Read / Write	N	7, 9-255	0-255	NA	0-15
ASCII	**Yes**	**Yes**	Read	A	3-999	0-999	NA	0-15
ASCII String	**Yes**	**Yes**	Read	ST	3-999	0-799	LEN, CHAR	0-15

Screen Types and Data Formats

Some application screens require that you specify register information. Each DTAM screen type supports different data formats. The following table lists each screen type and the data formats supported.

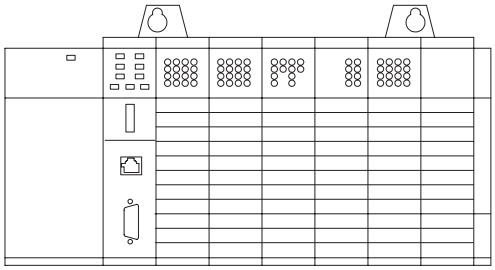


PLC Data Formats

Format	Display, Alarm, Printer Form ① Screens	Data Entry Screens	Bar Graph Screens ①	Background Monitor ①	Recipe Screens
Bit	✓	✓		✓	
16 Bit Signed Integer	✓	✓	✓	✓	✓
16 Bit Unsigned Integer	✓	✓			✓
16 Bit BCD	✓	✓	✓	✓	✓
16 Bit Hex	✓				
32 Bit Floating Point	✓	✓			✓
32 Bit Unsigned Integer	✓	✓			✓
32 Bit BCD	✓	✓			✓
32 Bit Hex	✓				
ASCII	✓				

① Bar Graph, Printer Form, and Background Monitor are only available on DTAM Plus Operator Modules.

SLC Data Formats



Format	Display, Alarm, Printer Form ① Screens	Data Entry Screens	Bar Graph Screens ①	Background Monitor ①	Recipe Screens
Bit	✓	✓		✓	
16 Bit Signed Integer	✓	✓	✓	✓	✓
16 Bit Unsigned Integer	✓	✓			✓
16 Bit BCD	✓	✓	✓	✓	✓
16 Bit Hex	✓				
32 Bit Unsigned Integer	✓	✓			✓
32 Bit BCD	✓	✓			✓
32 Bit Hex	✓				
ASCII	✓				

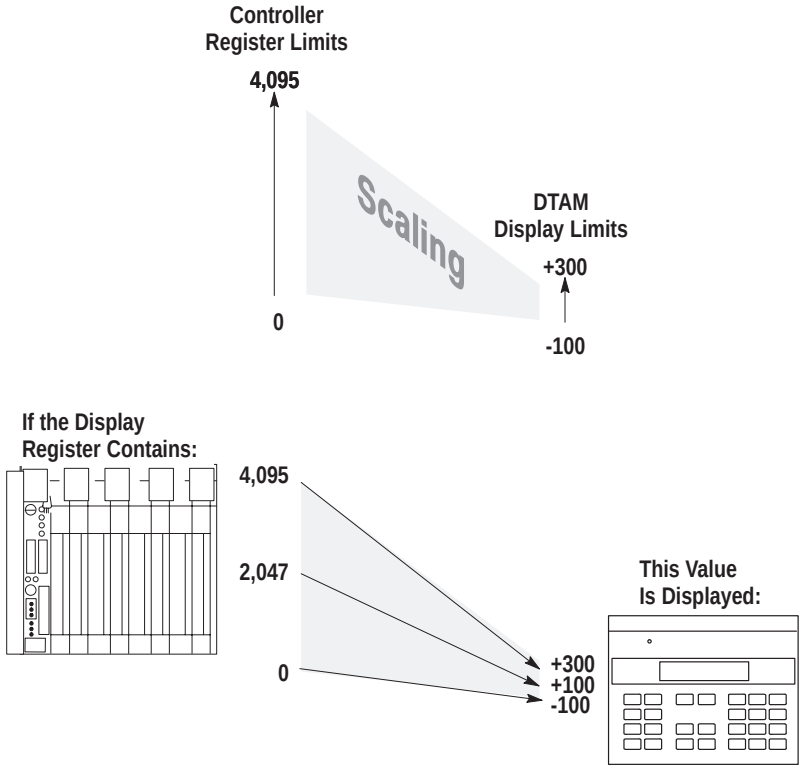
① Bar Graph, Printer Form, and Background Monitor are only available on DTAM Plus Operator Modules.

Data Scaling

Data entered by an operator can be scaled from engineering units such as gallons or PSI to machine control values. Likewise, data displays can take raw numeric values and scale them so they are displayed in engineering units.

Scaling of data is accomplished by defining a proportional ratio between the register value range and the display or entry value range. If a 1:1 ratio exists, the DTAM displayed or entered value equals the controller register value.

Here is an example of scaling using a data display to scale a register data range of 0 to 4,095 to a DTAM display range of -100 to +300.



When the ratio between the controller register values and DTAM display or entry values is not a multiple of 2, the value is rounded. Rounding may result in a 1 count error. Depending upon the direction of the scaling, this means that:

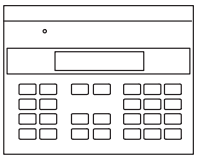
- The DTAM display value may be off by 1 when the controller register value is scaled
- The controller register value may be off by one when a DTAM data entry is scaled.

An error screen appears if a rounding error occurs at the end points of a data range. You must either increase the minimum or decrease the maximum range of either the controller register or display ranges.

Scaling Formulas

The scaling formula for a DTAM display value is:

Displayed Value = m x Register Value + b



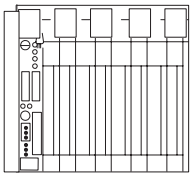
Where:

$$m = \frac{\text{Display Maximum Value} - \text{Display Minimum Value}}{\text{Register Maximum Value} - \text{Register Minimum Value}}$$

$$b = \text{Display Minimum Value} - (m \times \text{Register Minimum Value})$$

The scaling formula for an entered valued is:

Register Value = m x Entered Value + b



Where:

$$m = \frac{\text{Register Maximum Value} - \text{Register Minimum Value}}{\text{Entry Maximum Value} - \text{Entry Minimum Value}}$$

$$b = \text{Register Minimum Value} - (m \times \text{Entry Minimum Value})$$

Scaling example:

Register Range = $0 \rightarrow 4{,}095$
Display Range = $-100 \rightarrow +300$
Actual Register Value = 2,047

$$m = \frac{300 - (-100)}{4{,}095 - 0} = 0.0977$$

$b = -100 - (0.0977 \times 0) = -100$

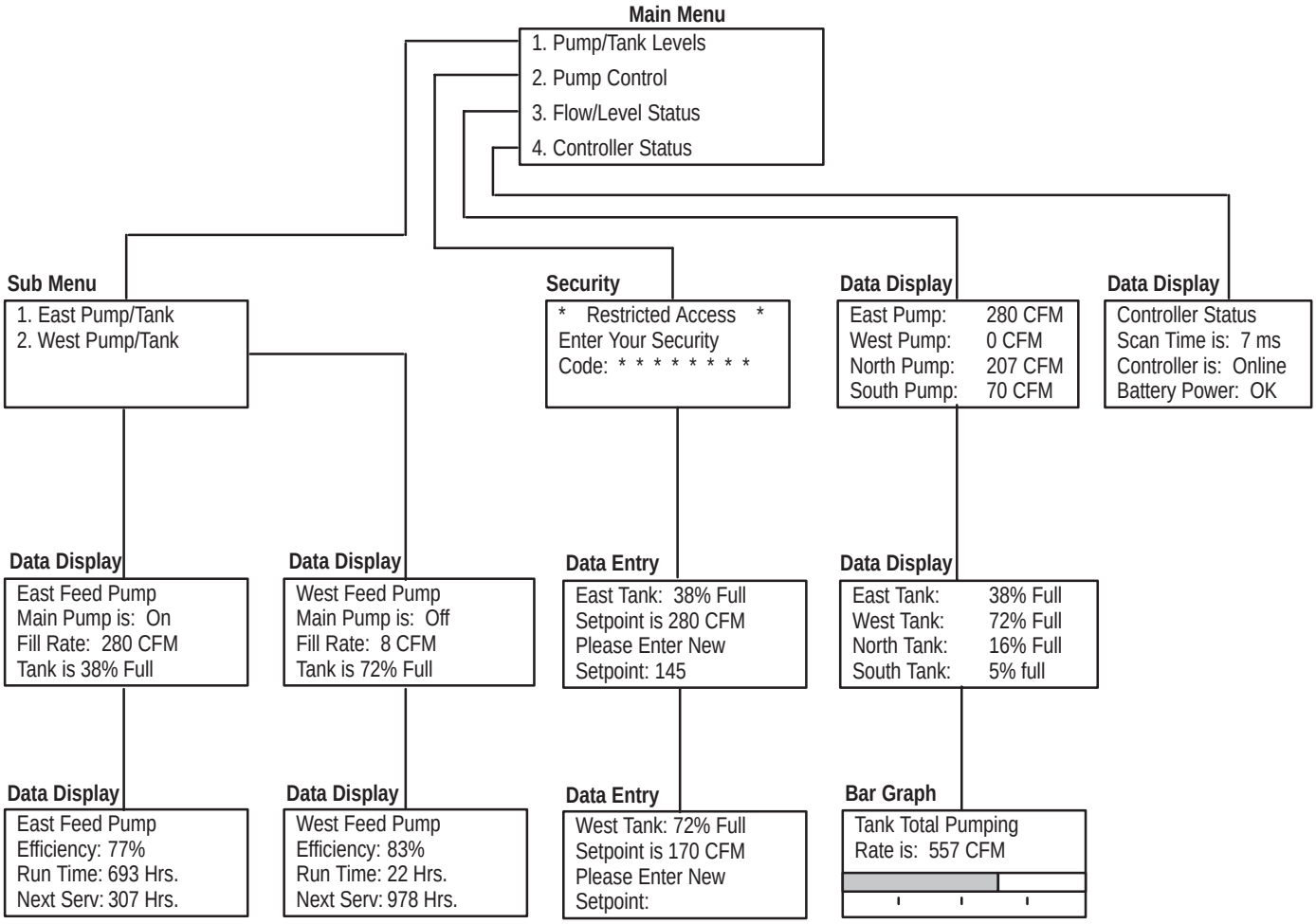
Displayed Value = $0.0977 \times 2{,}047 + (-100)$
$= 99.9919$
$=$ **100**

Application Example

The following example shows typical menus and screens of a DTAM Plus application. The same application could be created on a DTAM Micro with the following exceptions:

- DTAM Micro screen is 2 lines by 20 characters. Large screens would have to be shortened or broken down into separate screens.
- The DTAM Micro cannot support a bar graph screen.

DTAM Plus Application Outline



Example Application Description

Pump/Tank Levels

When Pump/Tank Levels is selected from the Main Menu, a Sub-Menu displays two new choices (East Pump/Tank and West Pump/Tank). Selecting either of these Sub-Menu items allows you to display pump and tank information for the East or West systems.

Pump Control

Allows you to enter new pump setpoints to be entered. A security code is required to access the Data Entry screens.

Data Entry screens use data from the SLC or PLC (% Full & CFM) to display this information along with a prompt to enter a new setpoint. When a new setpoint is entered, the value is checked to verify that it is within the programmed limits. If the value is within the entry limits, the number is then scaled to engineering units and sent to the SLC or PLC. If the value is outside the limits, an error message informs you of the valid range. You can then enter another value.

Flow/Level Status

Allows access to three Data Display screens identifying the flow rates for the four pumps. All values are updated in real time and are scaled to engineering units by the DTAM. Using the [NEXT] key on the DTAM keypad, an operator can display the sequence of Data Display screens. The Bar Graph screen (**DTAM Plus only**), lets you view the data in a graphic format.

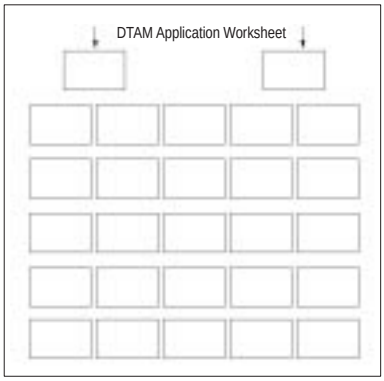
Controller Status

Shows the status of the controller (SLC or PLC).

Designing an Application

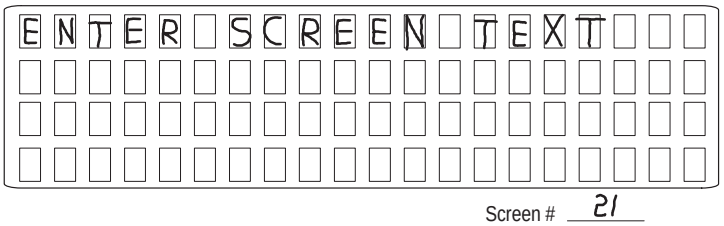
Appendix B contains worksheets for designing both DTAM Micro and DTAM Plus applications. Both application layout and screen design worksheets are provided.

Use the application design worksheets to layout a logical sequence of screens. Make copies of the worksheets as needed. On each worksheet, list the screen numbers, type of screens, register numbers, etc.

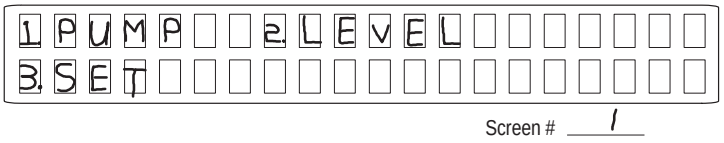


Use the screen worksheets to define screen text and layout. Make copies of the screen worksheets and write out each application screen.

DTAM Plus Screen Worksheet



DTAM Micro Screen Worksheet



Before you design an application, become familiar with the types of screens and how they function. To assist you, a sample application is provided in this chapter. In addition, you should become familiar with the controller files and data types supported for each operator module type and selected protocol (see previous section). When register information is required, this manual lists the applicable data formats (such as ASCII or 16 Bit Hex) for each controller file type.

Recommended sequence for creating an application:

Step 1 On paper, design all the operator screens with the associated register numbers, and produce a map of how all screens are linked together.

Step 2 Construct all screens using DPS. Save the program file without linking.

Step 3 Link the application screens. Use the design from step 1. When you have established all links, save the program file. An error display will warn you of any unlinked screens.

Step 4 Download the application file.

Step 5 Use the Simulate function (described in the DTAM Micro or DTAM Plus user manuals) to verify operations such as screen links, text, and screen types.

Step 6 Run the application.

Chapter 4

Creating or Editing an Application File

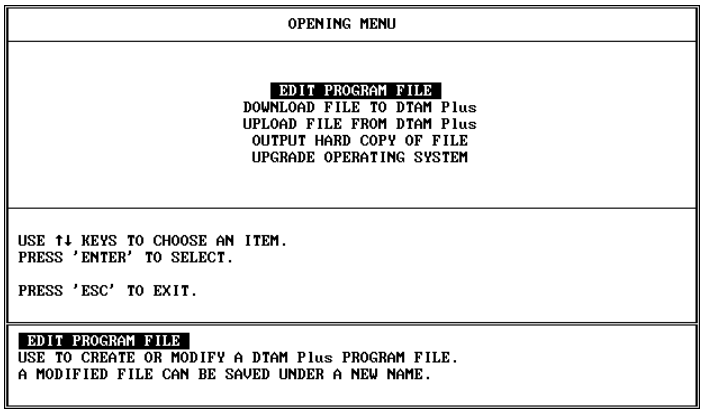
Chapter Objectives

This chapter describes how to open, edit and save an application file.

Opening Menu

The Opening Menu is the first menu displayed each time you run the software.

Note: If you specified prompts for monitor type and product type during installation, these prompts will appear before the opening menu.



The Opening Menu displays the following operations:

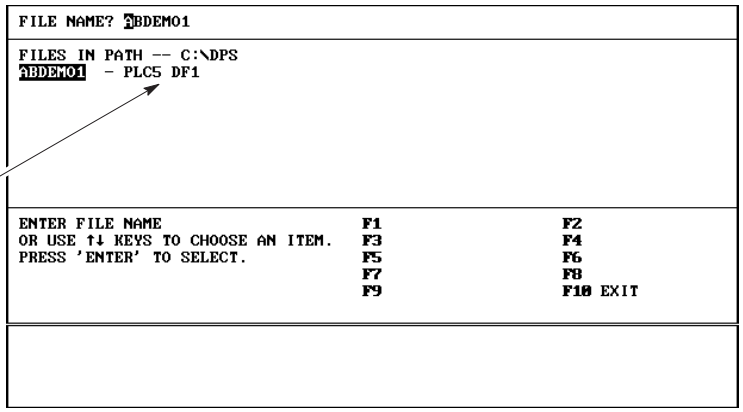
- Edit Program File
- Download File to DTAM Plus or Micro
- Upload File from DTAM Plus or Micro
- Output Hard Copy of File
- Upgrade Operating System

Edit Application File

To create or edit an application:

1. Select Edit Program File to create or edit a DTAM application file.

   You are prompted for the file name to edit or create. All DTAM application files in the current directory are listed.



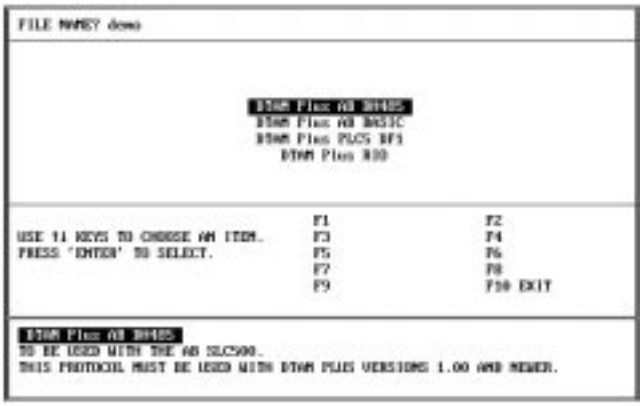
The directory only lists files compatible with the currently specified hardware type. For example, if DTAM Micro is specified only DTAM Micro applications are listed.

   If files already exist, each file name is followed by the type of Operating System the file was created for:

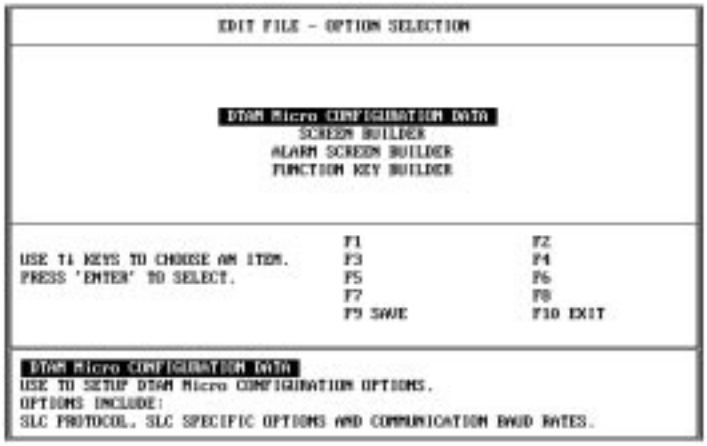
   - **AB DH485** for point to point or 32 node operation with SLC controllers.
   - **PLC5 DF1** for DF1 connection to PLC-5 serial port (channel 0).
   - **AB BASIC** only applies to DTAM Plus programming when communicating with an SLC BASIC module (Catalog No. 1746-BAS).
   - **RIO** only applies to DTAM Plus programming when communicating with an a PLC-5 or SLC 5/03 / 5/04 over a remote I/O link.

2. Select the name of an existing application file or enter a new file name.

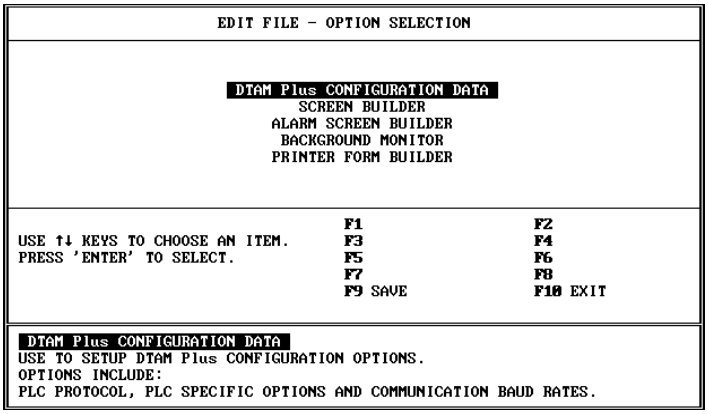
   If you entered a new file name, you must select an operating system:



After you select an existing file or enter the operating system (for new files), the Edit File - Option Selection menu is displayed.



DTAM Micro or



DTAM Plus

3. Access the following functions from the Edit File - Option Selection menu to create your application screens and enter configuration data.

Select this Menu Option:	Applies to:		To
	DTAM-Plus	DTAM-Micro	
DTAM Configuration Data	✓	✓	Set configuration and operating parameters.
Screen Builder	✓	✓	Create or modify application screens.
Alarm Screen Builder	✓	✓	Create or modify alarm screens.
Background Monitor	✓		Assign background registers and limits for the DTAM Plus to monitor.
Print Form Builder	✓		Create or modify DTAM Plus Printer Forms.
Function Key Builder		✓	Assign application specific operations to the DTAM Micro function keys.

Save Application File

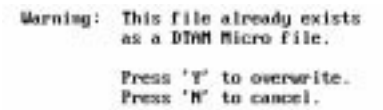
Save the application periodically while you are working on the application screens and save the file again before you exit the software.

To save an application periodically during editing:

1. Press [F9].

   You are prompted to save the application under the current file name or you can enter a new file name.

   Note: If the same file name currently exists under a different product type, you are prompted if you want to overwrite the existing file.



2. Press [Return] to save the application under the file name entered when the application file was opened.

   Or enter a new file name:

   If you were creating a new file, the new file name replaces the file name entered when the application was opened.

   If you are editing an existing file, the original file is unchanged. The file and all edits made prior to the last save are stored under the new file name.

3. After saving the file, you can continue with your editing of the application

To save an application before exiting:

1. Exit the software by pressing [F10].

   You are prompted save the application under the current file name or you can enter a new file name.

2. If you enter a new file name, the original file is unchanged. All edits are stored under the new file name.

   After saving the file, you are returned to a DOS prompt.

Chapter 5

Using Screen Builder

Chapter Objectives

This chapter describes options common to all of the Screen Builder types.

Screen Builder

Screen Builder is one of the menu items available when you select Edit Program File from the Opening menu. Use Screen Builder to create:

- Menus and Sub-menus
- Data Entry screens
- Data Display screens
- Security screens
- Recipe screens
- Bar Graph screens (**DTAM Plus only**)

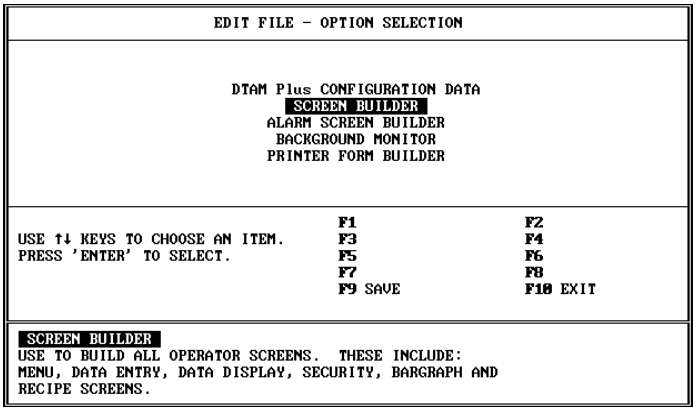
Alarm and Special menu security screens are not created within Screen Builder. These screens are created using other DPS functions:

- For alarm screens, refer to Chapter 13.
- For the Special menu security screen, see Chapter 14.

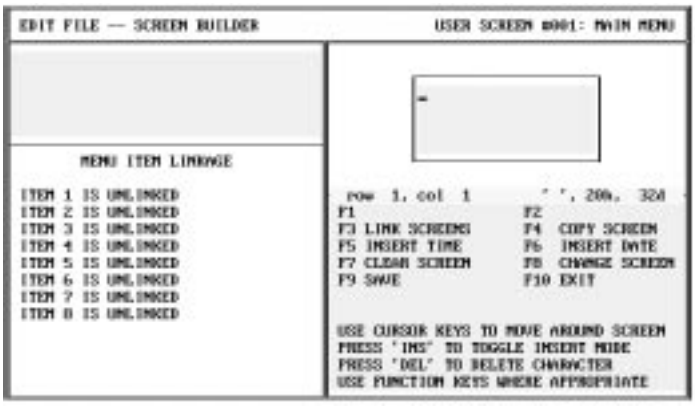
Accessing Screen Types

To access Screen Builder screens:

1. Select Screen Builder from the Edit File - Option Selection menu.

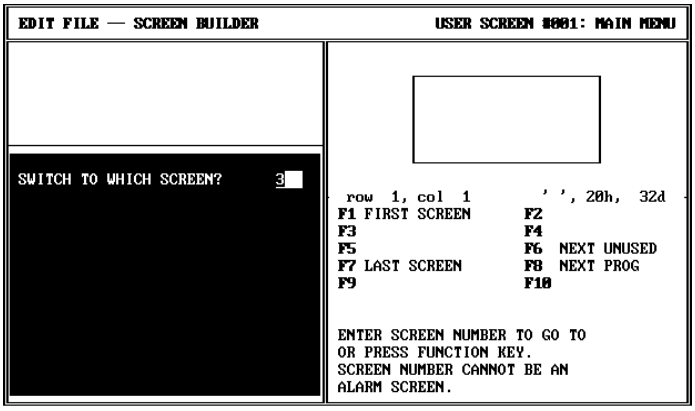


The Screen Builder for the main menu screen (screen #1) displays:



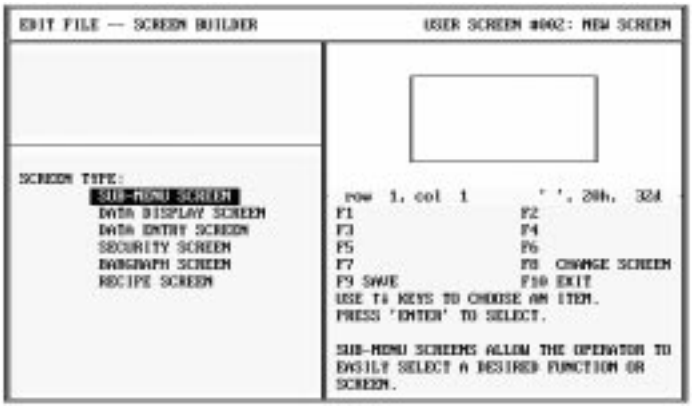
2. If you have designed your main menu screen, you can create it now as described in Chapter 6. Each application must have a main menu screen. If you want to create another screen type, proceed to the next step.

3. Press [F8] on any screen to access the other screen types. You are prompted for a screen number:



Press [F6] to go to the next available unused screen or [F8] to view the contents of the next programmed screen.

4. If you enter any screen number other than screen #1 (main menu screen), you are prompted for a screen type:



5. Select a screen type. A Screen Builder for the selected screen type is then displayed. Refer to Chapters 6 through 11.

Screen Type	Chapter
Menus and Sub-Menus	6
Data Displays	7
Data Entry	8
Security	9
Recipe	10
Bar Graph ①	11

① **DTAM Plus only**.

Editing Screen Displays

When you are editing screen text, the following editing operations are available:

Screen Text Edit Functions

Screen Edit Key	Function
Arrow keys [↑] [↓] [←] [→]	Move the screen cursor.
[Del]	Deletes the character at the cursor position.
[Back Space]	Deletes the character to the left of the cursor position. The cursor is moved to the left one space.
[Ins]	Toggles the insert mode on or off. Characters entered in the insert mode are shifted to the right. A block shaped cursor indicates the insert mode is on. An underline cursor indicates that insert mode is off.

The extended DTAM character set can be used, refer to Appendix A for additional information.

Screen Builder Function keys

The following function keys are available on most screen types.

Function Key	Designation	Applies to:		Function
		DTAM Plus	DTAM Micro	
[F3]	LINK SCREENS	✓	✓	Accesses screen mapping functions that link application screens in a logical sequence. Link screens only after all of the screens have been created.
[F4]	COPY SCREEN	✓	✓	Copies an existing screen to or from the current display window. Both the source and destination screens must be of the same type (such as Data Display screens).
[F5]	INSERT TIME	✓		Inserts the time into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F6]	INSERT DATE	✓		Inserts the date into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F7]	CLEAR SCREEN	✓	✓	Clears the current screen. You have the option of clearing only the screen text or deleting the entire screen including any linking you may have established.
[F8]	CHANGE SCREEN	✓	✓	Displays menu for selecting another screen type.
[F9]	SAVE	✓	✓	Saves the application without exiting the Screen Builder function.
[F10]	EXIT	✓	✓	Prompts you to save the application to the current file and exits the DPS software

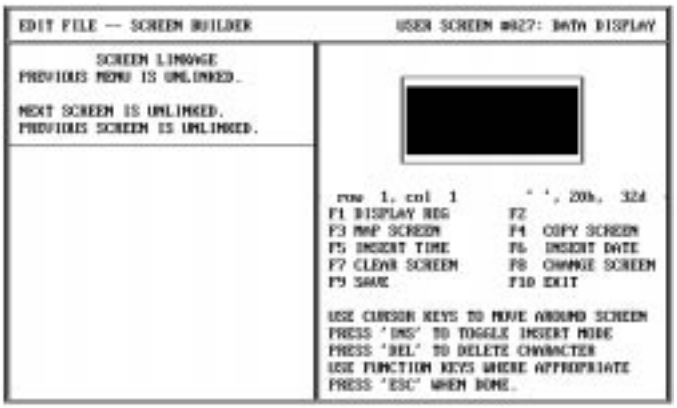
Copying Screens

Use the copy function [F4] to save time when creating similar screens. Both the source screen and the destination screen must be of the same type. For example, you can't copy Data Entry screen text into a Data Display screen.

When you copy a screen, all register data and display text is also copied. Edit the screen as needed after copying.

To copy a screen:

1. Open the screen you want to copy the screen to or from. In this example a Data Display screen:



2. Press [F4].

   You are prompted for the screen to copy to or from:

3. Press [F1] to copy the current screen to another screen. Press [F2] to copy another screen to the current screen.

   You are prompted for a screen number.

4. Enter the screen number and press [Return].

   The screen is copied.

5. Edit the copied screen text and/or register data, refer to descriptions of individual screen types (Chapters 6 through 11).

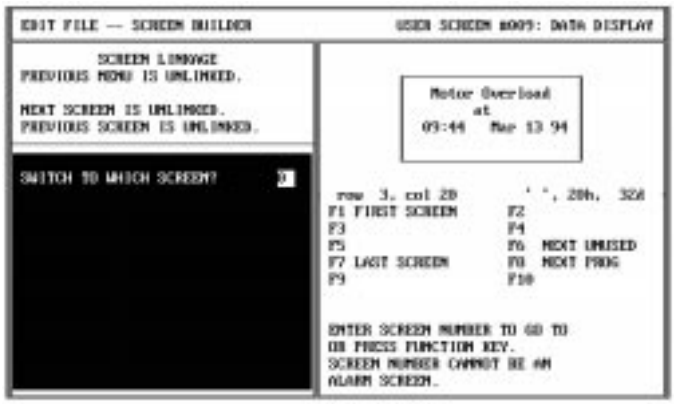
Selecting Other Screens

After you have completed an application screen, use [F8] Change Screen to edit another screen. You can change to any screen except an alarm screen. Use the Alarm Builder function (Chapter 13) to access alarm screens.

To change screens:

1. Select [F8] Change Screen.

   You are prompted for a screen number.



2. Enter the screen number you want to change to or select one of the function keys:

Function Key	Designation	Function
[F1]	FIRST SCREEN	Returns to screen #1, the main menu.
[F6]	NEXT UNUSED	Selects the next unused screen.
[F7]	LAST SCREEN	Selects the last programmed screen.
[F8]	NEXT PROG	Selects the next programmed screen.

   The selected screen is displayed.

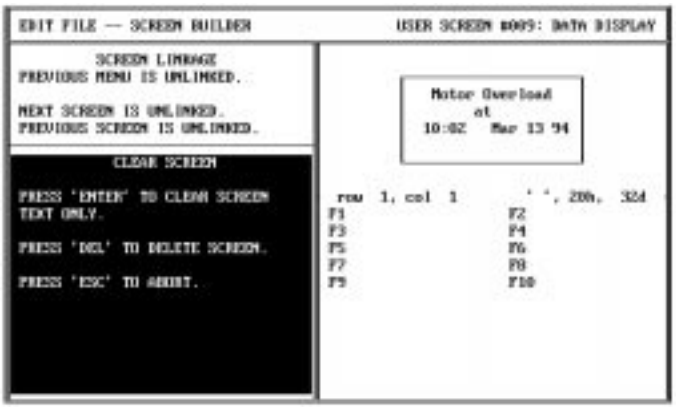
Clearing Screens

Use the [F7] Clear Screen function to clear all or part of the currently displayed screen.

To clear a screen:

1. Open the screen you want to clear.
2. Select [F7] Clear Screen.

   You are prompted for a clear screen option:



3. Select the Clear Screen option.

Press:	To:
ENTER [Return]	Clear the display text only. Screen linking and register data for the screen are not deleted.
DELETE [Del]	Clears the entire screen including screen display text, register data, and screen links.
ESCAPE [Esc]	Cancels the clear screen function.

   The screen is cleared.

4. Continue programming or change to another screen.

Inserting the Time or Date

If you are programming a DTAM Plus with a clock/calendar option, you can insert the time or date into any application screen. Time and date functions are not available on the DTAM Micro.

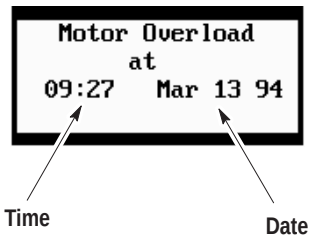
The time field takes up 5 character positions and is displayed in the format HH:MM. AM/PM and seconds are not displayed to conserve space. However AM/PM and the seconds are shown on print forms in the format HH:MM:SS AM.

The date field takes up 9 character positions and is displayed in the format MMM/DD/YY.

To insert the time or date:

1. Use the arrow keys to position the cursor where you want to insert the date or time.
2. Press [F5] to insert the time or [F6] to insert the date.

   The current date or time is inserted on the display:



3. Continue programming the remainder of the screen.

Exiting Screen Builder

You can exit Screen Builder at any time during the design of an application. Screen edits are not lost when you exit Screen Builder, however, we recommend that you press [F9] SAVE before exiting.

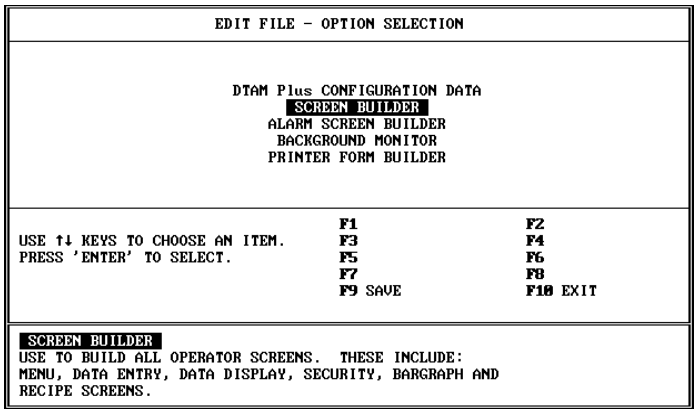
To exit Screen Builder:

1. Press [Esc].

   If you haven't established screen linking, you are provided a reminder:

2. Press [Y] to acknowledge the reminder (if displayed).

   After exiting Screen Builder, the Edit File - Option Selection menu is displayed.



   You can re-enter Screen Builder later for additional edits or to establish screen linking.

Chapter 6

Creating Menu and Sub-Menu Screens

Chapter Objectives

This chapter describes how to create the main menu and sub-menu screens.

Menu Screens

Menu Screens provide easy access to different parts of an application. Menus structure an application on the basis of specific tasks and responsibilities.

Each menu screen may consist of up to 8 different menu items. When selected (by pressing a corresponding numeric key), a menu item displays the linked screen or sub-menu.

A typical menu screen might look like this:

```
1. Temp Set   3. Level
2.  Monitor
```

Main Menu Screens

The Main Menu is always operator screen #1. This menu lists the primary components of your application. All other menus and data screens are accessed from this screen.

There are two differences between the main menu and sub-menus:

- The DTAM Plus [MAIN MENU] or DTAM Micro [MENU] key displays the Main Menu. This key is active at all times, unless an alarm is detected.
- The Main Menu is the first screen that appears after a restart or reset, unless an alarm is detected.

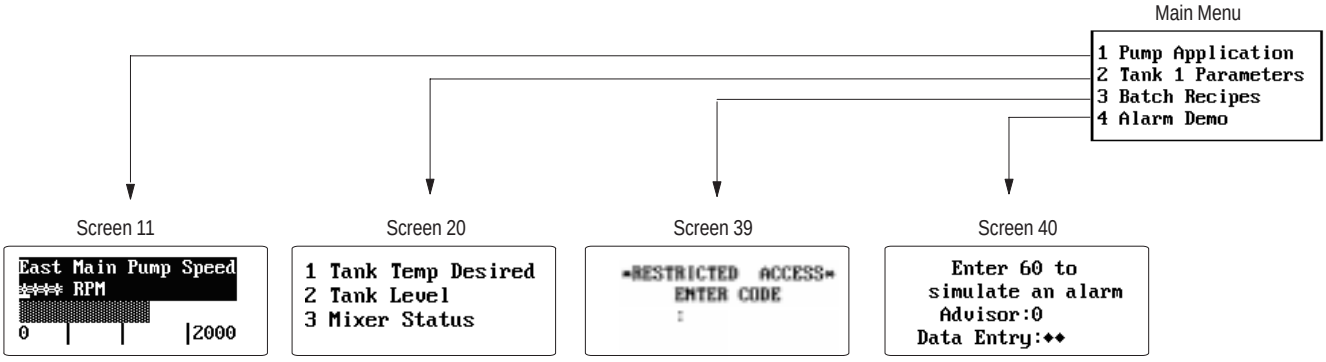
Sub-Menu Screens

Sub-menu screens are identical in appearance to the main menu screen. Sub-menu screens enable you to expand the scope of an application by providing directed choices through linked menus. This allows you to construct a large application and maintain efficient access to specific areas.

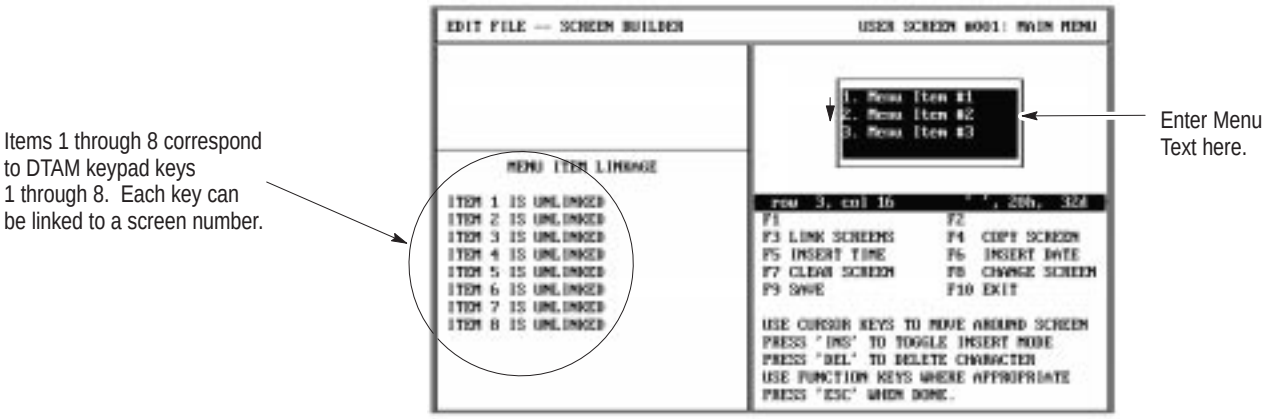
Building a Menu

When you build a menu, you are directing the operator to more specific screens. A menu is a numbered list of components available at the current stage of a process. Number each successive menu entry sequentially. The number tells the operator which DTAM keypad key ([**1**] through [**8**]) to press for each menu item (1 through 8).

The following example shows the menu structure of a DTAM Plus application. The operator uses the DTAM numeric keypad keys to select a menu item. Pressing [**1**] on the keypad selects the Pump Application screen. Screen #11 is linked to keypad key [**1**] on the DTAM while this menu is displayed. Pressing keypad key [**2**] on the DTAM Plus displays another menu which has different links assigned to keypad keys [**1**],[**2**] and [**3**].



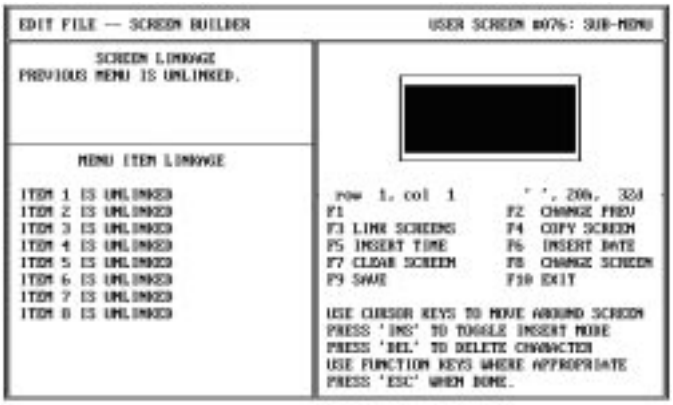
To assign menu text, position the cursor at the location you want the list to begin and enter text.



Screens can't be linked to DTAM keypad keys ([**1**] - [**8**]) until you have first created the screens. After creating your application screens, you can return to the menu screens and assign the links, refer to Chapter 12.

Main Menu and Sub-Menu Screen Builder

The screen for creating the main menu and sub-menu screens is the same for the DTAM Plus and DTAM Micro. The only difference is the DTAM Micro has a 2 line display and the DTAM Plus can display 4 lines.



Menu Screen Builder Function keys

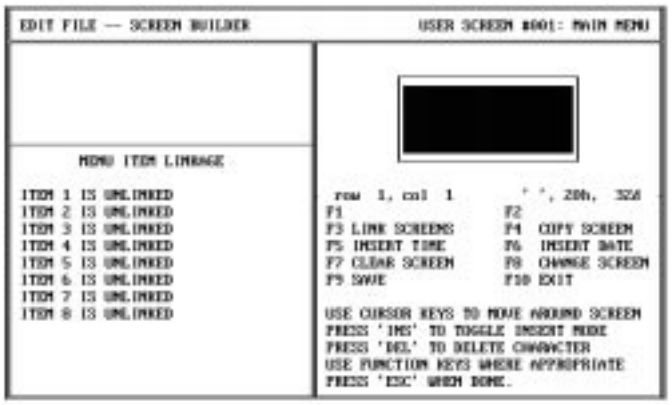
Function Key	Designation	Applies to: DTAM Plus	Applies to: DTAM Micro	Function
[F2]	CHANGE PREV	✓		Only applies to DTAM Plus sub-menu screens. Displays linking prompt used to designate the screen displayed when the operator presses the [**PREV MENU**] key (DTAM Plus only).
[F3]	LINK SCREENS	✓	✓	Accesses screen mapping functions that link application screens in a logical sequence. Link screens only after all of the screens have been created. Refer to Chapter 12.
[F4]	COPY SCREEN	✓	✓	Copies an existing screen to or from the current display window. Both the source and destination screens must be of the same type (Menu screens).
[F5]	INSERT TIME	✓		Inserts the time into the menu. Only available with a DTAM Plus having the Calendar/Clock option.
[F6]	INSERT DATE	✓		Inserts the date into the menu. Only available with a DTAM Plus having the Calendar/Clock option.
[F7]	CLEAR SCREEN	✓	✓	Clears the current screen. You have the option of clearing only the screen text or deleting the entire screen including any linking you may have established.
[F8]	CHANGE SCREEN	✓	✓	Selects another operator screen.
[F9]	SAVE	✓	✓	Saves the application without exiting the Screen Builder function.
[F10]	EXIT	✓	✓	Prompts you to save the application to the current file and exits the DPS software.

Creating a Menu Screen

To create a menu screen:

1. Select Screen Builder from the Edit File - Option Selection menu.

   The screen builder for the main menu (screen #1) is displayed.



2. If you are creating a sub-menu, press [F8], enter the screen number, and select a sub-menu screen type.

   The screen builder for a sub-menu is displayed. The sub-menu screen builder is the same as the main screen (shown above).

3. Enter the screen text. The sequence, length and location of the text does not matter but make sure you number each menu item (1 through 8).

4. Press [F9] to save the screen.

Note: You can't link screens to a menu until all of the application screens have been created. Chapter 12 describes how to link screens to a menu.

Chapter 7

Creating Data Display Screens

Chapter Objectives

This chapter describes how to create data display screens.

Data Displays

Data display screens allow you to monitor the value of registers in the SLC or PLC. The DTAM continuously reads the registers to update (at a user-defined rate) the displayed values.

This is how a data display screen may appear:

```
Tank Level = 33 Gallons
10% Full    Press NEXT
```

To construct data display screens, you need to specify:

- The type of screen as data display
- The type of data stored in the PLC or SLC register
- The register to access (address)
- Any data format and display information
- The display position for the data
- Any additional text information that you want to display

Scaling

Data in controller data files can be scaled to standard engineering units such as gallons, pounds, feet, etc. Data is scaled by setting up a proportion between the controller register data limits and the DTAM data display limits. Refer to the description of scaling in Chapter 3.

Note: The 32 bit BCD data format cannot be scaled.

Data Display Screen Builder

The screen for creating data display screens is the same for the DTAM Plus and DTAM Micro. The only exceptions are the DTAM Micro display does not show the time and date function keys and has a smaller display size (2 lines of 20 characters).

Data Display Screen Builder Function Keys

Function Key	Designation	Applies to:		Function
		DTAM Plus	DTAM Micro	
[F1]	DISPLAY REG	✓	✓	Inserts data display field at the cursor point. Accesses the display register information.
[F3]	MAP SCREEN	✓	✓	Accesses screen mapping functions that link application screens in a logical sequence. Link screens only after all of the screens have been created.
[F4]	COPY SCREEN	✓	✓	Copies an existing screen to or from the current display window. Both the source and destination screens must be of the same type (Data Display screens).
[F5]	INSERT TIME	✓		Inserts the time into the display. Only available on a DTAM Plus having the Calendar/Clock option.
[F6]	INSERT DATE	✓		Inserts the date into the display. Only available on a DTAM Plus having the Calendar/Clock option.
[F7]	CLEAR SCREEN	✓	✓	Clears the current screen. You have the option of clearing only the screen text or deleting the entire screen including any linking you may have established.
[F8]	CHANGE SCREEN	✓	✓	Selects another operator screen.
[F9]	SAVE	✓	✓	Saves the application without exiting the Screen Builder function.
[F10]	EXIT	✓	✓	Prompts you to save the application to the current file and exits the DPS software.

Creating a Display Screen

The display register data field may be inserted anywhere on the screen. The number of positions required for the data field depends upon the register information you provide. You can insert the display data while you are entering the screen text or you can leave spaces and insert the data field later.

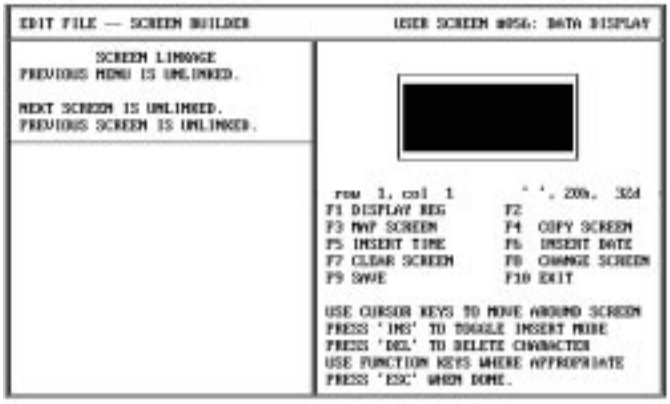
To create a data display:

1. Select Screen Builder from the Edit File - Option Selection menu.

   The Screen Builder for the main menu (screen #1) is displayed.

2. Press [F8], enter the display screen #, and select Data Display Screen type.

   The Screen Builder for a data display screen appears.



3. Enter the screen text to the point where you want the data display field to be inserted. You can either leave spaces for the display field or enter the display field at this time. Position the cursor where you want to insert the data display.
4. Press [F1] to insert a display register.

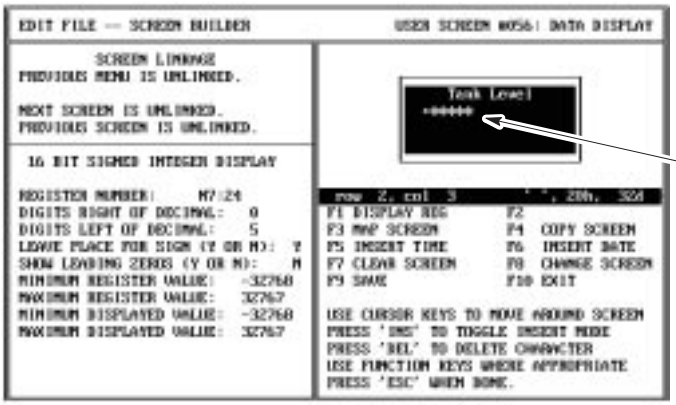
You are prompted to select a register type. The selection depends upon the protocol (AB-DH485, AB BASIC, PLC-5 DF1, RIO) that was selected. Refer to page 3–3 for a list of the applicable file types for each protocol.

5. Select a register type.

   You are prompted for data specific to the selected register type:

16 Bit Signed Integer Shown

6. Enter the register data. Refer to the next section Display Register Format Selections.
7. After entering the register data, press [Esc] to save the data and return to the screen editing. The data display register field is indicated by a series of asterisks ****. The number of asterisks and format (decimal point and sign) is determined by the register data you entered.



Data Display Register

8. Enter the remainder of the screen text or additional display registers and press [F9] to save the screen.

   Note: Move the cursor off the data display field using the arrow keys before entering additional screen text. If you attempt to enter text over a display field you will be prompted:

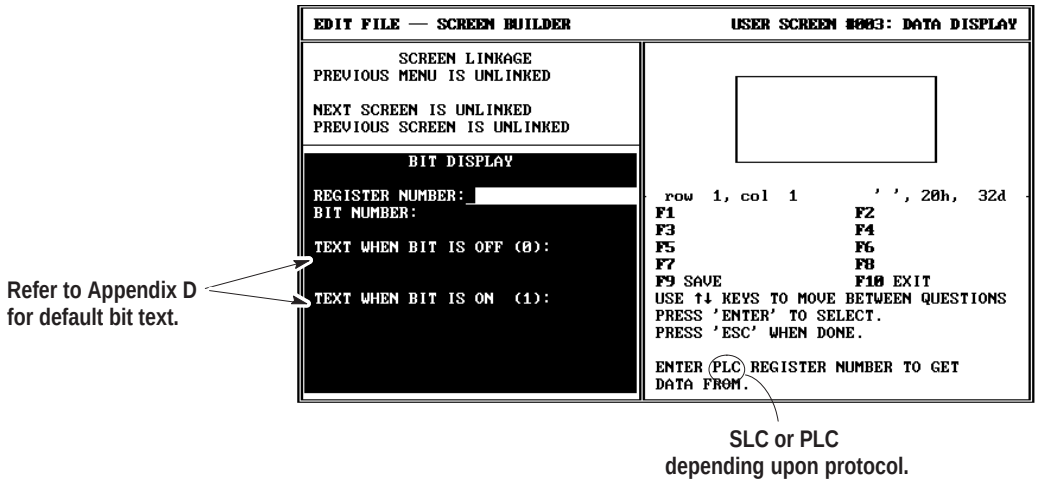
```
WARNING!  You are about to delete
          a register definition.
          PRESS 'Y' to proceed.
          PRESS 'N' to abort.
```

Display Register Format Selections

When inserting a data display field, you must provide register information that determines the address and format of the data being displayed. This section describes options available for data display registers.

Bit

The register information for a Bit display is shown below.

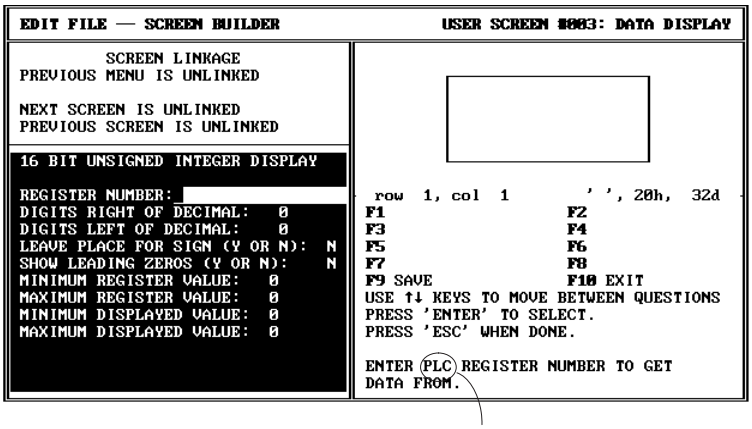


Format Selection	Description
Register Number	The controller address from which the bit will be monitored.
Bit Number	The Bit number of a multiple bit address which will be monitored for status if the register number designates a multiple bit address (a 16 bit data address, for example). This selection is irrelevant if the register number refers to a Bit type address.
Text when Bit is OFF (0)	The text description (20 character maximum) to be displayed when the bit is in an OFF (0) state.
Text when Bit is ON (1)	The text description (20 character maximum) to be displayed when the bit is in an ON (1) state.

Display Register Format Selections

16 Bit Signed Integer, 16 Bit Unsigned Integer, 16 Bit BCD (Binary Coded Decimal)

The screen for a 16 Bit Unsigned Integer format is shown below. The screens for 16 Bit Signed Integer and 16 Bit BCD formats are similar.



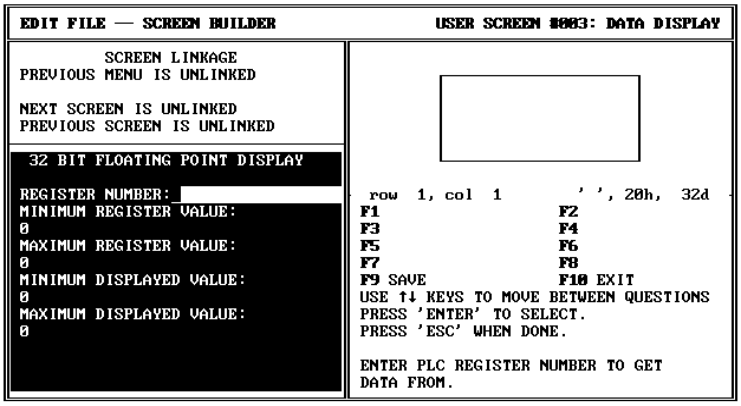
SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller address from which the integer will be monitored.
Digits Right of Decimal	The number of digits to be placed to the right of the decimal.
Digits Left of Decimal	The number of digits to be placed to the left of the decimal.
Leave Place for Sign (Y or N)	Provides for a one character place for the polarity sign (+ or -) when the data is displayed, if desired.
Show Leading Zeros (Y or N)	Provides for any zeros to the left of the data, if desired.
Minimum Register Value	The minimum data value of the controller address being monitored.
Maximum Register Value	The maximum data value of the controller address being monitored.
Minimum Displayed Value	The minimum data value to be displayed. This value is displayed when the data in the controller address is equal to the minimum register value.
Maximum Displayed Value	The maximum data value to be displayed. This value is displayed when the data in the controller address is equal to the maximum register value. The range defined by the Minimum Displayed Value and the Maximum Displayed Value is proportionally scaled to the range of the minimum and maximum register values. If both ranges are equal then the scaling ratio is 1:1.

32 Bit Floating Point

Important: 32 bit floating point is only supported on the DTAM Plus if PLC-5 DF1 protocol has been selected.

The screen for a 32 Bit Floating Point format is shown below.

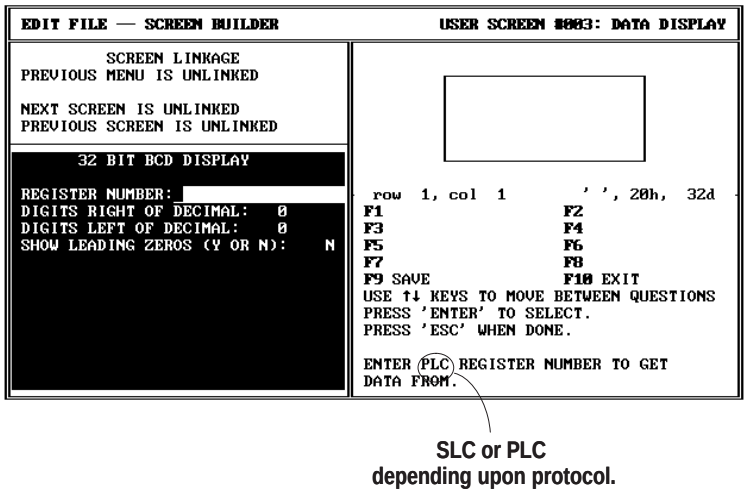


Format Selection	Description
Register Number	The PLC address to be monitored.
Minimum Register Value	The minimum data value of the PLC address.
Maximum Register Value	The maximum data value of the PLC address.
Minimum Displayed Value	The minimum data value to be displayed. This value is displayed when the data in the PLC address is equal to the minimum register value.
Maximum Displayed Value	The maximum data value to be displayed. This value is displayed when the data in the PLC address is equal to the maximum register value. The range defined by the Minimum Displayed Value and the Maximum Displayed Value is proportionally scaled to the range of the minimum and maximum register values. If both ranges are equal then the scaling ratio is 1:1.

Display Register Format Selections

32 Bit Unsigned Integer, 32 Bit BCD (Binary Coded Decimal)

The screen for a 32 Bit BCD format is shown below. The screen for a 32 Bit Unsigned Integer format is similar.



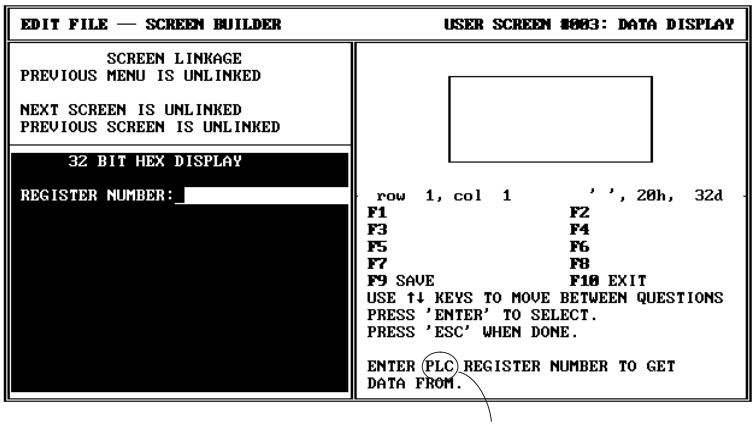
SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller address to be monitored.
Digits Right of Decimal	The number of digits to be placed to the right of the decimal.
Digits Left of Decimal	The number of digits to be placed to the left of the decimal.
Show Leading Zeros (Y or N)	Provides for zeros to the left of the data, if desired.

Note: For the 32 Bit selections, scaling of data is not supported. The selected register number and the next higher sequential register number identify the addresses defining the 32 bit data value.

16 Bit HEX (Hexadecimal), 32 Bit HEX

The screen for a 32 Bit Hex format is shown below. The screen for a 16 Bit Hex format is similar.



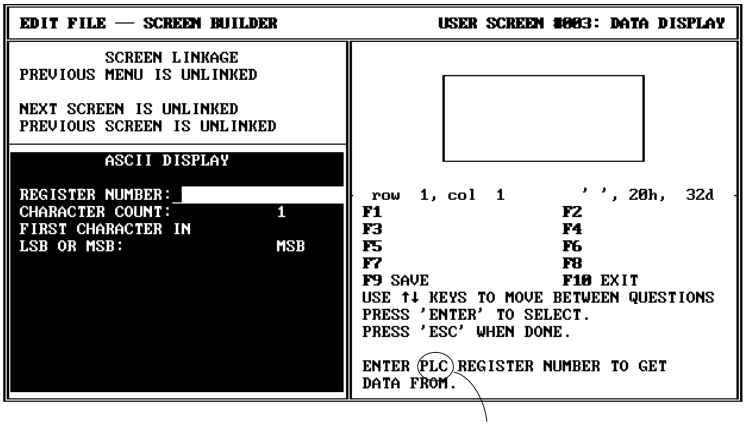
SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller address to be monitored.

Display Register Format Selections

ASCII

The screen for an ASCII format is shown below:



SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller address to be monitored.
Character Count	The number of characters (2 characters for each 16 bit data address) to be displayed, up to a maximum of 20 characters. The initial byte of the address identified by the register number is displayed first, then the second byte, the first byte of the next higher sequential address, and so on. To display 20 characters, a sequential block of ten 16 bit addresses is read by the DTAM.
First Character in LSB or MSB	Indicates placement of first ASCII character to be read.

Chapter 8

Creating Data Entry Screens

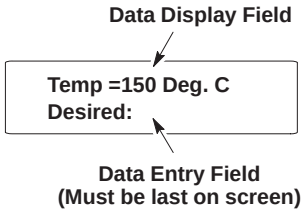
Chapter Objectives

This chapter describes how to create data entry screens

Data Entry Screens

Data entry screens allow an operator to directly enter values into SLC or PLC registers. Data entry screens can also contain a data display field.

This is how a data entry screen may appear:



To construct data entry screens, you need to specify:

- The type of screen as data entry
- Any additional text information that you want to display
- The type of data stored in the PLC or SLC register
- The register to access (address), and if used, a display register
- Any data format and display information
- The display position for the entry field

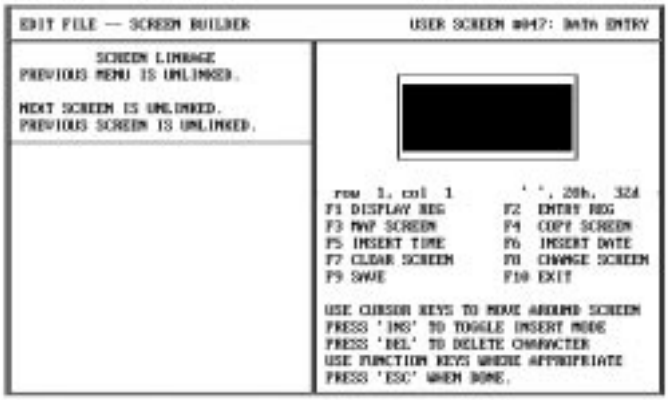
Scaling

Data entered in standard engineering units such as gallons, pounds, feet, etc. can be scaled to machine control values. Data is scaled by setting up a proportion between the DTAM data entry limits and the controller register data limits. Refer to the description of scaling in Chapter 3.

Note: The 32 bit BCD data format cannot be scaled.

Data Entry Screen Builder

The screen for creating data entry screens is the same for the DTAM Plus and DTAM Micro. The only exceptions are the DTAM Micro display does not show the time and date function keys and has a smaller display size (2 lines of 20 characters).



Data Entry Screen Builder Function Keys

Function Key	Designation	Applies to: DTAM Plus	Applies to: DTAM Micro	Function
[F1]	DISPLAY REG	✓	✓	Inserts data display field at the cursor point. Accesses the display register information. **Note:** Display values must positioned before the data entry field.
[F2]	ENTRY REG	✓	✓	Inserts data entry field at the cursor point. Accesses the entry register information.
[F3]	MAP SCREEN	✓	✓	Accesses screen mapping functions that link application screens in a logical sequence. Link screens only after all of the screens have been created.
[F4]	COPY SCREEN	✓	✓	Copies an existing screen to the current window. Both the source and destination screens must be of the same type (Data Entry screens).
[F5]	INSERT TIME	✓		Inserts the time into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F6]	INSERT DATE	✓		Inserts the date into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F7]	CLEAR SCREEN	✓	✓	Clears the current screen. You have the option of clearing only the screen text or deleting the entire screen including any linking you may have established.
[F8]	CHANGE SCREEN	✓	✓	Selects another operator screen.
[F9]	SAVE	✓	✓	Saves the application without exiting the Screen Builder function.
[F10]	EXIT	✓	✓	Prompts you to save the application to the current file and exits the DPS software.

Creating a Data Entry Screen

The entry register data field may be inserted anywhere on the screen, however, no text may follow the data entry field. This means that you must insert any text or a display field before the data entry field. The number of character positions required for the data entry field depends upon the register information you provide.

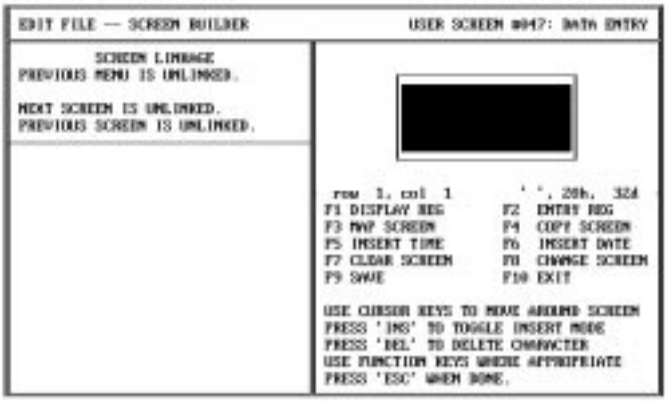
To create a data entry screen:

1. Select Screen Builder from the Edit File - Option Selection menu.

   The Screen Builder for the main menu (screen #1) is displayed.

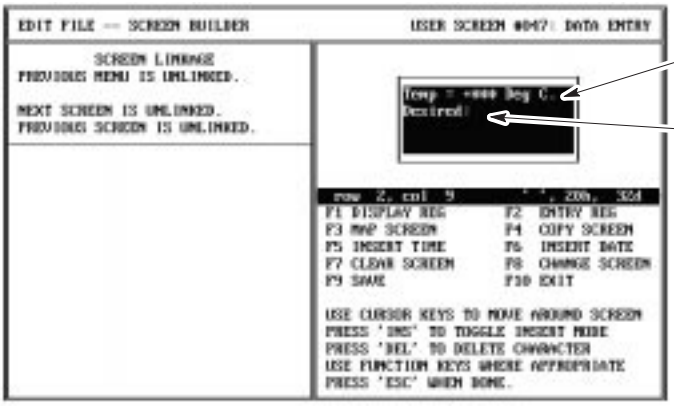
2. Press [F8], enter the display screen #, and select Data Entry Screen type.

   The Screen Builder for a data entry screen appears.



3. Create all of the screen text and, if used, a data display field. Refer to Chapter 7 for information on how to insert a data display field. The same procedures apply to a data display on the data entry screen.

4. Position the cursor where you want to insert the data entry field.



Creating a Data Entry Screen

5. Press [F2] to insert a data entry register.

You are prompted to select a register type. The selection depends upon the protocol that was selected. Refer to page 3–3 for a list of the applicable register types for each.

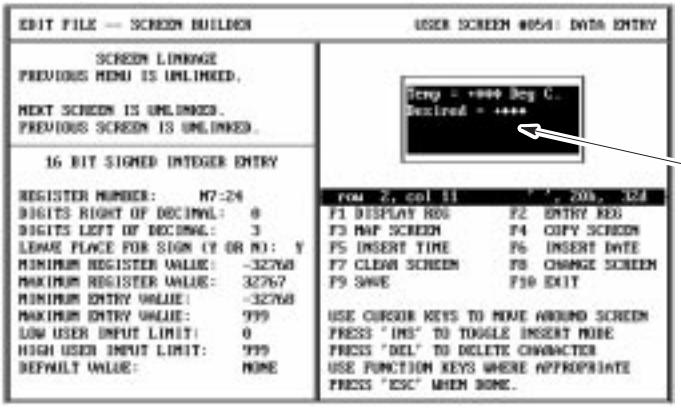
6. Select a register type.

You are prompted for data specific to the selected register type:

16 Bit Signed Integer Shown

7. Enter the register data. Refer to the next section Data Entry Register Format Selections.

8. After entering the register data, press [Esc] to save the data and return to the screen editing. The data entry register field is indicated by a series of diamonds ◆◆◆◆. The number of diamonds and format (decimal point and sign) is determined by the register data you entered.



9. Press [F9] to save the screen, any text entered after the data entry field will not be displayed.

Data Entry Register Format Selections

When inserting a data entry field, you must provide register information that determines the address and format of the data storage location. This section describes options available for data entry registers.

Bit

The screen for a Bit format is shown below:

SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller data address to be monitored.
Bit Number	The Bit number if the register number designates a multiple bit address (a 16 bit data address, for example). This selection is irrelevant if the register number refers to a Bit type address.
Input Data by Pressing '1'/'0' or 'Y'/'N' ? (Enter 1 or Y)	This parameter determines whether the operator will enter 1 or Y to set the defined bit address. If 1 is entered, 0 will clear the bit address. If Y is entered, N will clear the bit address.
Default Value ? Z = No Default (Enter 1,0,Y,N,Z)	This parameter defines the default value that is displayed at the data entry position of the DTAM display. If a default value of Y is entered, a Y is displayed, and the operator is only required to press ENTER to set the bit address. An entry of Z defines no default value. NONE appears in the window when z is entered.

16 Bit Signed Integer,
16 Bit Unsigned Integer,
16 Bit BCD (Binary Coded Decimal)

The screen for a 16 Bit Unsigned Integer format is shown below. The screens for 16 Bit Signed Integer and 16 Bit BCD formats are similar.

SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller data address to be monitored.
Digits Right of Decimal	The number of digits to be placed to the right of the decimal.
Digits Left of Decimal	The number of digits to be placed to the left of the decimal.
Leave Place for Sign (Y or N)	Provides for a one character place for the polarity sign (+ or -) when the data is displayed, if desired.
Minimum Register Value	The minimum data value of the controller address being monitored.
Maximum Register Value	The maximum data value of the controller address being monitored.
Minimum Entry Value	The minimum data value to be entered. When this value is entered the minimum register value is entered to the defined controller address.
Maximum Entry Value	The maximum data value to be entered. When this value is entered the maximum register value is entered to the defined controller address. The range defined by the minimum entry value and the maximum entry value is proportionally scaled to the range of the minimum and maximum register values. If both ranges are equal then the scaling ratio is 1:1.
Low User Input Limit	The minimum entry value that an operator may enter. This value must be within the minimum and maximum entry values. If a value lower than this limit is entered the DTAM will display an “Input Error” screen displaying the minimum and maximum entry limits.
High User Input Limit	The maximum entry value that an operator may enter. This value must be within the minimum and maximum entry values. If a value higher than this limit is entered the DTAM will display an “Input Error” screen displaying the minimum and maximum entry limits.
Default Value	This parameter defines a default value that is displayed at the entry address of the display. An entry of Z defines no default value. NONE appears in the window when Z is entered.

Data Entry Register Format Selections

32 Bit Floating Point

Important: 32 bit floating point is an option only on a DTAM Plus with PLC-5 DF1 protocol selected.

The screen for a 32 Bit Floating Point format is shown below.

Format Selection	Description
Register Number	The PLC address to be monitored.
Digits Right of Decimal	The number of digits to be placed to the right of the decimal.
Digits Left of Decimal	The number of digits to be placed to the left of the decimal.
Low User Input Limit	The minimum entry value that an operator may enter. This value must be within the range of the data format selected. If a value lower than this is entered, the DTAM will display an “Input Error” screen displaying the minimum and maximum entry limits.
High User Input Limit	The maximum entry value that an operator may enter. This value must be within the range of the data format selected. If a value higher than this is entered, the DTAM will display an “Input Error” screen displaying the minimum and maximum entry limits.
Default Value	This parameter defines a default value that is displayed at the entry address of the display. An entry of Z defines no default. NONE appears in the window when Z is entered.

32 Bit Unsigned Integer, 32 Bit BCD (Binary Coded Decimal)

The screen for a 32 Bit Unsigned Integer format is shown below. The screen for a 32 Bit BCD format is similar.

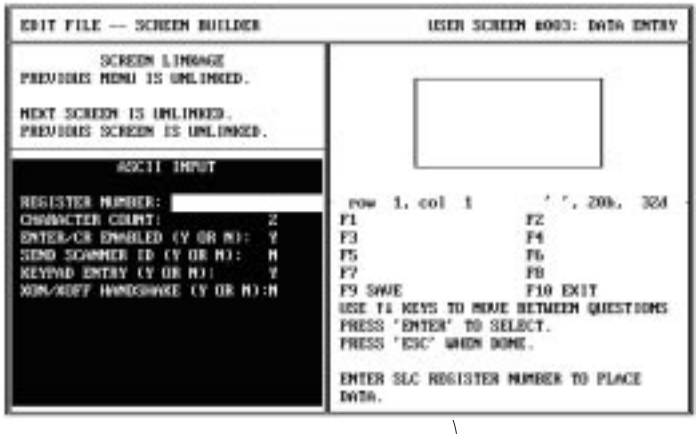
SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller data address to be monitored.
Digits Right of Decimal	The number of digits to be placed to the right of the decimal.
Digits Left of Decimal	The number of digits to be placed to the left of the decimal.
Low User Input Limit	The minimum entry value that an operator may enter. This value must be within the range of the data format selected. If a value lower than this is entered, the DTAM will display an “Input Error” screen displaying the minimum and maximum entry limits.
High User Input Limit	The maximum entry value that an operator may enter. This value must be within the range of the data format selected. If a value higher than this is entered, the DTAM will display an “Input Error” screen displaying the minimum and maximum entry limits.
Default Value	This parameter defines a default value that is displayed at the entry address of the display. An entry of Z defines no default. NONE appears in the window when Z is entered.

ASCII Input

The screen for ASCII input through the printer port (only on some versions) is shown below.

Note: Refer to Chapter 18 for additional information on using ASCII bar code input.



SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller data address to be written.
Character Count	The number of characters (1 to 32) that are expected for each entry. The DTAM sends the data to the controller after receiving the specified charcter count.
Enter/CR Enabled (Y or N)	Determines when the ASCII data is sent to the controller. If Y is selected, data is sent to the controller when one of the following ocurrs.: 1. The DTAM receives the the number of charcters specified in the character count 2. Operator presses the Enter key. 3. A carriage return character (ASCII 13) character is received. If N is selected, data is sent to the controller when the DTAM receives the number of characters specified in the character count.
Send Scanner ID (Y or N)	Specifies whether or not the scanner ID is included as part of the message sent to the controller.The scanner ID is a 2 character ASCII designation that identifies the ASCII string from each scanner.
Keypad Entry (Yor N)	Enables or disables the ability of the operator to enter data using the DTAM keypad.
XON/XOFF Handshake (Y or N)	Enables or disables XON/XOFF flow control between the bar code scanner and the DTAM.

Chapter 9

Creating Security Screens

Chapter Objectives

This chapter describes how to create security screens.

Security Screens

Security screens use numeric codes to restrict access to any associated information or processes. For ease of programming, security screens are provided with default text:

```
*RESTRICTED ACCESS*
ENTER CODE:
```

If a different message is required, the security screen text can be edited. Constructing a security screen usually consists of assigning the security code(s).

As an operator enters a security code, an asterisk (*) is displayed on the DTAM for each character input on the keyboard. If a valid security code has been entered, the next linked screen is displayed. If an invalid security code is entered, an error message appears. Once the error condition is acknowledged, the operator can re-enter the code or return to the Main Menu.

Security Screen Builder

The screen for creating security screens is similar for the DTAM Plus and DTAM Micro.

Security Screen Builder Function Keys

Function Key	Designation	Applies to: DTAM Plus	Applies to: DTAM Micro	Function
[F1]	EDIT CODES	✓	✓	Allows previously entered codes to be edited.
[F3]	MAP SCREEN	✓	✓	Accesses screen mapping functions that link application screens in a logical sequence. Link screens only after all of the screens have been created. Refer to Chapter 12.
[F4]	COPY SCREEN	✓	✓	Copies an existing screen to or from the current display window. Both the source and destination screens must be of the same type (Security screens).
[F5]	INSERT TIME	✓		Inserts the time into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F6]	INSERT DATE	✓		Inserts the date into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F7]	CLEAR SCREEN	✓	✓	Clears the current screen. You have the option of clearing only the screen text or deleting the entire screen.
[F8]	CHANGE SCREEN	✓	✓	Selects another operator screen.
[F9]	SAVE	✓	✓	Saves the application without exiting the Screen Builder function.
[F10]	EXIT	✓	✓	Prompts you to save the application to the current file and exits the DPS software.

Creating a Security Screen

You can specify up to three separate codes for each Security Screen. An operator is allowed access by entering any of the assigned security codes.

To create a security screen:

1. Select Screen Builder from the Edit File - Option Selection menu.

   The Screen Builder for the main menu (screen #1) is displayed.

2. Press [F8], enter the display screen #, and select Security Screen type.

   The Screen Builder for a security screen appears.

3. If no security codes have been previously defined, you are prompted to enter a code(s).

   If you are editing a screen with a previously defined security code(s), you must press [F1] to edit the code(s).

4. Enter at least one digit at each prompt. You can enter up to eight digits. If less than eight digits are entered, each remaining digit is displayed as a question mark (?). The question mark is a wildcard character, designating any character entry as acceptable.

5. To modify a security code, highlight the value and overwrite the old code.

6. To save the security code(s), press [Esc]. The cursor is then returned to the display window where you can edit the screen text.

7. Press [Esc] to save the screen.

Chapter 10

Creating Recipe Screens

Chapter Objectives

This chapter describes how to create recipe screens.

Recipe Screens

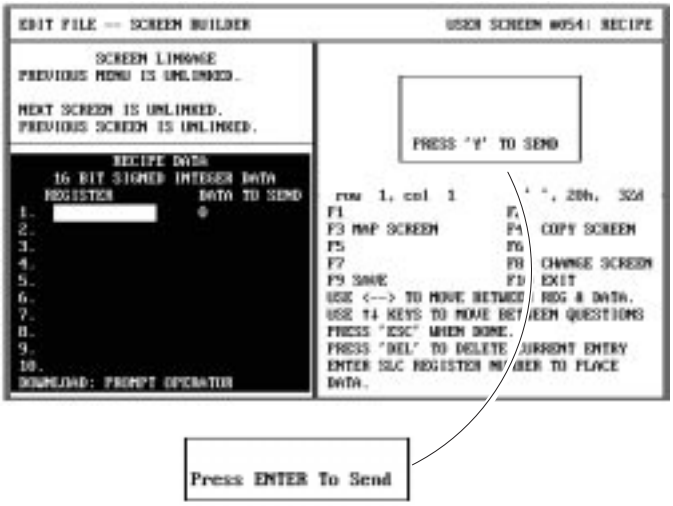
Recipe Screens allow an operator to download a block of data for up to 10 register addresses. These addresses can be in any order. Multiple recipe screens may be linked together in sequential order to download more than 10 register addresses, or to download more than one data format. You can choose to initiate the download automatically or manually (with a prompt).

If recipe screens are linked together, successive screens linked to the first recipe screen are downloaded immediately following the first screen. The operator prompt enabled for the first screen prompts the operator to acknowledge the recipe download. If the other linked recipes do not have the operator prompt enabled they are sent automatically. This appears to the operator as though all recipes were sent as one large recipe.

There is only one exception to the immediate download of successive recipe screens. If an alarm is initiated before all recipe screens are finished, the alarm screen is displayed, temporarily halting the download. As soon as the operator acknowledges the alarm, downloading of the recipe continues until completed.

Recipe Screen Builder

The screen for creating recipe screens is similar for the DTAM Plus and DTAM Micro. The default prompt for operator acknowledgement is different due to differences in the DTAM Plus and DTAM Micro keypads.



DTAM Micro Default Prompt

Recipe Screen Builder Function Keys

Function Key	Designation	Applies to:		Function
		DTAM Plus	DTAM Micro	
[F3]	MAP SCREEN	✓	✓	Accesses screen mapping functions that link application screens in a logical sequence. Link screens only after all of the screens have been created. Refer to Chapter 12.
[F4]	COPY SCREEN	✓	✓	Copies an existing screen to or from the current display window. Both the source and destination screens must be of the same type (Recipe screens).
[F8]	CHANGE SCREEN	✓	✓	Selects another operator screen.
[F9]	SAVE	✓	✓	Saves the application without exiting the Screen Builder function.
[F10]	EXIT	✓	✓	Prompts you to save the application to the current file and exits the DPS software

Creating a Recipe Screen

To create a recipe screen:

1. Select Screen Builder from the Edit File - Option Selection menu.

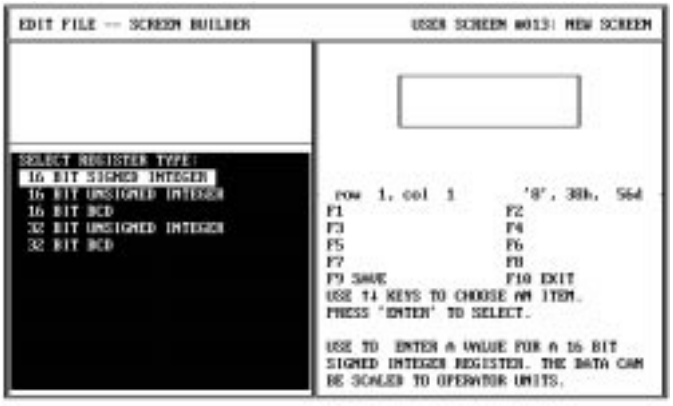
   The Screen Builder for the main menu (screen #1) is displayed.

2. Press [F8], enter the display screen #, and select Recipe Screen type.

   The Screen Builder for a recipe screen appears. You are asked whether the operator is to be prompted before the recipe data is downloaded (manual or automatic operation).

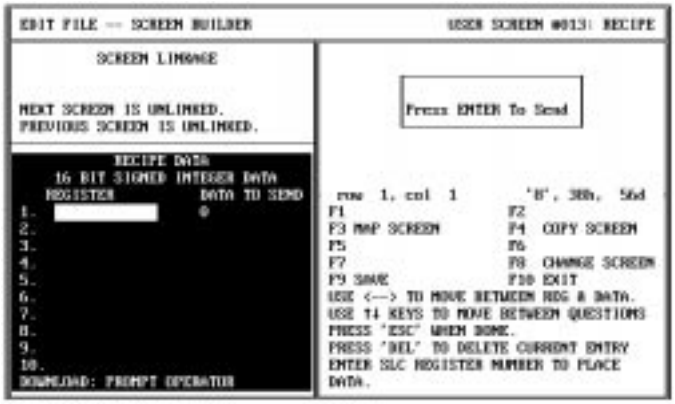
3. Enter [Y] or [N] and press [Return]. If you select [Y], the operator is prompted to acknowledge the screen. The operator must press [↵] on the DTAM Micro or [Y] on the DTAM Plus before the download occurs. If you select [N], the download occurs automatically when the screen is selected. The operator in most cases will not even see the screen, only the message that data is being downloaded.

   You are prompted for a register type.



4. Select a register type.

   You are prompted to enter the registers and the values you want to write.



5. Enter the register address and press [Return]. Enter the value to send and press [Return]. Repeat for up to 9 more addresses that you want to write at download.
6. After entering the download data and addresses, press [Esc] to accept the data.
7. Enter the screen text. If an operator prompt was selected, you cannot edit the prompt text.
8. Press [F9] to save the screen.

Chapter 11

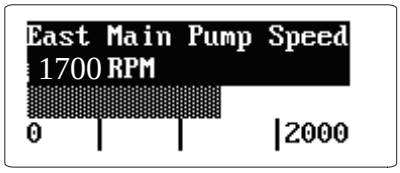
Creating Bar Graph Screens

Chapter Objectives

This chapter describes how to create bar graph screens for DTAM Plus applications. Bar graph screens are not available on DTAM Micro operator modules.

Bar Graph Screens

The following is an example of a bar graph screen:



The screen has the following structure:

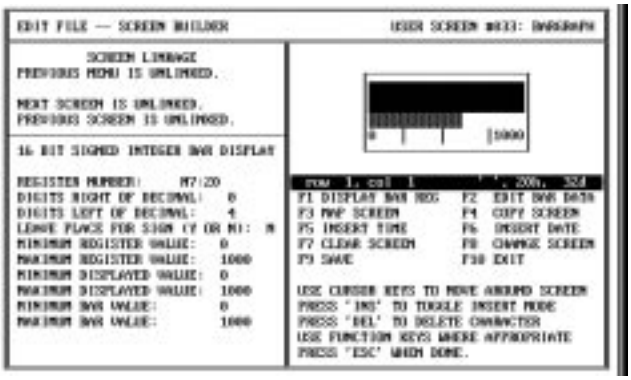
- Lines one and two are used for text and numeric data display.
- The third line displays a horizontal bar graph having a left to right scale. The bar can represent up to forty elements. Each element represents 2.5% of the bar range.
- The fourth line displays the minimum and maximum numeric values, and horizontal axis marks at 25%, 50%, and 75% of scale.

Constructing a bar graph screen consists of the following:

- The text to be displayed
- The type of data stored in the SLC or PLC register
- The register to access
- Any data format and display information
- Range of register values
- Range of display values
- Range of graphical display

Bar Graph Screen Builder

The bar graph screen is only available on the DTAM Plus. The bar graph Screen Builder looks like this:



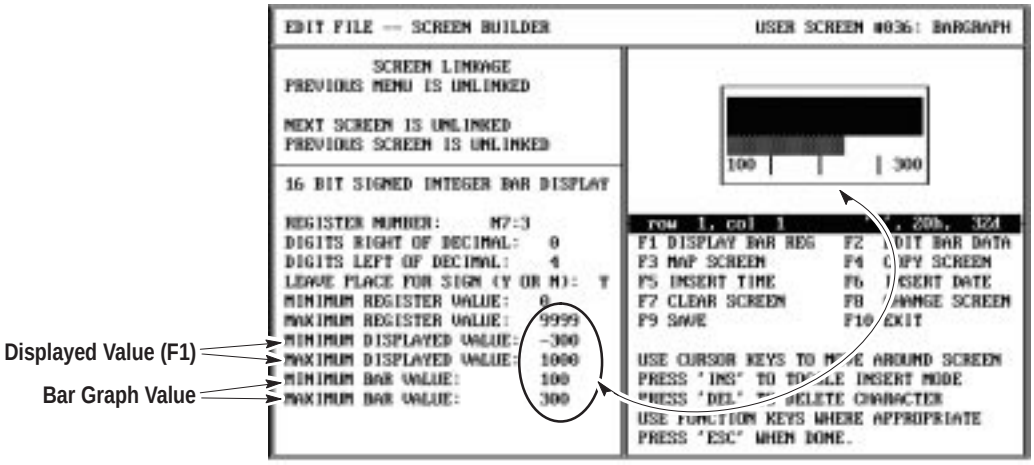
Bar Graph Screen Builder Function Keys

Function Key	Designation	Function
[F1]	DISPLAY BAR REG	Inserts data display field at the cursor point. Accesses the display register information.
[F2]	EDIT BAR DATA	Access data register and bar graph display information.
[F3]	MAP SCREEN	Accesses screen mapping functions that link application screens in a logical sequence. Link screens only after all of the screens have been created.
[F4]	COPY SCREEN	Copies an existing screen to or from the current display window. Both the source and destination screens must be of the same type (Bar Graph screens).
[F5]	INSERT TIME	Inserts the time into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F6]	INSERT DATE	Inserts the date into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F7]	CLEAR SCREEN	Clears the current screen. You have the option of clearing only the screen text or deleting the entire screen including any linking you may have established.
[F8]	CHANGE SCREEN	Selects another operator screen.
[F9]	SAVE	Saves the application without exiting the Screen Builder function.
[F10]	EXIT	Prompts you to save the application to the current file and exits the DPS software.

Graph Display Range

The bar graph can correspond to any range of values within the minimum and maximum values stored in a register. In this way, you can present the optimum control for an operator.

For example, if a register has values between 0 and 9999 that correspond to -300°F to 1000°F. For register data, enter 0 and 9999 for the low and high register limits, and -300°F and 1000°F for the display limits (the range shown the operator). If the major region of interest for the bar graph were 100°F to 300°F, you would enter these limits and the bar graph will display only the 100 → 300°F range.



Note: Display and bar graph values can be scaled separately. Refer to the description of scaling in Chapter 3.

Creating a Bar Graph Screen

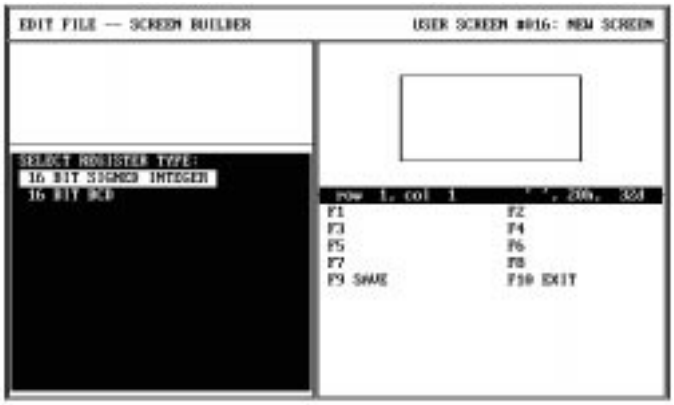
To create a bar graph screen:

1. Select Screen Builder from the Edit File - Option Selection menu.

   The Screen Builder for the main menu (screen #1) is displayed.

2. Press [F8], enter the display screen #, and select Bar Graph Screen type.

   The Screen Builder for a bar graph screen appears and you are prompted for a register type 16 Bit Signed Integer or 16 bit BCD.



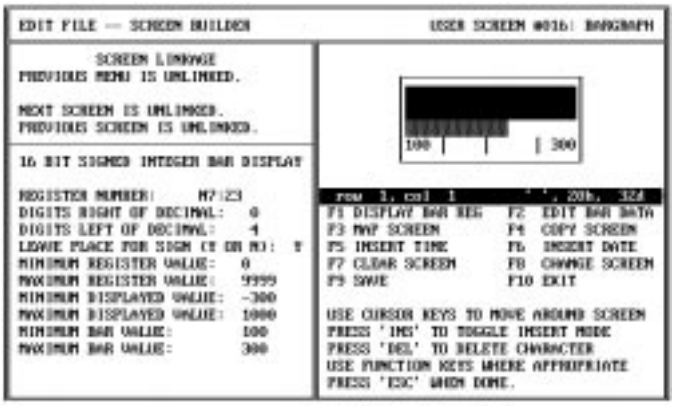
3. Select a register type.

   You are prompted for the register information.

4. Enter the register data, refer to the next section Bar Graph Register Format selections.

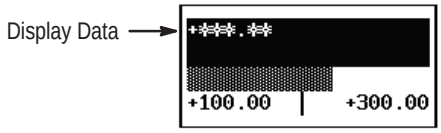
5. Press [Esc] to save the register data.

   You are prompted to enter any screen text on the first 2 lines of the display screen.



6. Enter the screen text or if you want to add a data display field, press [F1]. The data displayed is the same register value shown in a graphical form on the bar graph. The display window shows an asterisk (*) for each character displayed as register data, and a sign (if specified).

   For example, the display data for a Signed Integer register having two characters to the right of the decimal and three to the left and sign would be:



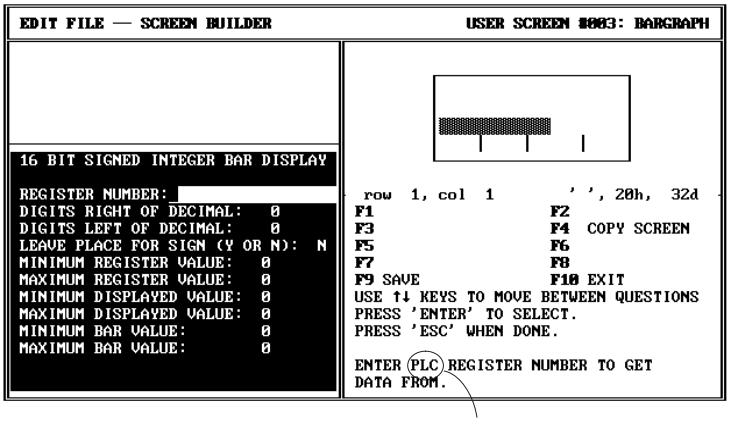
7. If you need to edit the bar graph register data, press [F2]

   The cursor is moved to the bar graph register data. Change any register values as required.

8. Press [F9] to save the screen.

Bar Graph Register Format Selections

The screen for a 16 Bit Signed Integer register is shown below. The screen for a 16 Bit BCD register is similar.



SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller address to be monitored.
Digits Right of Decimal	The number of digits to be placed to the right of the decimal.
Digits Left of Decimal	The number of digits to be placed to the left of the decimal.
Leave Place for Sign (Y or N)	Provides for a one character place for the polarity sign (+ or -) when the data is displayed, if desired.
Minimum Register Value	The minimum data value of the controller address.
Maximum Register Value	The maximum data value of the controller address.
Minimum Displayed Value	The minimum data value to be displayed. This value is displayed when the data in the controller address is equal to the minimum register value.
Maximum Displayed Value	The maximum data value to be displayed. This value is displayed when the data in the controller address is equal to the maximum register value. The range defined by the Minimum Displayed Value and the Maximum Displayed Value is proportionally scaled to the range of the minimum and maximum register values. If both ranges are equal then the scaling ratio is 1:1.
Minimum Bar Value	The minimum value of data to be displayed in the bar graph. This value must be greater or equal to the Minimum Displayed Value.
Maximum Bar Value	The maximum value of data to be displayed in the bar graph. This value must be less than or equal to the Maximum Displayed Value The minimum and maximum bar graph values may be used to display a particular range or window of an overall range (Minimum and Maximum Displayed Values).

Chapter 12

Linking Menu and Application Screens

Chapter Objectives

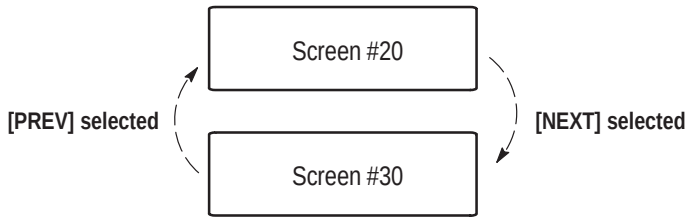
This chapter describes how to link the application screens so that an operator is presented with a logical flow of information.

Linking Application Screens

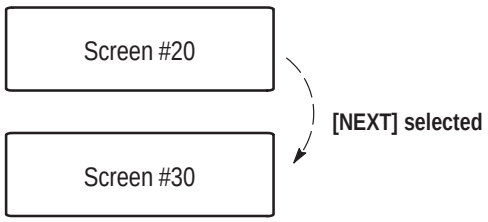
After you have developed all of the screens necessary for an application, you need to decide how to link them. It is very helpful to create a flowchart of the screens to use as a map before you begin to define the links.

The [PREV] and [NEXT] keys of the DTAM Plus or DTAM Micro use the linking information to move between screens. Not all links need to have a "next" and "previous" screen. A screen link may create a two-way or one-way relationship.

Two-way links utilize a **Link** function:

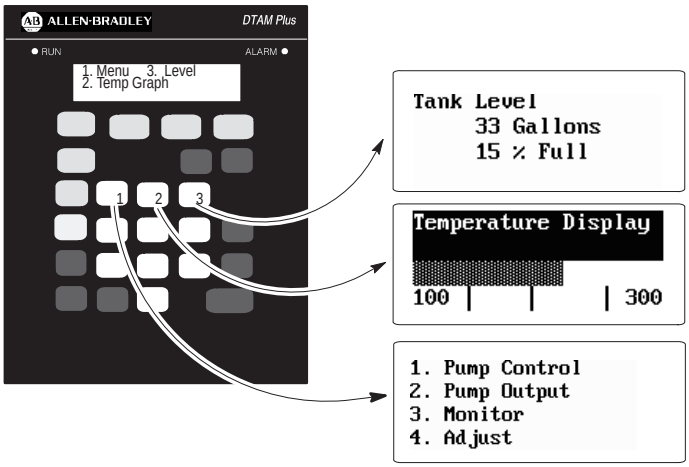


One-way links only utilize a **Goto** function:



Linking Menu Screens

Menu and sub-menu links provide one way links with up to 8 application screens or sub-menus. An operator selects a menu item by pressing the numeric key corresponding to the menu item. When you link the main menu and sub-menu items you are linking screens to the keys on the numeric keypad.

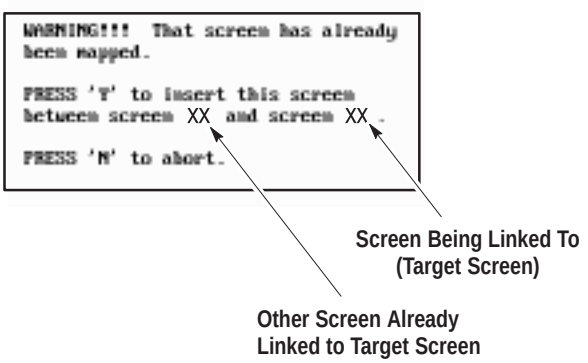


Screen Linking Guidelines

The following rules apply to linking screens:

- Only screens that are already defined can be linked.
- Wait until you have developed all of your screens and menus before establishing links. It is much easier to create your links once, rather than change them whenever you change the order of screens.
- A non-menu screen cannot be linked back to a menu screen, use a Goto (one way) link instead.
- A link is a one-to-one relationship between the current screen and the target screen. You cannot establish more than a single one-way link to any particular screen.

  If you attempt to link to a destination screen that is already linked, you have the option of inserting the screen (changing the current link) or aborting the operation.



Application Screen Linking Function Keys

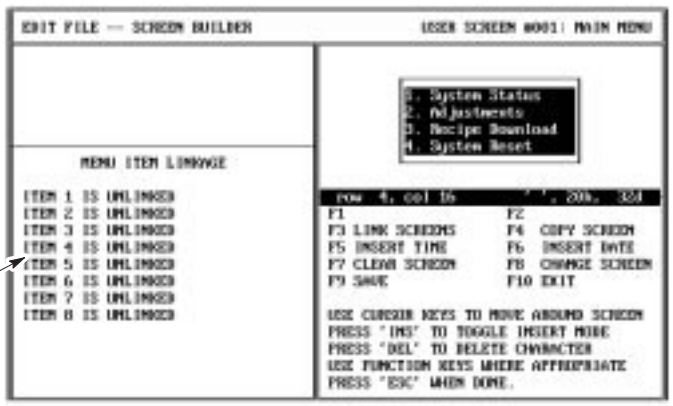
When you press [F3] MAP Screen on a non-menu screen, the screen linking function keys are active. Shown below is an example using a bar graph screen, the other screen types are similar.

Screen Linking Function Keys

Function Key	Designation	Applies to: DTAM Plus	Applies to: DTAM Micro	Function
[F1]	INSERT LINK	✓	✓	Inserts a link between two screens. This link is bi-directional, an operator can toggle between the screens using the [NEXT] and [PREV] keys.
[F3]	INSERT GOTO	✓	✓	Inserts Goto link between two screens. This is a one way link, an operator cannot return to the previous screen by pressing [PREV].
[F5]	DELETE MAPPING	✓	✓	Deletes all links to the current screen.
[F7]	DELETE NEXT	✓	✓	Deletes the link established for the next screen only. On two-way links this also deletes the link to the screen previous to the current screen.

Menu and Sub-Menu Linkage Display

When you press [F3] MAP Screen on a main or sub-menu screen, the current screen links are displayed. Items 1 through 8 correspond with keypad keys [1] through [8]. Screens are linked by entering a screen number.

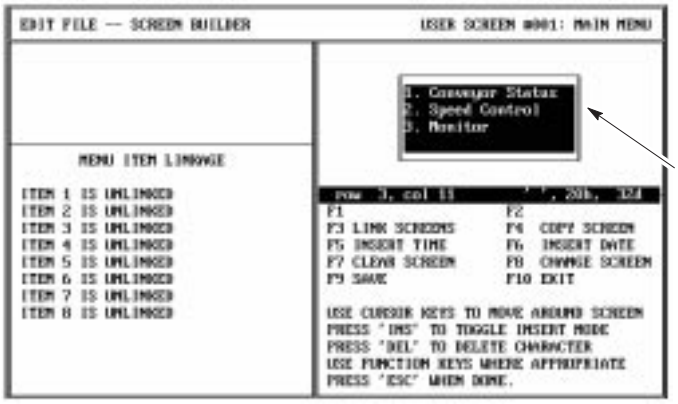


Linking a Menu

The following is a typical example of how to link items to a main menu. Links to a sub-menu are done in the same manner.

To link screens to a menu:

1. Open the menu or sub-menu screen.



Previously entered text, refer to Chapter 6

2. Press [F3] to select the link screens function.

   You are prompted to enter a screen number.

3. Enter the screen # you want linked to numeric entry key [1] and press [Return].

   You are prompted to enter the screen linked to DTAM numeric key [2].

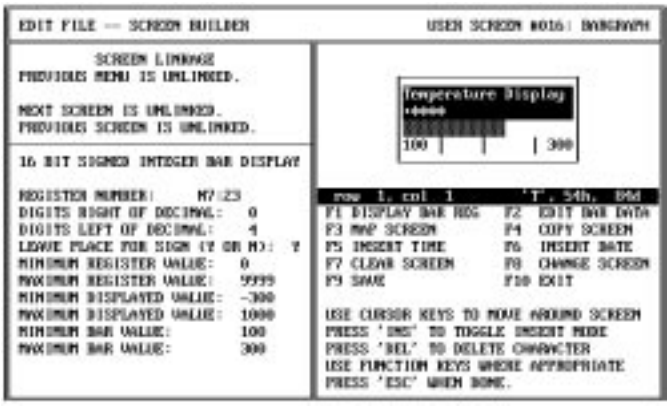
4. Continue entering screen links with up to 8 DTAM numeric entry keys.
5. Press [F9] to save the menu edits.

Linking Example

The following is an example of how to create one way or bidirectional screen links.

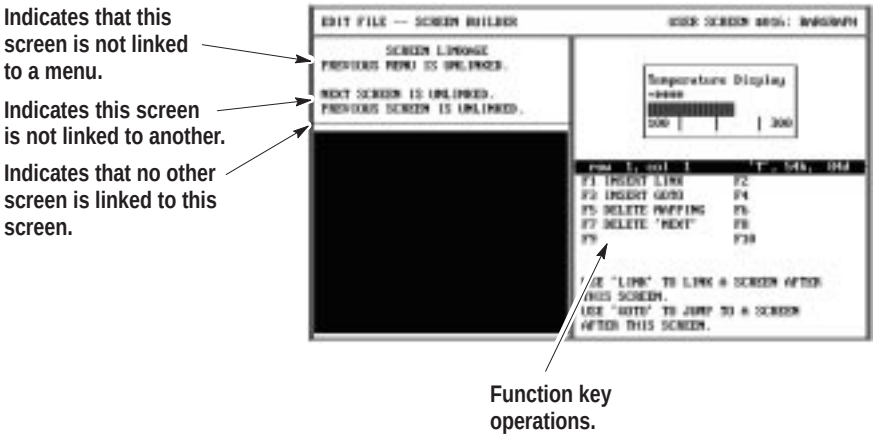
To link application screens:

1. Open the screen you want to link. In this example we are linking screen #16 (bar graph display) to screen # 33 (numeric entry screen).



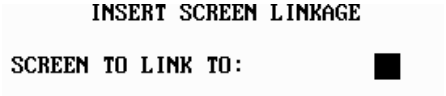
2. Press [F3] to select the MAP Screen function.

   The current screen links are displayed along with the screen linking function key operations.



3. Press [F1] to create a bidirectional link (operator can move between screens) or [F3] to create a Goto (one way link, this screen to specified screen).

   You are prompted to enter a screen number.

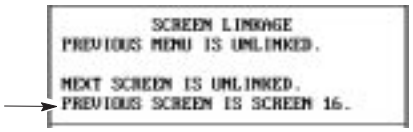


4. Enter a screen number (in this example screen #33) and press [Return].

   The screen link is shown in the Screen Linkage description.

5. Press [F9] to save the screen edits.

   When you open the screen that was just linked (#33), the Screen Linkage description will show that there is now a previous screen link to that screen.



Chapter 13

Creating Alarm Screens

Chapter Objectives

This chapter describes how to create an alarm screen. It contains these sections:

Alarm Screens

Alarm screens identify cautionary or emergency conditions. Alarm screens are much like data display screens with two exceptions:

- Alarm screens cannot be linked together.
- They can contain an alarm acknowledge sent back to the SLC or PLC.

Constructing an alarm screen consists of specifying the following:

- Screen text information
- The type of data stored in the SLC or PLC register
- The register to access
- The alarm acknowledge specifications
- Any data format and display information

Alarm messages are triggered by the Advisor Register. If you are programming a DTAM Plus, alarm messages can also be triggered by the Background Monitor. The response to the Advsior register is 5 times faster than the Background Monitor registers. For critical alarms, the Advisor should be used.

All alarm messages must be acknowledged by the operator before the next screen is displayed (except for print forms).

Advisor Register

The advisor register allows screen changes to be initiated by the PLC or SLC controller. An alarm screen displays when the SLC or PLC controller writes the alarm screen number to the advisor register. Refer to page 14–4 for a description of the advisor operation.

Background Monitor

Available on the DTAM Plus only, the background monitor triggers an alarm screen when the data at a controller address (background register) exceeds a minimum or maximum value. Up to 4 controller addresses can be monitored as background registers. Refer to Chapter 15 if you are using the background monitor to control alarm screens.

DTAM Micro Alarm Screens

A typical alarm screen appears like this on the DTAM Micro:

```
Motor Overload
PRESS ENTER TO CLEAR
```

The last line of an alarm screen automatically defaults to: Press Enter to Clear. If you edit this text, make sure that the operator knows to press the [↵] key to clear the alarm.

DTAM Plus Alarm Screens

A typical alarm screen appears like this on the DTAM Plus:

```
Mixer OL is Tripped
03:19  April 28 94

Press 'Y' to Clear
```

The last line of an alarm screen automatically defaults to: Press 'Y' to Clear. If you edit this text, make sure that the operator knows to press the [Y] key to clear the alarm.

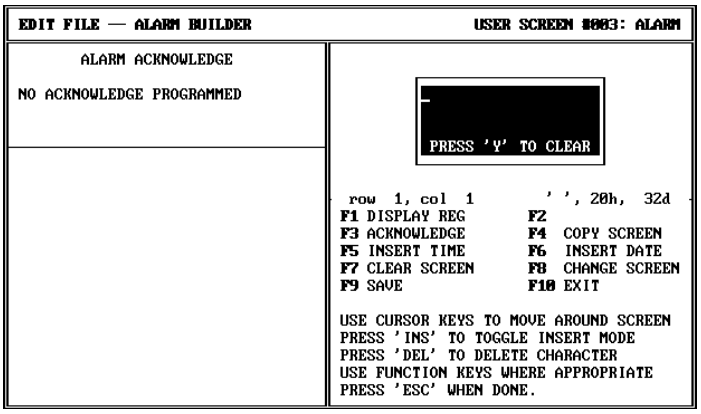
Multiple Alarm Screens

If using the background monitor (DTAM Plus only) as a trigger source and additional alarm or printer form screens are detected while an alarm screen is being displayed, the DTAM will stack the alarm screens in temporary storage on a first-in first-out basis (up to 128 alarm screens).

An alarm screen can only appear in temporary storage once. If an alarm is sent to the DTAM and it already exists in the alarm stack, the new alarm is ignored. The only way to clear the alarm screen from the display or the alarm stack is for the operator to acknowledge it by pressing the [Y] key (DTAM Plus) or [↵] key (DTAM Micro). When an alarm screen is displayed, all keys are non-functional except the alarm acknowledge keys.

Alarm Screen Builder

The screen builder for DTAM Plus alarm screens is shown below. The alarm screen builder for DTAM Micro is similar.



Alarm Function Keys

Function Key	Designation	Applies to: DTAM Plus	Applies to: DTAM Micro	Function
[F1]	DISPLAY REG	✓	✓	Inserts data display field at the cursor point. Accesses the display register information.
[F3]	ACKNOW-LEDGE	✓	✓	Defines the acknowledge bit sent to the controller when the operator acknowledges an alarm. An acknowledge bit is not required.
[F4]	COPY SCREEN	✓	✓	Copies an existing screen to or form the current display window. Both the source and destination screens must be of the same type (Alarm screens).
[F5]	INSERT TIME	✓		Inserts the time into the display. Only available with a DTAM Plus having the Calendar/Clock option. The time displayed is the current time, not the time of the alarm. This is not a time stamp for alarm conditions.
[F6]	INSERT DATE	✓		Inserts the date into the display. Only available with a DTAM Plus having the Calendar/Clock option.
[F7]	CLEAR SCREEN	✓	✓	Clears the current screen. You have the option of clearing only the screen text or deleting the entire screen including any linking you may have established.
[F8]	CHANGE SCREEN	✓	✓	Selects another operator screen.
[F9]	SAVE	✓	✓	Saves the application without exiting the Alarm Builder function.
[F10]	EXIT	✓	✓	Prompts you to save the application to the current file and exits the DPS software.

Creating an Alarm Screen

To create an alarm screen:

1. Select Edit Program File from the Opening menu:

   You are prompted for a file name.

2. Enter the file name of the application.

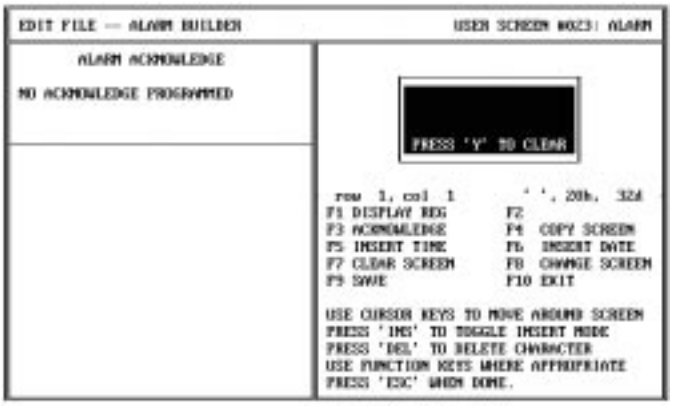
   The Edit File - Option Selection menu is displayed.

3. Select Alarm Screen Builder.

   You are prompted for a screen number of the first alarm screen.

4. Enter a screen number.

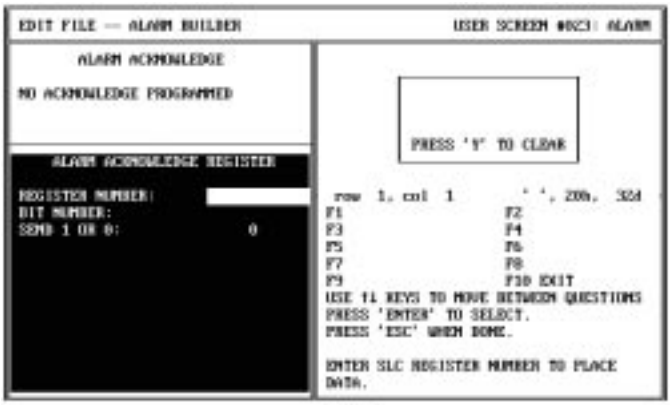
   The screen builder for an alarm screen is displayed.



5. Enter the alarm message text. If you are entering a display field, press [F1] where you want the field positioned. Refer to Chapter 7 for information on how to setup a display field.

6. If you want to set an acknowledge bit at the controller when an operator acknowledges an alarm, press [F3].

   You are prompted for the acknowledge bit register information.



Register Information	Enter
Register Number	The register number you want to write to when the operator acknowledges the alarm screen.
Bit Number	The bit number within the register you want to write to when the operator acknowledges the alarm screen.
Send 1 or 0	Value to be sent to acknowledge bit.

7. Press [F9] when the screen is completed.

Chapter 14

Entering DTAM Configuration Data

Chapter Objectives

This chapter describes how to set the configuration parameters of the DTAM Plus or DTAM Micro.

Configuration Parameters

The following configuration parameters can be set. These parameters are downloaded with the application and override any settings that are currently used by the DTAM Micro or DTAM Plus.

Parameter	Applies to: DTAM Plus	Applies to: DTAM Micro	Description
Update Interval	✓	✓	Defines the rate at which the screen display is updated.
DTAM Advisor	✓	✓	Assign advisor register data allowing screen changes by a controller. Advisor is also used to trigger alarm screens.
Time Synchronization	✓		Synchronizes PLC-5 or SLC 5/03 clocks with the DTAM Plus clock. Time is either read or written to the controller.
Set Master Security Code	✓	✓	Sets the master security code allowing an operator access to security screens and codes.
Special Security Screen	✓	✓	Restricts access to the Special menu of the DTAM to prevent unauthorized access to special controller functions.
Printer Port Parameters	✓		Defines printer port parameters of a DTAM Plus with optional printer port.
Hardware Parameters	✓	✓	Defines the communication parameters between a controller and the DTAM.

Accessing Configuration Data

The following shows how to access DTAM Plus configuration data. The procedures for the DTAM Micro are similar.

1. Select Edit Program File from the Opening menu.

   You are prompted for a file name.

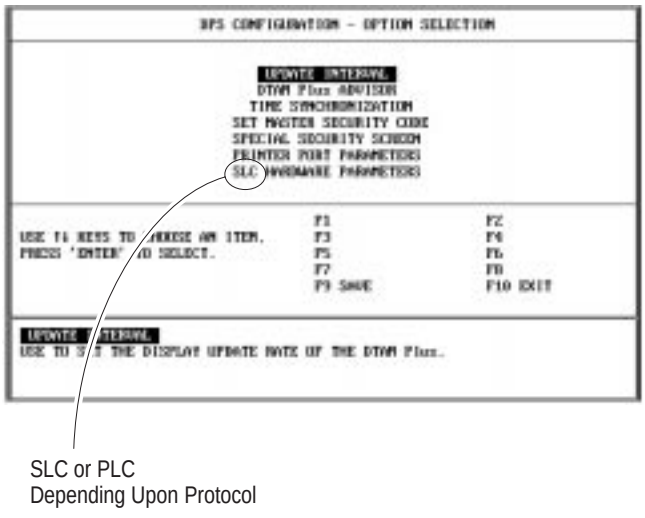
2. Enter the file name of the application.

   The Edit File -Option Selection menu displays.

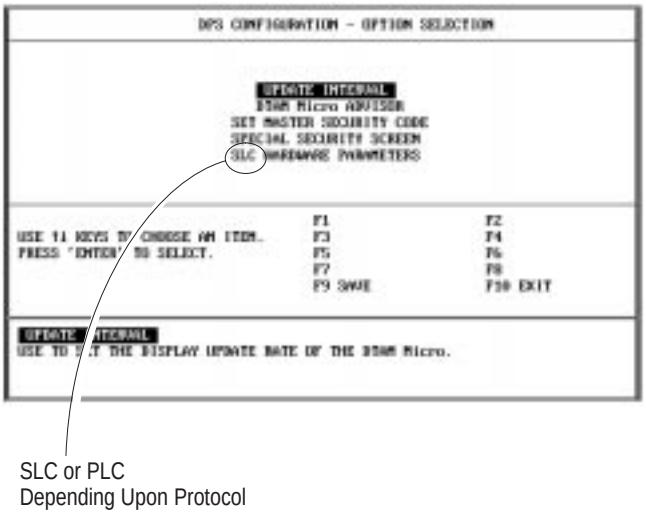
3. Select DTAM Configuration Data.

   The DPS Configuration -Option Selection menu displays.

DTAM Plus



DTAM Micro

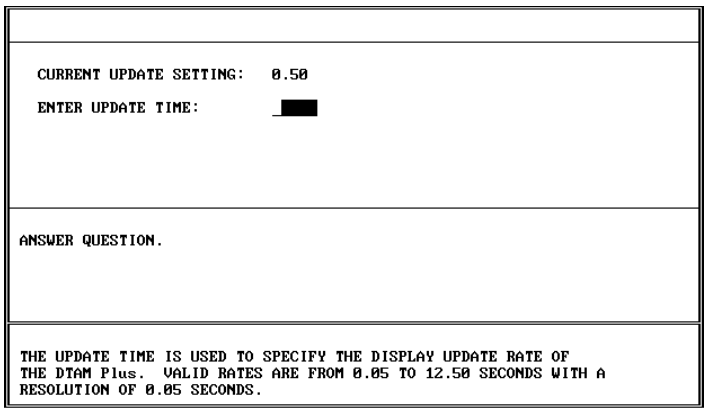


4. Select the configuration item you want to modify. Refer to the appropriate section in this chapter for additional information.

Update Interval

The update interval specifies the DTAM display update rate. The Update Interval is the period of time between read and write requests to the controller. This is not the rate at which data is read from or written to a controller.

When you select Update Interval from the DPS Configuration - Option Selection menu, the following is displayed:



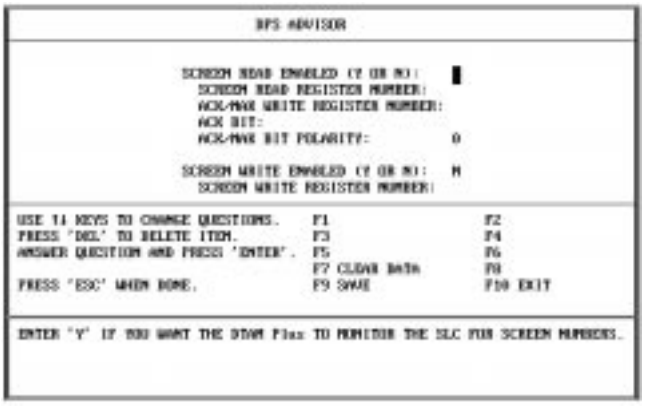
To assign a new update interval, enter a valid number from 0.05 to 12.50 seconds in any increment of 0.05 seconds and press [Return].

To save the new update interval, press [Esc]. You are then returned to the DPS Configuration - Option Selection menu.

DTAM Advisor

The Advisor function allows screen changes to be made by the logic controller. Alarm screens can also be triggered by the Advisor function. The advisor consists of a controller address monitored by the DTAM. When the advisor address contains a screen number, the corresponding screen is displayed.

When you select DTAM Advisor from the DPS Configuration - Option Selection menu, the following is displayed:



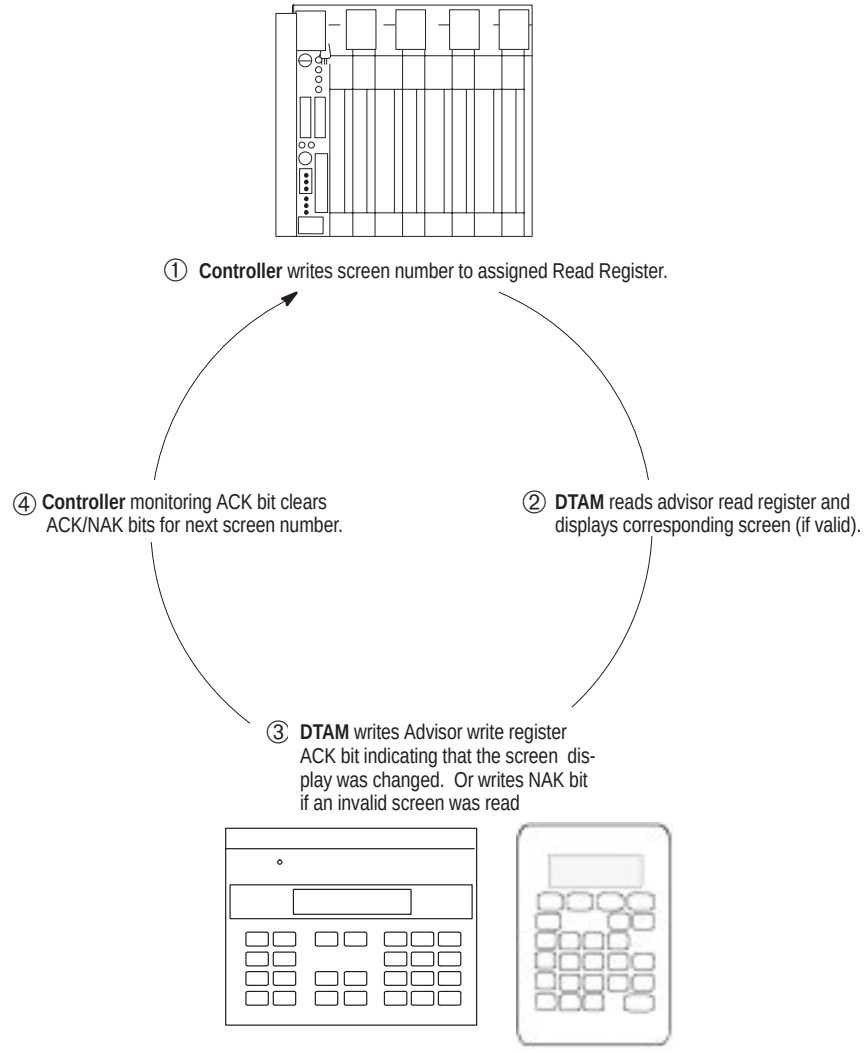
The DTAM Plus Advisor consists of four items:

Item	Purpose
Read Register Number	The controller address (16 bit) that the DTAM reads for the current screen number.
Write Register Number	The controller address (16 bit or bit type) that contains the ACK and NAK bits which are written to and monitored by the DTAM and controller. The write register is updated at the Update Interval not the Advisor update rate.
ACK Bit*	The bit number within the write register that will be used as an acknowledgement bit. If a bit type address was assigned for the write register, this field will be filled in using the bit address specified. ACK/NAK bits are used only to indicate that the DTAM has received a message.
ACK Bit Polarity	Defines the polarity (0 or 1) ACK/NAK bits: When set to 1, a value of 1 for the ACK bit indicates a valid screen and a value of 1 for the NAK bit indicates an invalid number. When set to 0, a value of 0 for the ACK bit indicates a valid screen and a value of 0 for the NAK bit indicates an invalid number.
Screen Write Enable	When enabled, the DTAM Plus writes the current screen number to the controller.
Screen Write Register Number	The controller address that is written by the DTAM Plus when screen write is enabled.

* NAK bit is always the next sequential bit after the ACK bit.

Advisor Operation

The following shows how the Advisor function operates. The controller program must reset the ACK and NAK bits after writing a screen number.



If the controller sends an invalid screen number (not a programmed screen) the DTAM writes the write register NAK bit (always next sequential bit following ACK bit). The NAK bit indicates to the controller that the screen number is incorrect.

Time Synchronization

Only available on the DTAM Plus with the Clock/Calendar option, this setting controls synchronization between a DTAM Plus and a PLC-5 or SLC controller. The time is synchronized between the DTAM Plus and controller approximately every 60 seconds.

The time synchronization does not update when the DTAM is in the P-A/D mode (see Appendix C) or while a data entry screen is displayed.

When you select Time Synchronization from the DPS Configuration - Option Selection menu, the following is displayed:

The DTAM Plus Time Synchronization consists of two selections:

Select:	To:
Read Time	Set the DTAM Plus clock by reading the time and date from the controller.
Write Time	Write the DTAM Plus time/date settings to the controller. You can write time data to a controller even if the controller does not have a clock source.

The PLC-5 always writes the time to addresses S:18 through S:23. When you read time or write time with an SLC, you are shown the current time base register and are prompted to enter a new register value:

The time base register is the initial register of the sequential registers storing the time. For example, if the time is stored in SLC registers N7:1 to N7:8, the base register would be N7:1.

PLC-5 Read/Write Time Registers

The DTAM Plus reads and writes the time to the following fixed registers.

Location	Contents
S:18	Year
S:19	Month
S:20	Day
S:21	Hours
S:22	Minutes
S:23	Seconds

SLC Read/Write Time Registers

The time data register is a 16 bit integer format. Time/Date data is stored in each of the eight sequential registers as shown below. The register locations are defined by the Time Base Register (see previous page).

Location	Time	Data
1	Seconds	0-59 (Decimal)
2	Minutes	0-59 (Decimal)
3	Hours	0-23
4	Day (Week)	1-7 (Sun - Sat)
5	Day (Month)	1-31
6	Month	1-12
7	Year	1980-2079
8	AM/PM	0 or 1 (Bit Designation)

Note: Synchronization can't occur if the base register is zero (such as N7:0).

SLC 5/03 Time Synchronization

Do not use S:37 as base register for a clock sync read or write. The SLC-5/03 locations S:37 through S:44 have a different sequence of data than DTAM Plus locations 1 through 8 as shown below. For example, set the base register to N7:10 and then use ladder programming to move each data location to the time/date status words.

DTAM Plus		SLC-503	
Location	Contents	Location	Contents
1	Seconds	S:37	Year
2	Minutes	S:38	Month
3	Hours	S:39	Day
4	Day (Week)	S:40	Hours
5	Day (Month)	S:41	Minutes
6	Month	S:42	Seconds
7	Year	S:43	Not Used
8	AM/PM	S:44	DII File Number

Setting Master Security Code

The master security code is used by an operator to access and/or change the security codes of the security screens.

When you select Master Code from the DPS Configuration - Option Selection menu, the following is displayed:

Enter a new security code. There are two codes that perform special functions:

00000000 disables the security function. This allows an operator to enter any number as a valid access code.

99999999 disables the master security code(s). When used, only the security code(s) assigned to individual screens are valid. Use this code when you do not want to provide an operator the ability to override or change security codes for security screens.

The security code must be an 8 digit number, if you enter less than 8 digits, the remaining values are set to 0. The operator must enter all eight numbers (including zeroes) for a valid code.

Special Security Screen

The special security screen restricts access to the special menu item on the DTAM Mode menu. The DTAM special functions menu allows an operator to directly access controller data files and other controller functions. Providing a security screen protects against unintended use of these functions. If you don't provide a special security screen, the special functions menu is available to any operator.

When you select Special Security Screen from the DPS Configuration - Option Selection menu, the following is displayed:

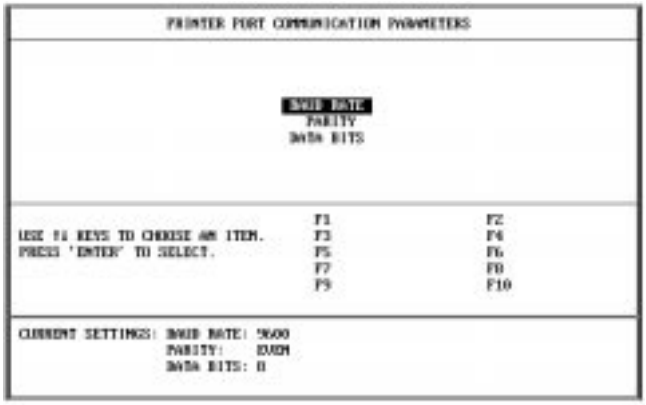
Enter one, two or three eight digit codes. An operator can enter any one of the codes (or master security code) to gain access to the special functions. Use a question mark ? to specify a wild card character. A wildcard character matches with any character input by the operator.

Note: You cannot link the special security screen. This screen only restricts access to the special function menu and is not assigned a screen number.

Printer Port Parameters

Only available on a DTAM Plus with an optional printer port. Use this screen to set the operating parameters of the printer port.

When you select Printer Port from the DPS Configuration - Option Selection menu, the following is displayed:



Baud Rate

Default is 9600 baud. Baud rate options are 38400, 19200, 9600, 4800, 2400, 1200, and 300. Select a baud rate that matches your printer.

Parity

Default is Even parity. Parity options are None, Odd, or Even.

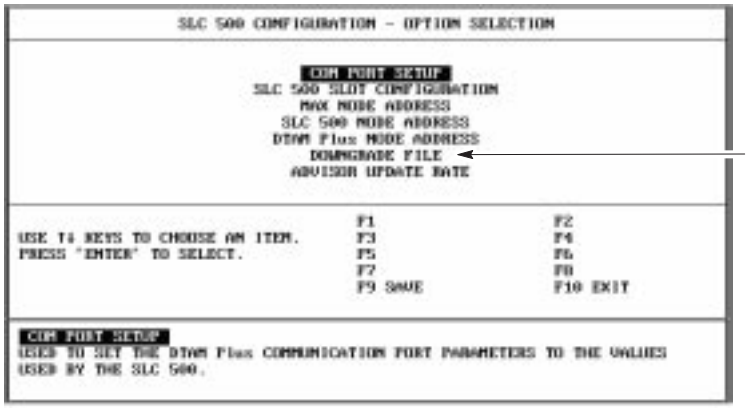
Data Bits

Defines the word length, the default is eight bits. Data bit options are Seven or Eight bits.

SLC Hardware Parameters

When using AB DH485 or AB BASIC protocols, you must specify the operating parameters that allow the DTAM Plus or DTAM Micro to communicate with the SLC controller. The DTAM settings must match the settings of the SLC or DH-485 network. If you are communicating with a PLC-5, refer to the next section PLC Hardware Parameters.

When you select SLC Hardware Parameters from the DPS Configuration - Option Selection menu, the following is displayed:



Hardware Parameter	Applies to: DTAM Plus	Applies to: DTAM Micro	Purpose
Com Port Setup	✓	✓	Defines the baud rate, parity, and number of data bits used for communication with an SLC or DH-485 network.
SLC 500 Slot Configuration	✓	✓	Specifies the number of inputs and outputs in each controller slot. This allows the DTAM to access the correct input and output bit files.
Max Node Address	✓	✓	Sets the maximum node address on a DH-485 network.
SLC 500 Node Address	✓	✓	Sets the node address of the SLC that the DTAM is communicating with.
DTAM Node Address	✓	✓	Sets the address of the DTAM.
Downgrade File	✓		Allows DTAM Plus files to be downgraded to a Spectrum Controls format.
Advisor Update Rate	✓	✓	Sets the rate at which the DTAM reads the advisor register.

SLC Hardware Parameters

SLC Com Port Setup

Selecting Com Port Setup displays:

The Communications Port parameters have the following default values for an SLC:

Baud Rate:	19200
Parity:	Even
Data Bits:	8

Baud Rate

Default is 19200 baud. Baud rate options are 38400, 19200, 9600, 4800, 2400, 1200, and 300. Select a baud rate that matches your SLC.

Note: The DTAM Plus only supports baud rates 1200 through 19200 when communicating with SLC processors over the DH-485 network.

Parity

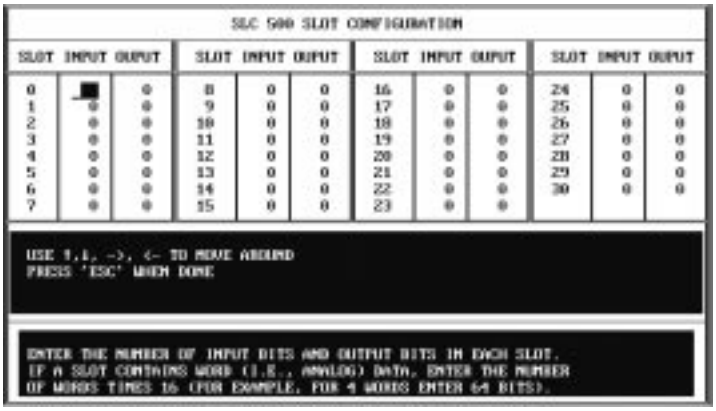
Default is Even parity. Parity options are None, Odd, or Even.

Data Bits

Defines the word length. Default is eight bits. Data bit options are Seven or Eight bits.

SLC 500 Slot Configuration

Selecting the SLC 500 Slot Configuration allows you to specify the slot configuration so that input and output bit files are correctly mapped.

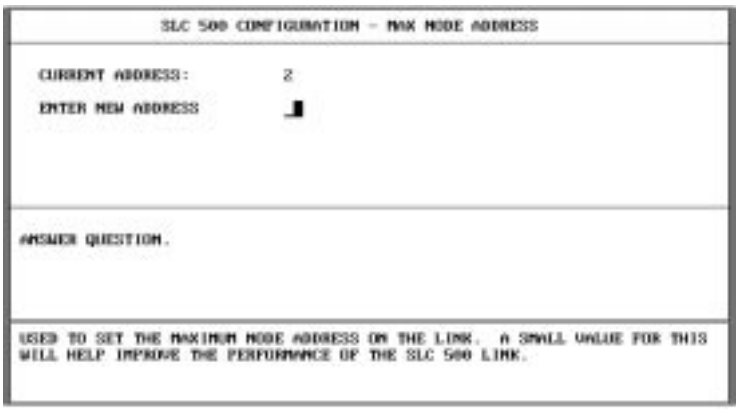


Note: The Slot Configuration table must be properly filled out before input or output files can be used in DPS.

Enter the number of input and output bits in each slot (0 to 255). If a slot contains word (i.e. analog) data, enter the number of words times 16. For example: 4 words = 64 bits.

Max Node Address

Select Max Node Address to set the maximum node address on the network. Enter the lowest possible value. A lower value improves the performance of the network by eliminating open (unused nodes).



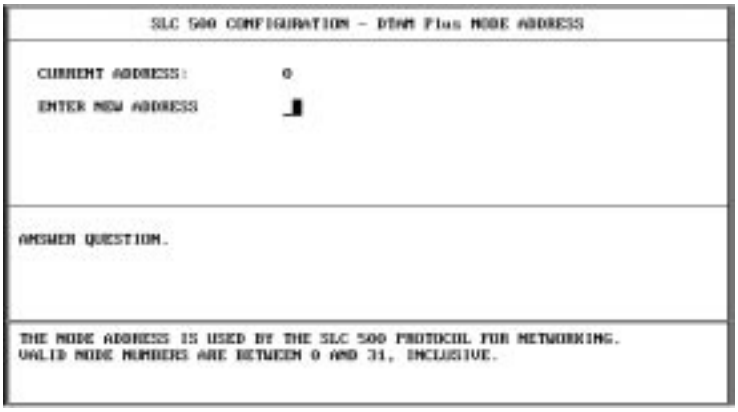
SLC Hardware Parameters

SLC 500 Node Address

The SLC 500 Node Address defines the node address of the SLC 500 that the DTAM will communicate with. The default address for the SLC 500 is address 1.

DTAM Node Address

The DTAM Node Address defines the node address of the DTAM. The default address for the DTAM is 0.



Note: We recommend the DTAM always be set to a node address less than the SLC for best performance.

Upgrade / Downgrade File

Only applies to the DTAM Plus. Use the Upgrade/Downgrade file function to convert files between DTAM Plus and Spectrum Controls① SOI2xx formats. You cannot convert between DTAM Micro and DTAM Plus file types.

If the file is for a DTAM Plus, the **Downgrade File** option is displayed. Downgrading the file makes it compatible with a Spectrum Controls① SOI2xx.

If the file is for a Spectrum Controls SOI2xx, the **Upgrade File** option is displayed. Upgrading the file makes it compatible with a DTAM Plus.

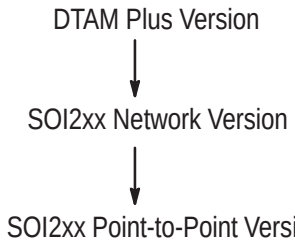
① Spectrum Controls, Bellevue, WA

Upgrade/Downgrade Capability

Type No.	Interface Type	Usage	Upgradability	Downgradability
1	A-B DH485	Allen-Bradley 32 node DH-485 networking	None	Downgradable to Type #3
2	A-B BASIC	Allen-Bradley Point to Point using BASIC module (Catalog No. 1746-BAS)	None	None
3	SOI Network	Spectrum 32 node DH-485 networking (SOI version 2.10 or greater)	Upgradable to Type #1	Downgradable to Type #4
4	SOI PT-PT	Spectrum Point to Point (SOI versions before V2.10)	Upgradable to Type #1	None

Downgrade File

Use the downgrade file to convert DTAM Plus files to a Spectrum Controls SOI2xx format. Files can be downgraded in three steps:



If you want to downgrade a DTAM Plus file to an SOI2xx point-to-point format, you must perform the downgrade twice. Downgrade once to convert the file to an SOI2xx network format and then again to convert the file to the SOI2xx point-to-point version.

SLC Hardware Parameters

When downgrading files, the following warning appears:

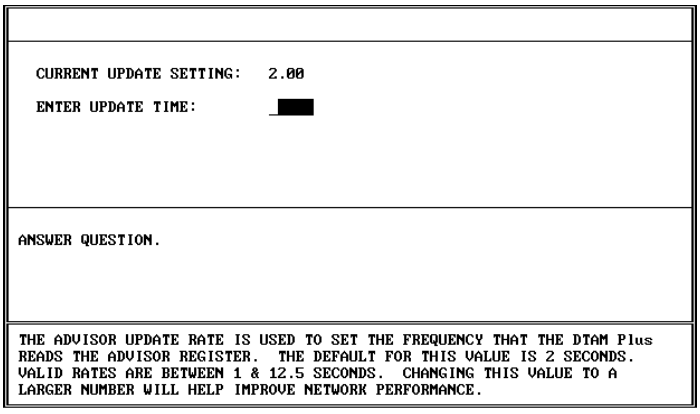
Upgrade File

Use the upgrade file to convert files from a Spectrum Controls[①] SOI2xx format to a DTAM Plus format. You can not upgrade an SOI2xx point-to-point format to an SOI2xx network format.

① Spectrum Controls, Bellevue, WA

Advisor Update Rate

When selecting Advisor Update Rate from the SLC 500 Configuration - Option Selection menu, the following is displayed:



The Advisor Update Rate is the periodic rate at which the DTAM scans the Advisor register. For example a rate of 2.00 means the DTAM reads the advisor register once every 2 seconds.

To assign a new Advisor Update Rate, enter a valid decimal number and press [Return]. The valid range is from 1 to 12.5 seconds. The default is 2 seconds. Entries are rounded up to the next higher 0.1 second.

Note: Because the advisor adds to the communications traffic, the rate should be set to the highest possible value.

To save the new Advisor Update Rate, press [Esc]. You are returned to the SLC 500 Configuration - Option Selection menu.

PLC Hardware Parameters

When using PLC-5 DF1 or Remote I/O protocol, you must specify the operating parameters that allow the DTAM Plus or DTAM Micro to communicate with the controller. The DTAM settings must match the settings of the PLC-5. If you are communicating with an SLC or DH-485 network, refer to the previous section SLC Hardware Parameters.

When you select PLC Hardware Parameters from the DPS Configuration - Option Selection menu, the following is displayed:

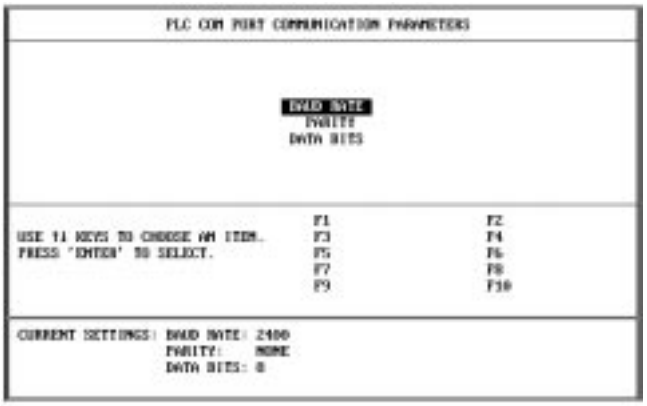
PLC-5 DF1 files cannot be upgraded or downgraded like SLC file types.

Hardware Parameter	Applies to:		Purpose
	DTAM Plus	DTAM Micro	
Com Port Setup	✓	✓	Defines the baud rate, parity, and number of data bits used for communication with a PLC-5.
Advisor Update Rate	✓	✓	Sets the rate at which the DTAM reads the advisor register.

Com Port Setup with PLC5 Operating System

Note: See next page for Remote I/O port setup on Remote I/O terminals.

Selecting Com Port Setup displays:



The Communications Port parameters have the following default values for a PLC:

Baud Rate:	2400
Parity:	None
Data Bits:	8

Baud Rate

Default is 2400 baud. Baud rate options are 38400, 19200, 9600, 4800, 2400, 1200, and 300. Select a baud rate that matches your PLC.

Parity

Default is no parity. Parity options are None, Odd, or Even.

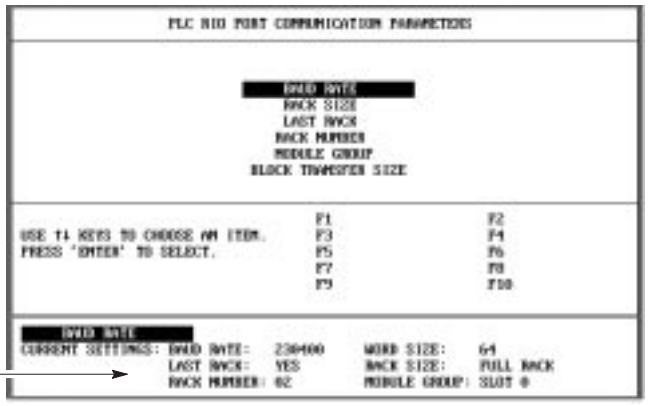
Data Bits

Defines the word length, the default is eight bits. Data bit options are Seven or Eight bits.

RIO Port Setup with Remote I/O Operating System

Note: See previous page for communications port setup when using PLC5 DF1 operating system.

Selecting RIO Port Setup displays:



Current Settings

The Port parameters have the following default values for remote I/O:

Baud Rate:	230400	Last rack:	Yes
Rack Number:	02	Word Size:	64
Rack Size:	Full Rack	Module Group	Slot 0

Baud Rate

Default is 230.4K baud. Baud rate options are 230.4 Kbps, 115.2 Kbps, or 57.6 Kbps. Select a baud rate that matches your Remote I/O link.

Rack Size

Default is Full. Options are 1/4, 1/2, 3/4, or Full. Each 1/4 rack contains 32 input and 32 output bits.

Last Rack

Yes or No. Default is Yes. Select Yes if the DTAM occupies the last rack on the Remote I/O link or No if the DTAM is not the last rack.

Rack Number

The rack number assigned to the DTAM. Default is 02. Options are 0 through 59.

Module Group

The starting module group within the rack. Default is 0. Options are 0, 2, 4, or 6. Starting module group must be low enough so that the specified rack size fits within the assigned rack number.

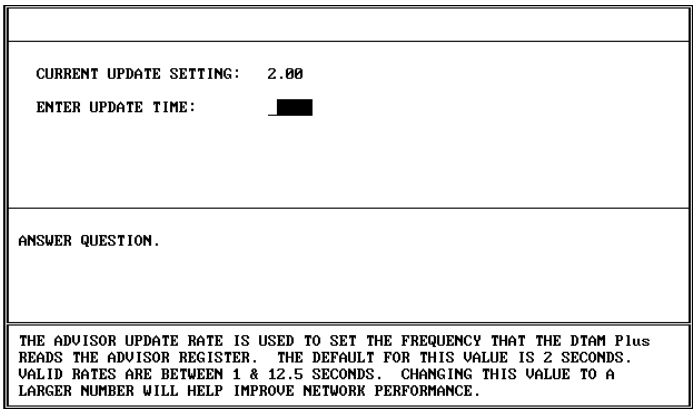
Block Transfer Size

Default is 64 words. Options are 1 to 64 words. Specifies the number of words to be transferred with eack block transfer read or write.

PLC Hardware Parameters

Advisor Update Rate

Selecting Advisor Update Rate from the PLC Hardware Parameters - Option Selection menu, displays the following:



The Advisor Update Rate is the periodic rate at which the DTAM scans the Advisor register. For example a rate of 2.00 means the DTAM reads the advisor register once every 2 seconds.

To assign a new Advisor Update Rate, enter a valid decimal number and press [Return]. The valid range is from 1 to 12.5 seconds. The default is 2 seconds. Entries are rounded up to the next higher 0.1 second.

Note: Because the advisor adds to the network communication traffic, the rate should be set to the highest possible value that is acceptable for your application.

To save the new Advisor Update Rate, press [Esc]. You are returned to the PLC Hardware Parameter - Option Selection menu.

Chapter 15

DTAM Plus Background Monitor

Chapter Objectives

This chapter describes how to use the Background Monitor function (available on the DTAM Plus only).

Background Monitor

The Background Monitor allows the DTAM Plus to monitor registers in the SLC or PLC and display the appropriate alarm screen or execute a printer form when the register values exceed the assigned limits.

Note: If the Advisor or data entry screens are active, the Background Monitor is ignored. Print forms and alarms are not triggered until the data entry screen is no longer displayed.

The Background Monitor is similar to the DTAM Plus advisor with these differences:

- The response to Background Monitor registers is 5 times slower than the Advisor register. For critical alarms, the Advisor should be used.
- The message triggered to alert an operator of an existing condition is generated within the DTAM Plus, not the SLC or PLC. This means no ladder logic programming is required for the DTAM Plus to operate independently.
- The number of screens or forms that can be triggered is determined by the data type. The background monitor allows a total of four background registers to be monitored.

  If triggered by a bit status change in the SLC or PLC, up to 64 individual alarm screens or printer forms can be executed (4 registers x 16 bits = 64 screens/forms).

  If triggered by an Integer or BCD register, one screen is displayed for each register. These register types allow an alarm or print form to be triggered if the value of the register is outside defined limits.

Background Monitor Screen

The screen for editing the Background Monitor is the same for a DTAM Plus communicating with an SLC or PLC.

Background Monitor Function Keys

Function Key	Designation	Function
[F1]	SHOW NEXT ALARM	Displays all defined alarm screens to allow you to select a particular alarm screen to be assigned to the monitor definition. Pressing [F1] scrolls through a list of the defined alarm screens.
[F2]	NEXT FORM #	This function is similar to the [F1] Show Next Alarm function, however defined Printer Form numbers are displayed rather than alarm screens. Printer forms exceed the display format of the editing screen, therefore, only the printer form numbers are displayed.
[F3]	DELETE SCREEN #	Allows you to delete a selected Alarm or Printer Form Screen number. The screen number is removed from the field in the Control Window definitions.
[F5]	PREVIOUS BIT	Displays the programmed parameters for the previous bit within the 16 bit background register selected. It is only available for bit data formats.
[F6]	NEXT BIT	Displays the programmed parameters for the next bit within the 16 bit background register selected. It is only available for bit data formats.
[F7]	DELETE REG	Deletes all parameters that have been defined for this background register.
[F8]	NEXT REGISTER	This function displays the next background register and its respective parameters.
[F9]	SAVE	Saves your program while allowing you to stay in the Background Monitor.
[F10]	EXIT	Prompts you to save the current file, then exits the DPS program.

Creating a Background Monitor

To define a Background Monitor:

1. Select Edit Program File from the Opening menu and enter a file name.

   The Edit File-Option Selection menu is displayed.

2. Select Background Monitor.

   The background register screen is displayed.

3. Select one of the four background registers.

   You are prompted for a data type:

Select this data type:	To:
Bit	Monitor each bit in the register for an alarm condition. There can be one alarm screen for each bit in the register.
16 Bit Signed Integer	Monitor an integer register and trigger an alarm screen when the register data exceeds preset limits.
16 Bit BCD	Monitor a BCD register and trigger an alarm screen when the register data exceeds preset limits.

4. Select a data type:

   You are prompted for information specific to the data type.

16 Bit Integer Shown

5. Enter the register data. Refer to the next section Background Monitor Register Selections.
6. Press [Esc] to save the register data and press [F9] to save the screen.

Background Monitor Register Selections

When assigning a background register, you must provide register information that determines the address and data limits.

Bit

The register information for a Bit background register is shown below.

Parameter	Description
Register Number	The PLC or SLC register number you want to monitor.
Bit Number	The bit number of the register to monitor.
Alarm State	The bit status that will indicate an alarm state. The bit status may be either 1 (on) or 0 (off).
Screen Number	The number of the screen to display when the status of the monitored bit indicates an alarm state.

Integer or BCD Selections

The register information for an Integer or BCD background register is shown below.

Parameter	Description
Register Number	The PLC or SLC register number you want to monitor.
Low Alarm Limit	The lowest value that is acceptable before an alarm state is indicated.
High Alarm Limit	The highest value that is acceptable before an alarm state is indicated.
Low Return to Normal	The predetermined value that the register data must exceed before a new alarm state may be triggered. Defaults to the value of the low alarm limit.
High Return to Normal	The predetermined value that the register data must fall below before a new alarm state may be triggered. Defaults to the value of the high alarm limit.
Screen Number	The number of the screen to display when the status of the monitored register indicates an alarm state.

Chapter 16

DTAM Micro Function Key Builder

Chapter Objectives

This chapter describes how to use the Function Key Builder to assign screen selection or bit write operations to function keys (available on the DTAM Micro only). This chapter contains these sections:

Function Key Options

You can link the DTAM Micro function keys F1 through F8 to the following screens depending upon whether or not Auto Return is enabled.

Auto Return Enabled?	Function keys can be assigned to these screen types:
Yes	Data Display, Data Entry, Recipe
No	Menu, Sub-Menu, Data Display, Data Entry, Security, Recipe

Pressing an assigned function key displays the function key number for approximately 0.5 seconds and then the assigned screen. There are two function key modes:

- Auto Return
- Continue

Auto Return

Auto return function keys return to the initial display after the linked screen is executed. For example, assume that an application is displaying screen #6 and an auto return function key F3 is linked to a recipe screen #10. When F3 is pressed, the recipe screen #10 is displayed. After the operator downloads a new recipe on screen #10, the initial screen #6 is displayed.

The following table describes when the return to the initial screen occurs.

Function Key Linked To:	Returns to Initial Screen After:
Data Display Screen	[←┘] , [PREV], or [NEXT] keys are pressed
Data Entry Screen	A value is entered or [PREV] or [NEXT] keys are pressed ①
Recipe Screen	Recipe data is downloaded or [PREV], or [NEXT] keys are pressed ①

① [PREV] and [NEXT] abort the operation.

Function Key Options

Continue

Continue function keys do not return to the initial display but remain at the linked screen. For example, assume that an application is displaying screen #3 and a continue function key F2 is linked to a data entry screen #5. When F2 is pressed, the data entry screen #5 is displayed. The application continues from screen #5.

Bit Write Mode

The 8 function keys of the DTAM Micro can also set or clear bits in the logic controller. The bit write mode may be enabled with or without screen links being assigned to the same function keys (if bit write is enabled, all 8 function keys will write to the corresponding registers). The function keys are assigned to 8 contiguous 16 bit addresses such as N7:20 through N7:27.

Depending upon how a bit write is configured (clear or set), a function key will either:

- send the corresponding value (F1 = 1, F2 = 2, etc.)
- clear the register

The following chart shows the set and clear values for each function key. The register location for F1 is specified on the Function Key Builder screen. The remaining 7 function keys are automatically assigned to the next 7 consecutive registers.

DTAM Micro Function Key	Set Value	Clear Value		Register Location
F1	00000000 00000001	00000000 00000000	↦	1
F2	00000000 00000010	00000000 00000000	↦	2
F3	00000000 00000100	00000000 00000000	↦	3
F4	00000000 00001000	00000000 00000000	↦	4
F5	00000000 00010000	00000000 00000000	↦	5
F6	00000000 00100000	00000000 00000000	↦	6
F7	00000000 01000000	00000000 00000000	↦	7
F8	00000000 10000000	00000000 00000000	↦	8

Notes: The entire word register (16 bits) is written when a bit write is initiated. Bit write does not change individual bits.

If a function key is used for bit write mode as well as screen navigation, the bit pattern will not be written if the DTAM Micro cannot go to the mapped screen.

Function Key Builder

The screen for assigning DTAM Micro function key options is shown below:

Function Key Builder Function Keys

Function Key	Designation	Function
[F1]	PREV SCREEN	Displays next programmed screen in display window. Use this display as a reference when assigning screen numbers to function keys.
[F2]	NEXT SCREEN	Displays previous programmed screen in display window. Use this display as a reference when assigning screen numbers to function keys.
[F5]	BIT WRITE REG	Prompts you for a base register location.
[F7]	CLEAR F KEYS	Clears all screen and bit write mode operations assigned to the function keys.
[F9]	SAVE	Saves the application without exiting the Function Key Builder screen.
[F10]	EXIT	Prompts you to save the application to the current file and exits the DPS software.

Linking Screens to Function Keys

You can link function keys [F1] through [F8] to individual screens (except alarm screens). You can only link the function keys of the DTAM Micro, this procedure does not apply to the DTAM Plus.

To link screens to function keys:

1. At the Opening menu select Edit Program File and enter a file name.

   The Edit File - Option Selection menu is displayed.

2. Select Function Key Builder.

   The Function Key Builder screen appears.

3. Use the arrow keys to highlight the function key you want to assign.
4. Enter a screen number for the function key and press [Return]. If you want to see the screen you are assigning, press [F1] and [F2].

   You are prompted if you want the key to auto return.
5. Enter [Y] for Auto Return Mode or [N] for Continue Mode and press [Return].
6. Assign the remaining function keys. If you want to assign bit write mode functions, refer to the next section.
7. Press [F9] to save the screen.

Assigning Bit Write Functions

To assign bit write mode functions:

1. Open the Function Key Builder screen, refer to previous section.

2. Press [F5] to assign the bit write mode register.

   You are prompted to enter a base register.

3. Enter the base register number (for function key F1), the next seven registers will automatically be reserved for function keys F2 through F8.

   You are prompted to clear or set a bit when the operator presses the function key.

4. Enter [1] or [0] and press [Esc] when done.

   The function key register assignments are displayed.

```
FUNCTION KEY REGISTERS

REGISTERS: N7:23 - N7:30
FUNCTION BIT: SET (1)
```

5. Press [F9] to save the screen.

Chapter 17

DTAM Plus
Printer Form Builder

Chapter Objectives

This chapter describes how to use the Printer Form Builder function (available on the DTAM Plus only). This chapter contains these sections:

Printer Form Builder

Only available on the DTAM Plus with the optional printer port, the Printer Form Builder lets you create formats for printing alarm messages, production reports, or any other messages. A print form may contain 1 to 8 lines of text.

You can combine text and controller register data to create a custom print out. Register data can be scaled prior to being printed.

Printer Control

You have the option of selecting either:

- a form feed prior to printing the form
- printer control codes

Printer control codes allow you to enter printer control functions such as Line Feed or extended ASCII characters into the print form.

Note: The default settings of the printer form prints out all eight lines for each print form even if all the lines don't contain text. To save paper on print forms containing less than 8 lines, we recommend that you:

- disable the form feed option.
- disable the line feed after carriage return option on your printer.
- enter a line feed printer code (decimal 10) after the end of each line on the print form.

Print Form Builder Function Keys

The Print Form Builder screen is only available for the DTAM Plus.

Printer Form Builder Function Keys

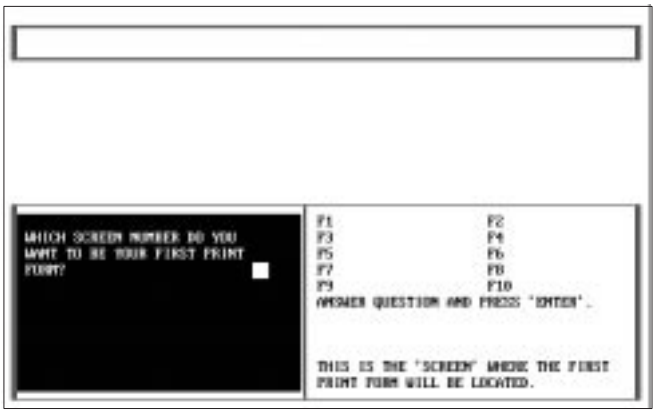
Function Key	Designation	Function
[F1]	REGISTER DATA	Allows you to place or allocate a data field on the printer form. Multiple data fields can be placed anywhere on the printer form. Any supported data formats can be printed.
[F2]	PRINT CONTROL	Provides an option of causing a Form Feed [F1] prior to the form being printed or manually entering Printer Codes [F3] in decimal form.
[F3]	CHANGE WIDTH	Allows you to change the existing column width. The number of characters for the column width must be at least 16 and less than or equal to 80.
[F4]	COPY SCREEN	Copies an current screen to another screen or another screen to the current window. Both the source and destination must be of the same screen type.
[F5]	INSERT TIME	Inserts the time into the display. Only available on a DTAM plus having the Calendar/Clock option.
[F6]	INSERT DATE	Inserts the date into the display. Only available on a DTAM plus having the Calendar/Clock option.
[F7]	CLEAR SCREEN	Clears the current screen. you have the option of clearing only the screen text or deleting the entire screen including any linking you may have established.
[F8]	CHANGE SCREEN	Selects another screen.
[F9]	SAVE	Saves the application without exiting the print form builder screen.
[F10]	EXIT	Prompts you to save the application to the current file and exits the DPS software.

Creating a Printer Form

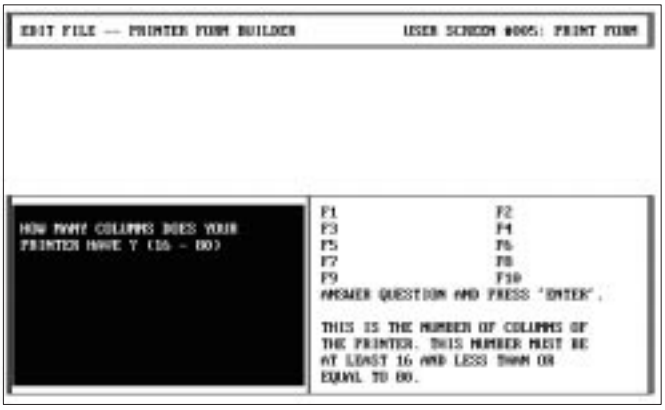
To create a DTAM Plus printer form.

1. Select Edit Program File from the Opening menu and enter a file name.
   The Edit File-Option Selection menu is displayed.

2. Select Printer Form Builder.
   You are prompted to enter the screen number of the first printer form.

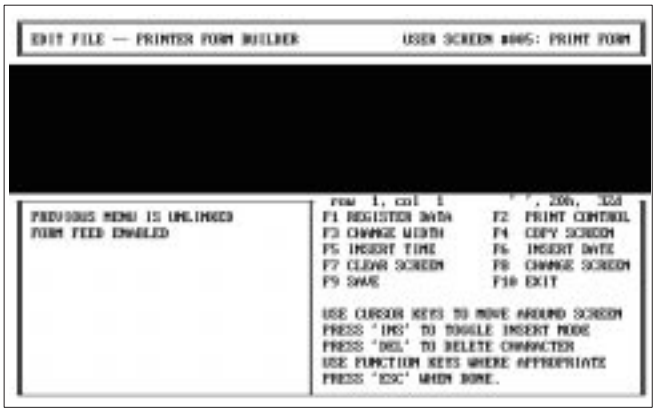


3. Enter a screen number.
   You are prompted for the printer carriage width (16 to 80 characters).



4. Enter a carriage width. The carriage width affects all printer forms.

   The printer form screen builder is displayed.



5. Enter the text you want to appear on the print form. If you want to insert a data display, press [F1]. You are then prompted for the register data, refer to Chapter 7 for additional information.
6. If you want to insert the time or date, press [F5] or [F6].
7. Press [F2] to change the printer control.

   You are prompted to press [F1] for a form feed prior to the form being printed or [F3] for printer codes to be used.
8. If you want to enter a printer code, position the cursor where you want to enter the code and press [F3] after printer control [F2] has been selected.

   You are prompted for the printer code.

9. Enter the decimal value for the control code (or ASCII character), refer to the table below. For example, decimal 10 is equivalent to LF (Line Feed). Press [Return] after the entry.

   The Hex Value and ASCII symbol are displayed.

ASCII Code	Description	Decimal Value
<NUL>	Null	0
<SOI>	Start of Heading	1
<STX>	Start Text	2
<ETX>	End Text	3
<EOT>	End of Transmission	4
<ENQ>	Enquiry	5
<ACK>	Acknowledge	6
<BEL>	Bell	7
<BS>	Backspace	8
<HTAB>	Horizontal Tab	9
<LF>	Line Feed	10
<VTAB>	Vertical Tab	11
<FF>	Form Feed	12
<CR>	Carriage Return	13
<SO>	Shift Out	14
<SI>	Shift In	15
<DLE>	Data Link Escape	16
<DC1>	Direct Control 1	17
<DC2>	Direct Control 2	18
<DC3>	Direct Control 3	19
<DC4>	Direct Control 4	20
<NAK>	Negative Acknowledge	21
<SYN>	Synchronous Idle	22
<ETB>	End Transmission Block	23
<CAN>	Cancel	24
<EM>	End of Medium	25
<SUB>	Substitute	26
<ESC>	Escape	27
<FS>	Form Separator	28
<GS>	Group Separator	29
<RS>	Record Separator	30
<US>	Unit Separator	31
<SP>	Space	32

10. Enter the remaining screen text or printer codes, press [F9] to save the screen.

Chapter 18

DTAM Plus ASCII Bar Code Input

Chapter Objectives

This chapter describes how to input ASCII bar code data through the optional printer port of the DTAM Plus.

ASCII Input

Versions of the DTAM Plus with the optional printer port allow ASCII data to be written to a data entry display. The ASCII data may be from a variety of sources, including Allen-Bradley decoded bar code scanners:

- Hand-Held Scanners (Catalog No. 2755-G3-D or -G6-D)
- Fixed Mount Scanners (Catalog No. 2755-LD1-D or -LD2-D)

Allen-Bradley Bar Code Message Formats

Allen-Bradley bar code scanners transmit data after a successful decode in the following format:

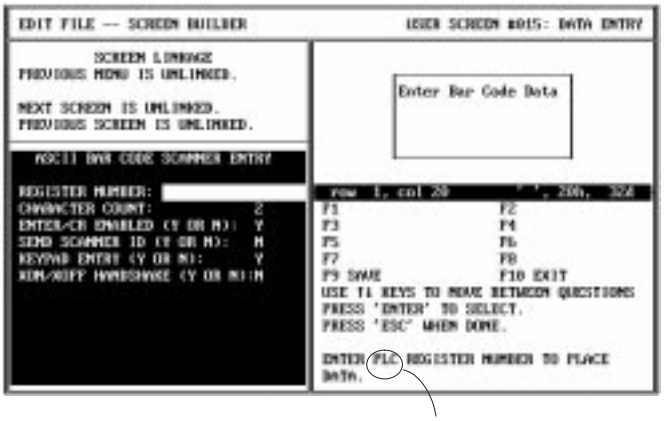
Prefix	Scanner ID	Preamble	Code ID	Data	Postamble	Suffix

The DTAM Plus supports the following fields of the bar code message format.

Field	Field Name	Contents	DTAM Plus Support
1	Prefix	STX	Only STX is supported.
2	Scanner ID	Two character ASCII idntifier form 01 to 99.	user can specify whether or not the scanner ID field is used by the DTAM.
3	Preamble	None	No preamble is supported. This is the default setting of the scanners.
4	Code ID	None	No code ID is supported. This is the default setting of the scanners.
5	Data	1 to 32 ASCII characters.	This field is variable and contains the exact number of characters scanned.
5	Postamble	None	No postamble is supported. This is the default setting of the scanners.
7	Suffix	CR LF (Carriage Return / Line Feed)	CR LF is the default setting of the scannerrs.

Creating an ASCII Entry Display

A bar code entry display is a standard data entry display with ASCII Bar Code Scanner set as the data format. Refer to Chapter 8 for a description of how to create a data entry display. These are the options you have when defining the data entry field.



SLC or PLC depending upon protocol.

Format Selection	Description
Register Number	The controller data address to be written.
Character Count	The number of characters (1 to 32) that are expected for each entry. The DTAM sends the data to the controller after receiving the specified character count.
Enter/CR Enabled (Y or N)	Determines when the ASCII data is sent to the controller. If Y is selected, data is sent to the controller when one of the following ocurrs.: 1. The DTAM receives the the number of charcters specified in the character count 2. Operator presses the Enter key. 3. A carriage return character (ASCII 13) character is received. If N is selected, data is sent to the controller when the DTAM receives the number of characters specified in the character count.
Send Scanner ID (Y or N)	Specifies whether or not the scanner ID is included as part of the message sent to the controller.The scanner ID is a 2 character ASCII designation that identifies the ASCII string from each scanner.
Keypad Entry (Yor N)	Enables or disables the ability of the operator to enter data using the DTAM keypad.
XON/XOFF Handshake (Y or N)	Enables or disables XON/XOFF flow control between the bar code scanner and the DTAM.

Entering Data with a Bar Code Scanner

After creating the data entry screen and downloading the application to the DTAM Plus, bar code data can be scanned into the data entry field.

1. Setup the bar code scanner to match the message format the DTAM Plus is expecting:
   - Prefix = STX
   - Preamble = None
   - Code ID = None
   - Postamble = None
2. Configure the DTAM printer port and the bar code scanner's communication port to match:
   - Baud Rate = 300, 600, 12000, 24000, 48000, 96000, 19200 with **9600** as both the scannner and the DTAM default.
   - Data Bits = 8
   - Stop Bits = 1
   - Parity = Odd, Even, or None with **None** as the DTAM default.
3. Connect the DTAM to the bar code scanner as described in the DTAM Plus user manual.
4. When the bar code entry screen is displayed, data can be scanned in. Here are some items you should note when using a bar code scanner.
   - Odd character counts from the scanner are rounded up to create even byte counts. This facilitates word writes to the controller. The last character written is a Null.
   - When displaying a bar code input data entry display the following DTAM keys are active:

     and the following keys are inactive:

     and the 

     key is not available for printing screens
   - If keypad entry is enabled, the operator can enter the ASCII character's decimal equivalent value into the data entry field. The bar code ASCII input is also enabled at the same time. This allowsinput from both sources. For example, an operator can manually enter 3 characters and then scan a bar code containing 8 characters. The DTAM then would write all 11 characters to the controller.

Chapter 19

Transferring / Printing Application Files

Chapter Objectives

This chapter describes how to transfer application files between a DTAM and a personal computer. Also provided is a description of how to print out an application file.

Upload / Download DIP Switch Settings

Before you can upload or download an application, you must verify that the DIP switches are set properly. Refer to the DTAM Plus or DTAM Micro user manuals for the upload/download switch settings.

Communication Cables

Refer to the accessories list in DTAM Plus or DTAM Micro user manuals for the proper communication cable. Cable diagrams are provided in these manuals if you need to construct your own cable.

Computer Setup

Upload and download functions are initiated from a personal computer running the programming software DPS. Transfer functions occur at 9600 baud. Make sure that the computer's communication port is also set for 9600 baud.

After the transfer is complete, the DTAM Baud rate is set to the parameters defined by the application program residing in the DTAM Micro or DTAM Plus.

Printer Setup

Make sure that the printer communications port and the DTAM Plus printer port have matching baud rates, parity and data lengths. Refer to Chapter 14 for a description of the printer port configuration screen.

Downloading an Application

This section shows how to download an application from a computer running DPS software to the DTAM.

1. Apply power to the DTAM.

   The following message appears in the window of the DTAM.

   Programming Mode
   Waiting Up/Download

   If you do not see this message, check the DIP switch settings. DIP Switch 1 must be in the Closed (ON) position.

2. On your computer, move to the /DPS subdirectory where the software resides.

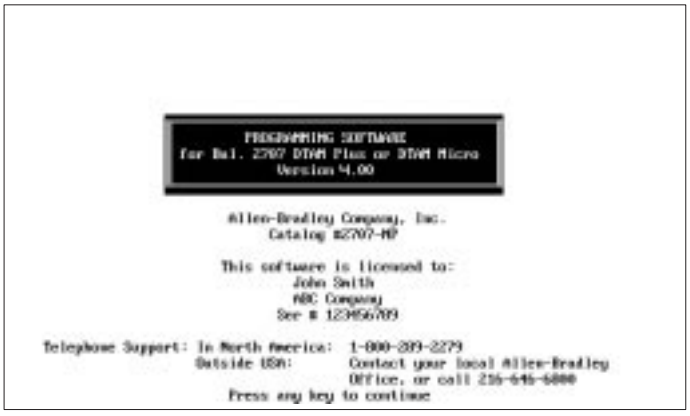
   C:\DPS>

3. Type **dps** and press [Return] to start the program.

   C:\DPS>**dps** [Return]

☞ *You will not see this prompt if a monitor was specified during installation.*

4. Specify whether you are using a color monitor. Enter [Y] or [N].
5. The startup screen displays:



6. Press any key (other than [Esc]) to continue.
   The Product Selection menu appears.

☞ *You will not see this prompt if a product type was specified during installation.*

7. Press [Return] to select the DTAM Micro or DTAM Plus product.
   The Opening menu appears.

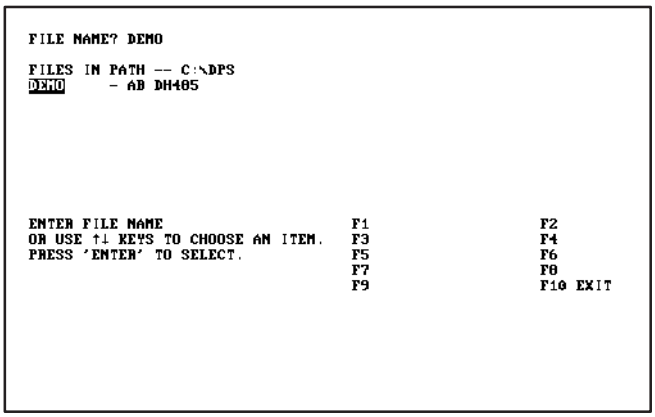
8. Highlight Download File to DTAM and press [Return].
   The Communication Port Selection screen appears.

☞ *You will not see this screen if a communication port was specified during installation.*

Downloading an Application

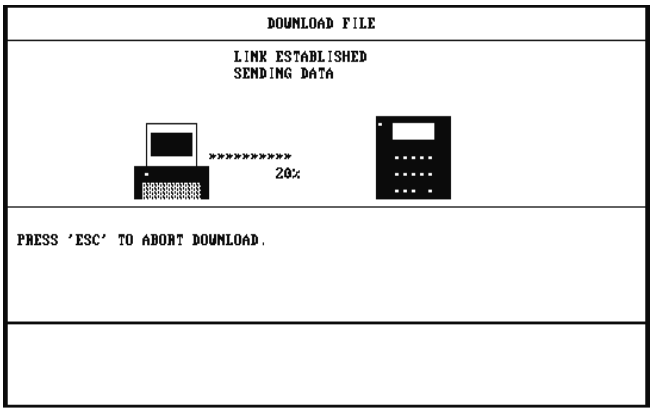
9. Highlight the serial port on your computer that is connected to the DTAM (COMM 1 or COMM 2) and press [Return].
10. When communication is established, the following screen appears:

☞ *If a communication link does not occur in 10 seconds, you get an error message. Check DIP switch settings and cable connections.*



11. Enter or select the file name that you want to download. If the application file type (DH-485, PLC5 DF1, or Remote I/O) is different from the existing operating system, you are prompted to download the new operating system.
12. Press [Return] to load the application file.

    The download begins and the following screen shows the progress of the download operation.



13. During the downloaded, the DTAM alternately displays:

Programming Mode
Transfer in Progress

Programming Mode
Copying to Memory

14. When the download is complete, you are returned to the Opening menu.

and the DTAM displays:

Programming Mode
Waiting Up/Download

15. Press [Esc] to exit the software.
16. Press [Y] to return to DOS.

The application is now loaded into the DTAM.

Uploading an Application

This section shows how to upload an application from the DTAM to a computer running DPS software.

1. Apply power to the DTAM.

   The following message appears in the window of the DTAM.

DTAM Plus **DTAM Micro**

   If you do not see this message, check the DIP switch settings. DIP Switch 1 must be in the Closed (ON) position.

2. On your computer, move to the /DPS subdirectory.

   C:\DPS>

3. Type **dps** and press [Return] to start the program.

   C:\DPS>**dps** [Return]

☞ *You will not see this prompt if a monitor was specified during installation.*

4. Specify whether you are using a color monitor. Enter [Y] or [N].
5. The startup screen displays.

Uploading an Application

☞ *You will not see this prompt if a product type was specified during installation.*

6. Press any key (other than [Esc]) to continue.
   The Product Selection menu appears.

7. Press [Return] when the correct DTAM product is highlighted.
   The Opening menu appears.

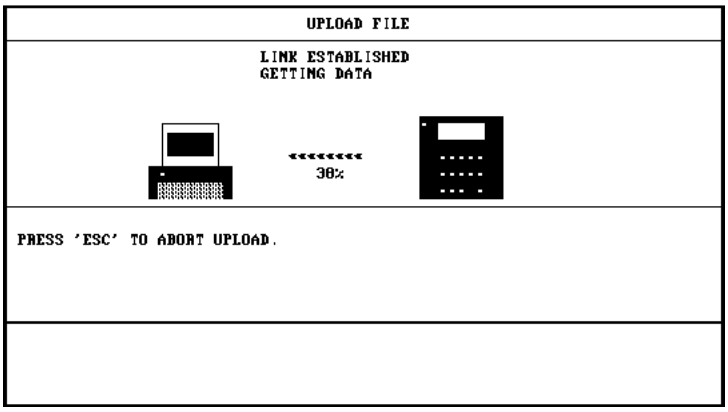
8. Highlight Upload File from DTAM and press [Return].
   The Communication Port Selection screen appears.

☞ *You will not see this screen if a communication port was specified during installation.*

9. Highlight the serial port on your computer that is connected to the DTAM (COMM 1 or COMM 2) and press [Return].

☞ *If a communication link does not occur in 10 seconds, you get an error message. Check DIP switch settings and cable connections.*

10. The upload begins and the following screen shows the progress of the upload operation.



After the upload is complete, you are prompted to enter a file name for the application.

11. Enter the file name for the uploaded application, you are returned to the Opening menu.

12. Press [Esc] to exit the software.

13. Press [Y] to return to DOS.

The application is now loaded into the DPS software and can be edited like any other application file.

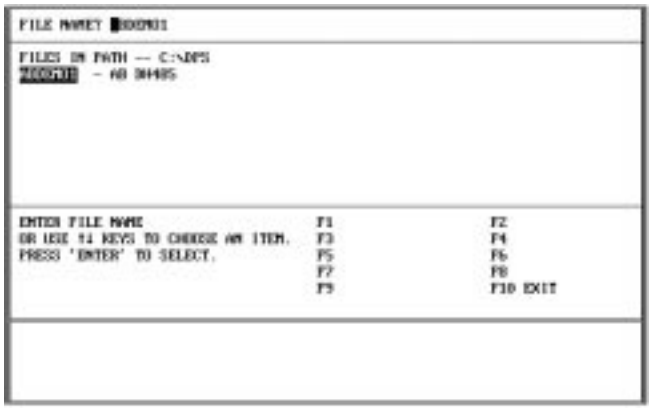
Printing Application Files

This section describes how to print out a copy of an application file. Keep a hardcopy for your records.

You can send the program file to:

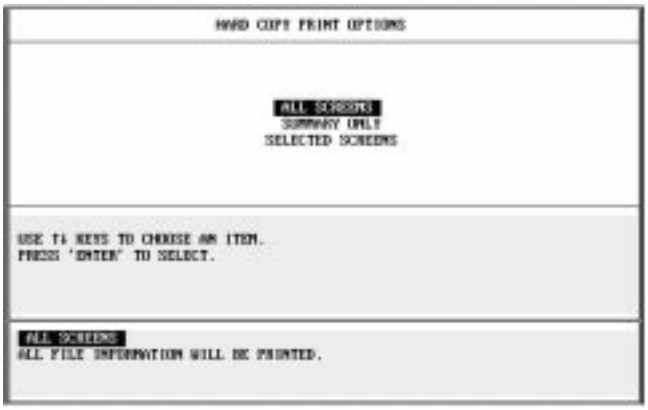
- the attached printer
- the computer screen
- another file (using the current file name with a .LST extension)

1. Select Output Hard Copy of File on the Opening menu. You will be prompted for the application file to print.



2. Enter the name of the application file you want to print. You are then prompted for the type of output device.

3. Enter the device type. You are then prompted for the screens that you want printed. You have the option of printing all screens, a summary only, or selected screens.



Select this Option	To
All Screens	Print all program screens including summary information.
Summary Only	Print only summary information including: Controller Type, File Size, and Number of Screens DTAM Configuration Data Advisor Register Data Time Synchronization Data ① Background Monitor Assignments ① Function Key Assignments ② Numerical Listing of Programmed Screen Types
Selected Screens	Print block of specified screens.

① DTAM Plus only.
② DTAM Micro only.

4. If you specified more than one screen, you will see the following prompt:

This prompt enables as many screens to be printed on one page as possible.

5. Enter [Y] to compact output or [N] for standard format.

You are prompted to start the hardcopy printout by pressing any key. After the printout has begun, the following function keys are available:

- Press the [Space Bar] to pause the printout. Pressing the [Space Bar] again resumes printing.
- Press [Esc] key to abort the printout and return to the Opening menu.

Chapter 20

Upgrading the Operating System

Chapter Objectives

This chapter describes how to update the DTAM operating system while maintaining the current application file.

Note: If you want to change the operating system to a system that is different from the current system, you must first download an application file of that type.

For example, if an AB DH485 file is currently installed in the DTAM Plus and you want to load an AB BASIC operating system, you must first load an AB BASIC application file. You will be prompted to download the new operating system with the application file.

Upgrading the Operating System

This option lets you upgrade the Operating System currently installed in the DTAM to AB DH485, AB BASIC (DTAM Plus only), PLC-5 DF1, or Remote I/O without changing the application file.

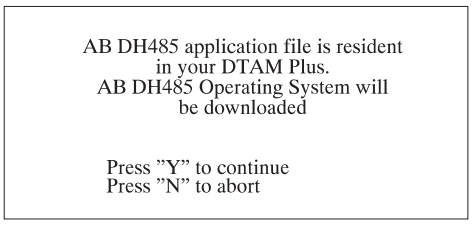
To upgrade the operating system:

1. Select Upgrade Operating System on the Opening menu. You will be prompted to select the communications port.

   Note: This option is not displayed if a communication port was specified during installation.

2. Select the serial port on your computer that is connected to the DTAM (COMM 1 or COMM 2).

3. A message will be displayed indicating the Operating System in the DTAM and the Operating System of the application file. For example:



4. If you select [Y], the new operating system is downloaded.

   If you select [N], the downloaded is aborted and the Opening menu is displayed.

Appendix A

ASCII Character Set

ASCII Table

When ASCII characters are downloaded to the DTAM, they may appear different than the standard ASCII character. Use the following ASCII table to determine what characters display for each decimal equivalent value entered. Do not use a standard ASCII table.

There are two characters that display differently on the DTAM as compared to A-B 6200 PLC Programming Software.

ASCII Character (Decimal Value)	Diplayed On 6200 Software	Displayed On DTAM
92	\	¥
126	~	→

How to Program Supported ASCII Characters

The DTAM is capable of displaying additional characters above the 96 standard ASCII characters (127 decimal / 80 Hex). To access characters above 127 decimal / 80 Hex using the programming software, you must enter a special sequence.

To program the desired character(s), you must be ready to create a screen. Position the cursor where you want the special character positioned and perform the following steps:

1. Identify the character in the ASCII character set table. As an example, we will use the ∞ character.
2. Identify the equivalent decimal code of the character.
   For example, the ∞ character is equivalent to 243 decimal.
3. Press and hold the [ALT] key and enter the decimal equivalent value. Use the separate numeric keypad, not the top row numeric keys on your keyboard.

   A character will be displayed in the specified position.
   For example, press and hold the [ALT] key and enter **0243** to enter a ∞ character.

Note: The displayed character may be displayed as an unexpected character on your computer monitor. When you download and display the character on the DTAM, the correct character will be displayed (for example ∞ displays as ≤.

Note: Values C0 through Cf are reserved for DPS functions and cannot be inserted into a screen display. However, you can display these characters on the DTAM Plus when received in the terminal mode (refer to the DTAM user manuals).

Table A.1
ASCII Display Character Set*

DEC	HEX	CHR
32	20	
33	21	!
34	22	"
35	23	#
36	24	$
37	25	%
38	26	&
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	-
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7

DEC	HEX	CHR
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O

DEC	HEX	CHR
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	¥
93	5D	]
94	5E	^
95	5F	_
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g

* All of the above characters are supported when 8 data bit communication is enabled.
Hex codes below 80H are supported by 7 data bit communication.

Table A.1
ASCII Display Character Set*

DEC	HEX	CHR
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	→
127	7F	←

DEC	HEX	CHR
160	A0	
161	A1	｡
162	A2	｢
163	A3	｣
164	A4	､
165	A5	･
166	A6	ｦ
167	A7	ｧ
168	A8	ｨ
169	A9	ｩ
170	AA	ｪ
171	AB	ｫ
172	AC	ｬ
173	AD	ｭ
174	AE	ｮ
175	AF	ｯ
176	B0	ｰ
177	B1	ｱ
178	B2	ｲ
179	B3	ｳ
180	B4	ｴ
181	B5	ｵ
182	B6	ｶ
183	B7	ｷ

DEC	HEX	CHR
184	B8	ｸ
185	B9	ｹ
186	BA	ｺ
187	BB	ｻ
188	BC	ｼ
189	BD	ｽ
190	BE	ｾ
191	BF	ｿ

* All of the above characters are supported when 8 data bit communication is enabled.
Hex codes below 80H are supported by 7 data bit communication.

Table A.1
ASCII Display Character Set*

DEC	HEX	CHR
208	D0	
209	D1	
210	D2	
211	D3	
212	D4	
213	D5	
214	D6	
215	D7	
216	D8	
217	D9	
218	DA	
219	DB	
220	DC	
221	DD	
222	DE	
223	DF	
224	E0	
225	E1	
226	E2	
227	E3	
228	E4	
229	E5	
230	E6	
231	E7	

DEC	HEX	CHR
232	E8	
233	E9	
234	EA	
235	EB	
236	EC	
237	ED	
238	EE	
239	EF	
240	F0	
241	F1	
242	F2	
243	F3	
244	F4	
245	F5	
246	F6	
247	F7	
248	F8	
249	F9	
250	FA	
251	FB	
252	FC	
253	FD	
254	FE	
255	FF	

* All of the above characters are supported when 8 data bit communication is enabled. Hex codes below 80H are supported by 7 data bit communication.

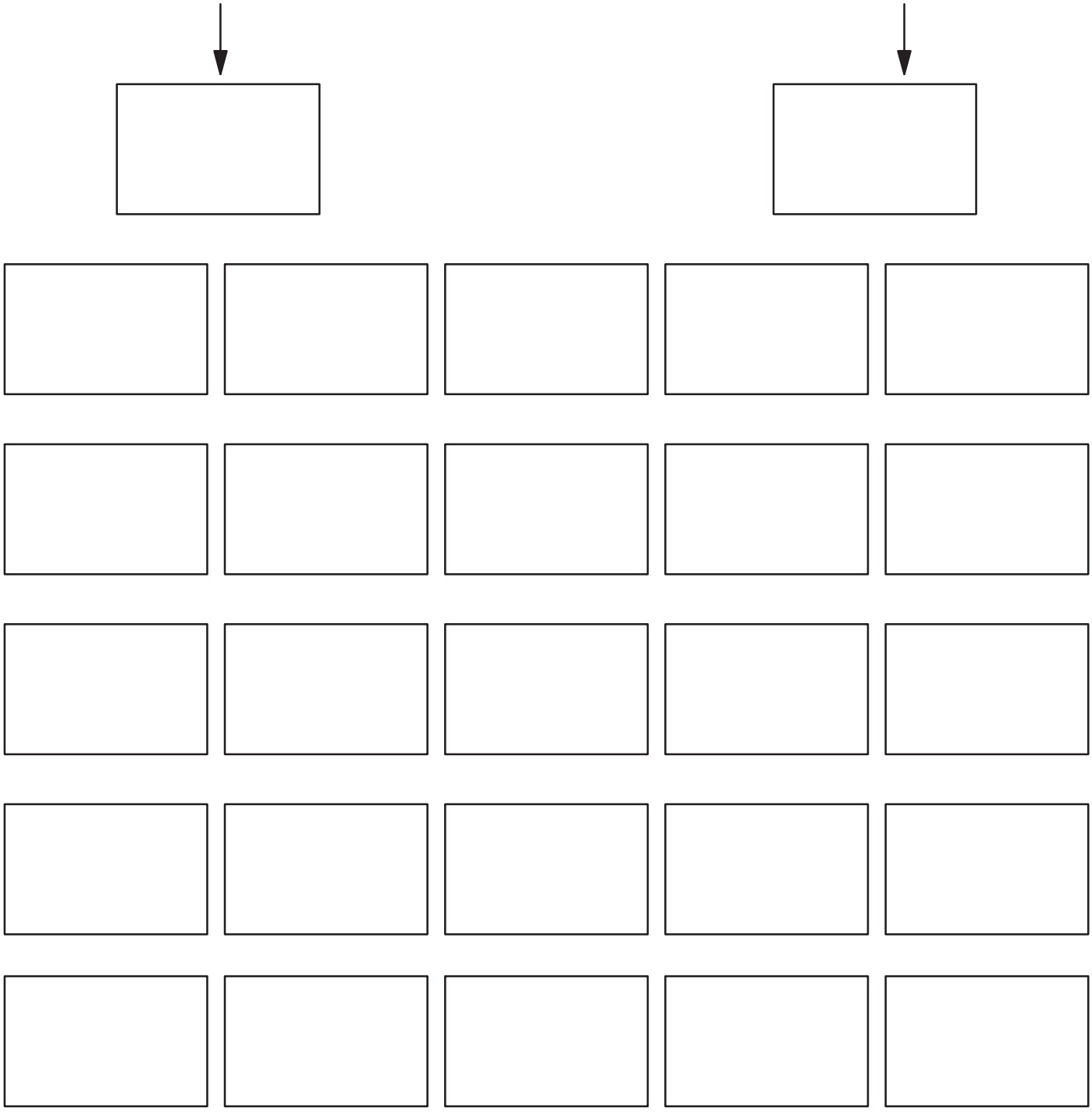
Appendix B

Application and Screen Worksheets

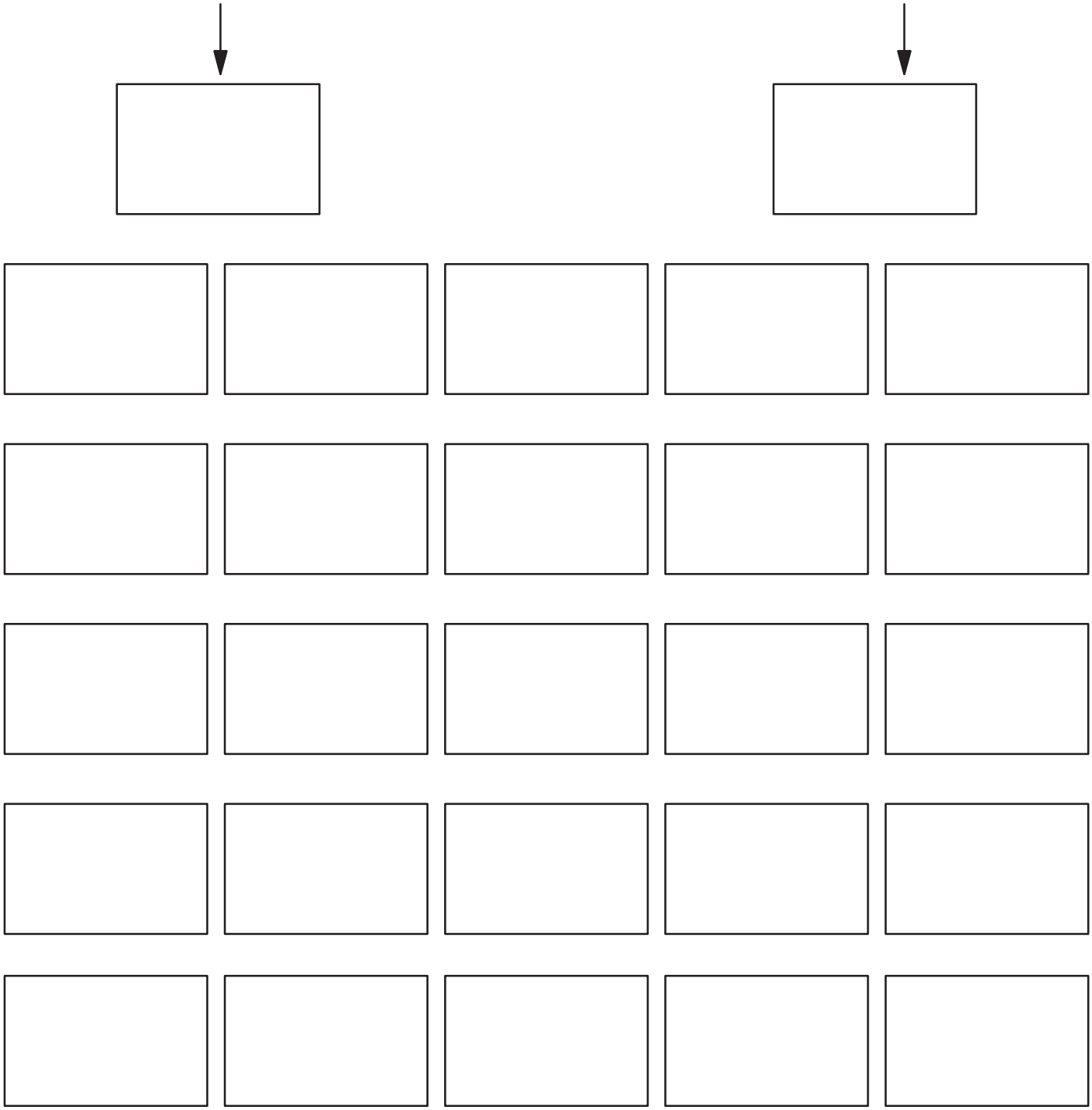
You can use the worksheet templates on the following pages when designing your application program. Make copies of these pages as needed.

Appendix B
Application and Screen Worksheets

DTAM Application Worksheet

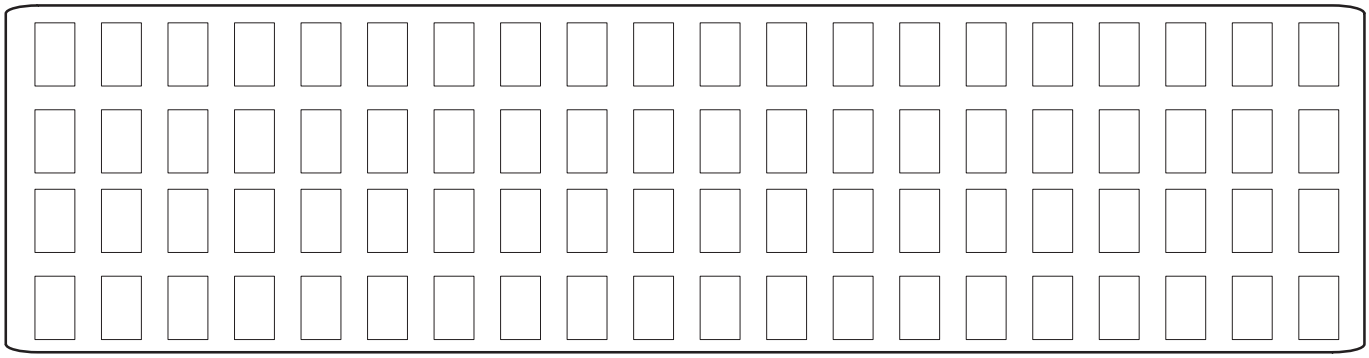


DTAM Application Worksheet

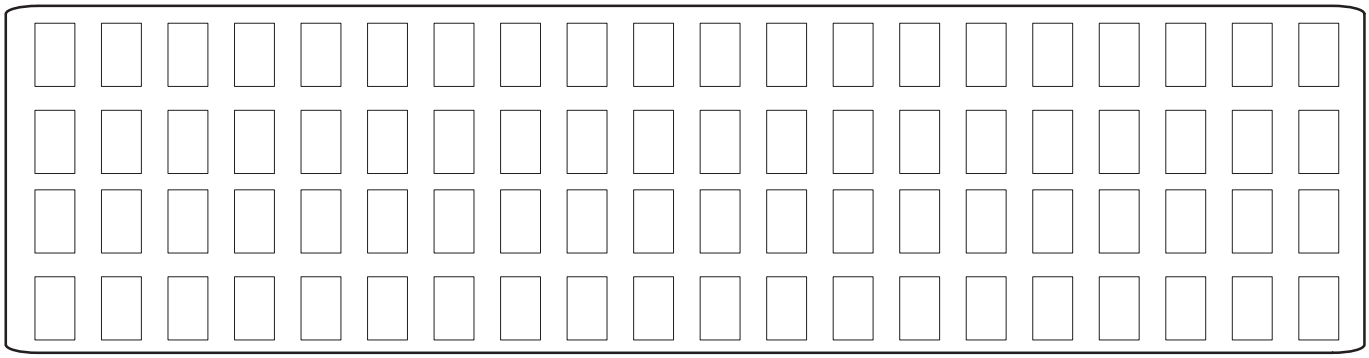


DTAM Plus Screen Worksheet

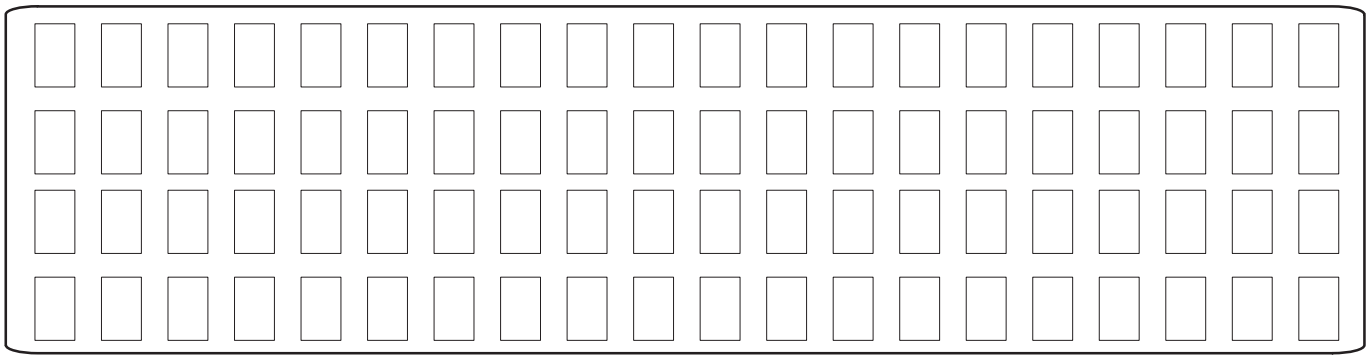
4 lines of 20 characters



Screen #_____



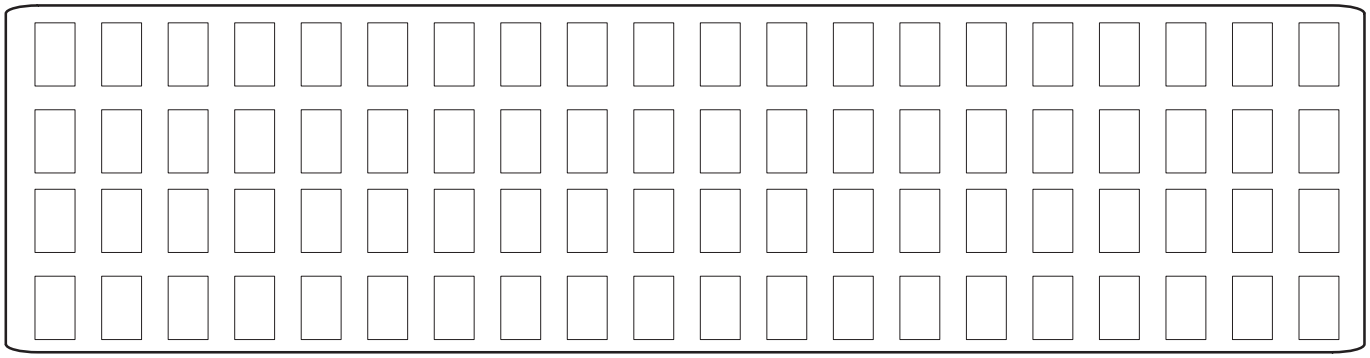
Screen #_____



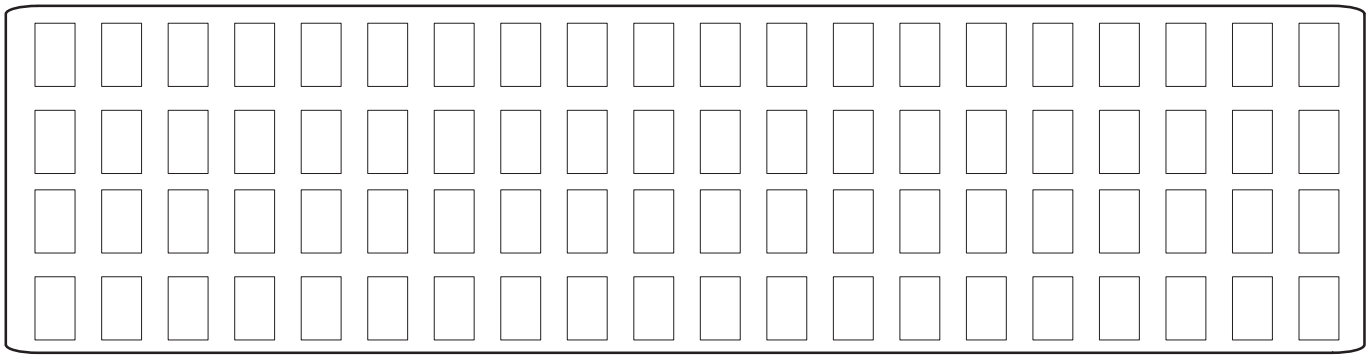
Screen #_____

DTAM Plus Screen Worksheet

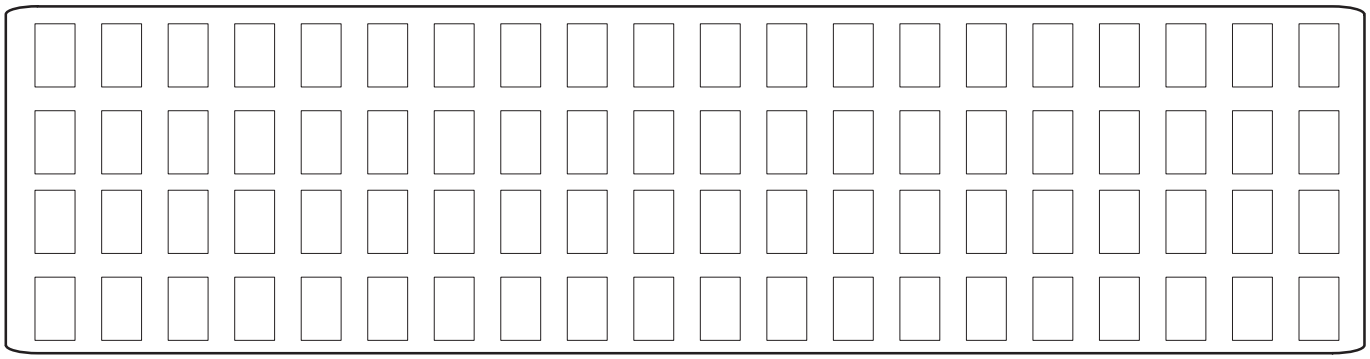
4 lines of 20 characters



Screen #_____



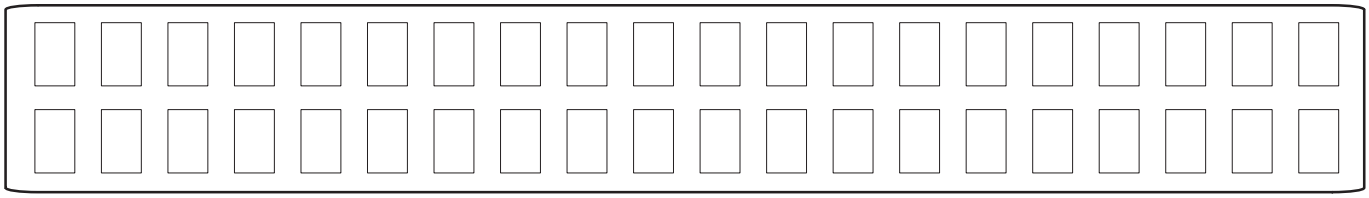
Screen #_____



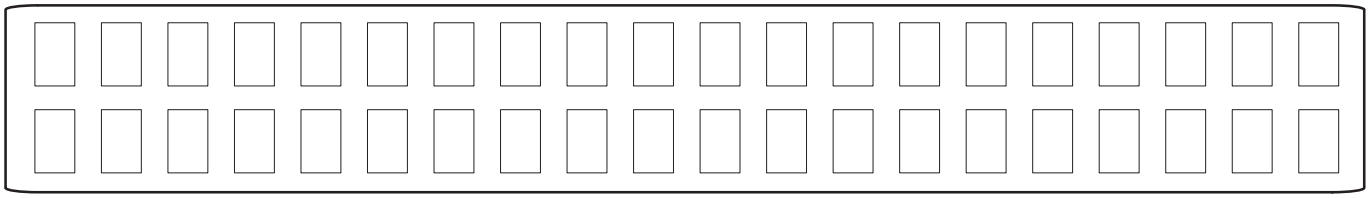
Screen #_____

DTAM Micro Screen Worksheet

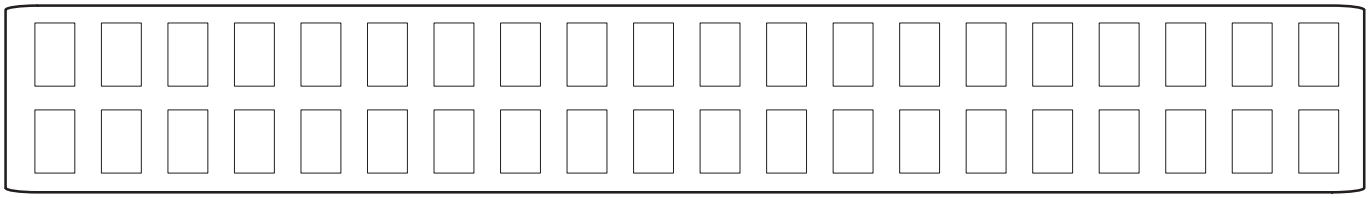
2 lines of 20 characters



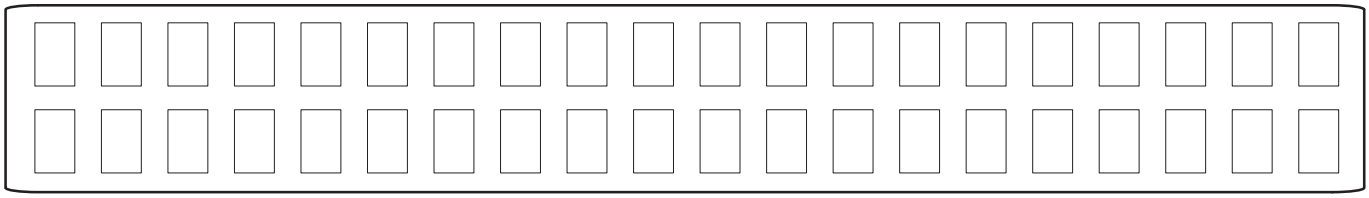
Screen #_____



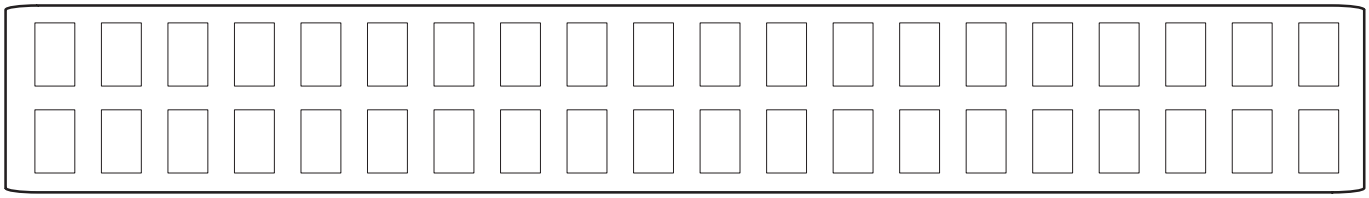
Screen #_____



Screen #_____



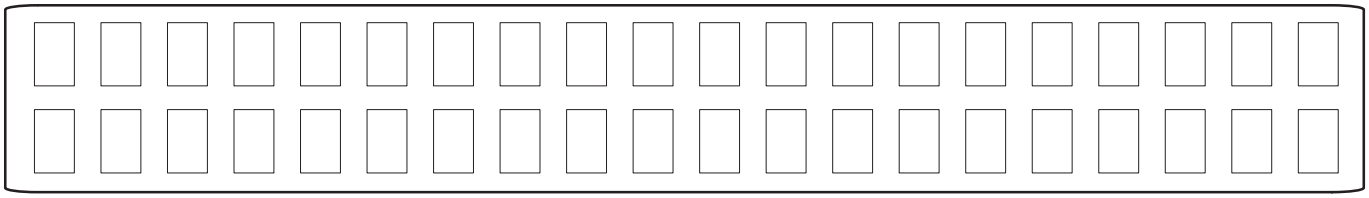
Screen #_____



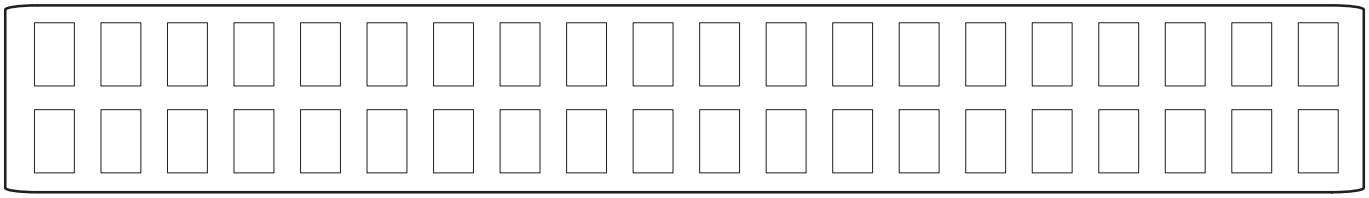
Screen #_____

DTAM Micro Screen Worksheet

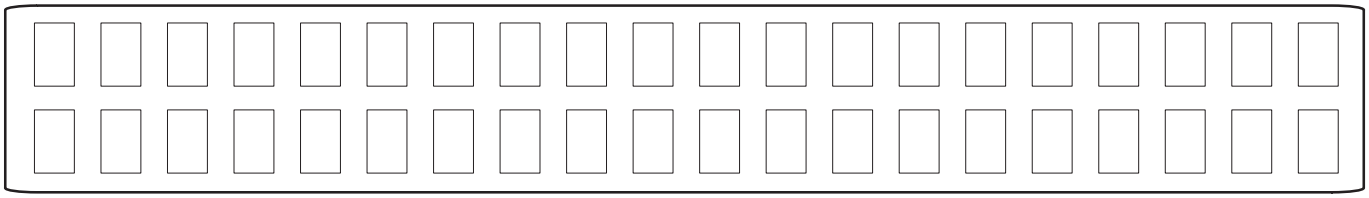
2 lines of 20 characters



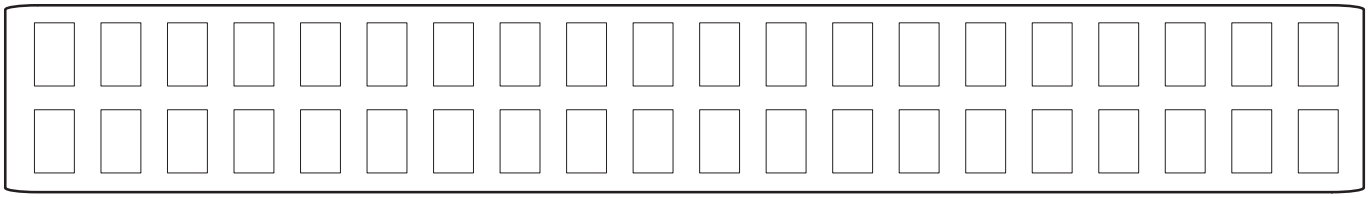
Screen #_____



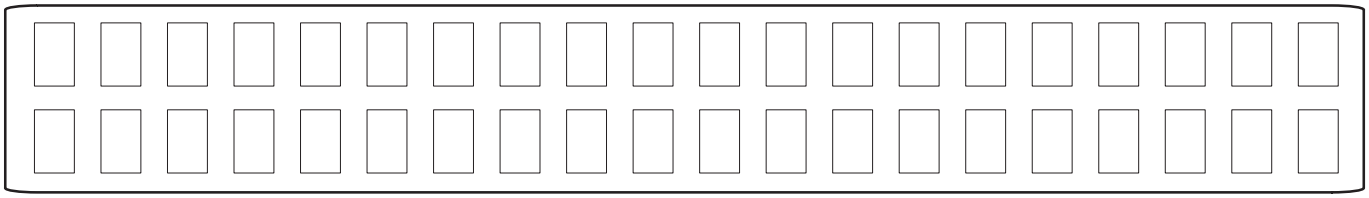
Screen #_____



Screen #_____



Screen #_____



Screen #_____

Appendix C

Using BASIC Module With An SLC

Overview

The BASIC module (Catalog No. 1746–BAS) provides another means of communicating with the SLC. This appendix describes the protocol used with the BASIC module.

Requirements

The following are required when operating the DTAM Plus with an SLC BASIC module. The DTAM Micro does not support communications with a BASIC module.

- The DTAM Plus supports 40 consecutive words (0-39) available at the DH-485 port.
- Only integer data is supported.

Note: Data throughput depends on the BASIC program residing in the BASIC module. In addition to the BASIC program, a ladder type program is required for the SLC processor.

Bit Manipulation

The SLC BASIC module does not support true bit formats/transfers. To support bit functions through the DTAM Plus, a BASIC program routine must be created to transfer complete words of data. This is commonly called masking. The DTAM Plus reads data from the BASIC module output file, masks the new value, and then sends the word data to the input file. The BASIC module program then 'calls' the data from this file, copies the data, and sends the data to the corresponding word in the BASIC module output file. The DTAM Plus then reads the data from the BASIC module output file.

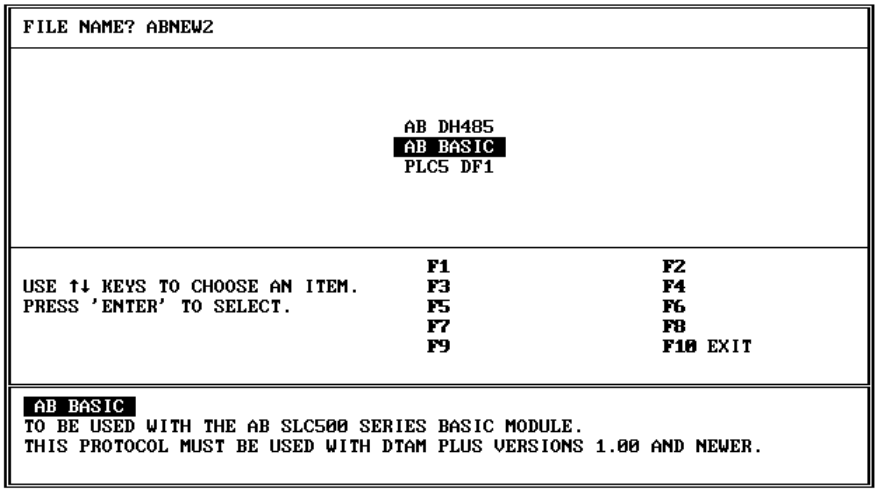
Point-Access/Display Function

The Point-Access/Display (P/AD) is limited in functionality when communicating with an SLC BASIC module:

- The P/AD function only operates with integer data.
- Special Functions are not supported.

Protocol Selection

The protocol used for an application is specified on the protocol selection screen.



This screen appears when you create a new application file. Specifying AB BASIC selects the protocol used with the SLC BASIC module.

Connections

The DTAM Plus User Manual illustrates the connection with an SLC BASIC module.

BASIC Programming References

Read the following publications prior creating a BASIC program for DTAM Plus applications.

- SLC500 BASIC Language Reference Manual (Catalog No. 1746-NM002)
- SLC500 BASIC Development Software (Catalog No. 1746-NM001)

Programming 'CALLS' for Data Transfers

The following tables list the types of data that can be transferred between a DTAM Plus and SLC using a BASIC module program. These 'CALLS' are instruction programs, that reside in the BASIC module, for transferring data.

Note: The call commands listed in this section pertain to the DTAM Plus, other call programs are described in the SLC500 BASIC Language Reference Manual.

BASIC Module Math Conversion Functions

The BASIC module stores all values as floating point numbers. You must convert these numbers to a signed 16 bit integer or 16 bit binary format before they can be transferred to the DTAM Plus. The system calls for converting floating point values is provided below:

Math Conversion Calls

CALL	Purpose
14	Converts 16 bit signed integer to BASIC floating point.
15	Converts 16 bit unsigned integer to BASIC floating point.
24	Converts BASIC floating point to a 16 bit signed integer.
25	Converts BASIC floating point to a 16 bit binary format.

SLC Backplane Interface

The BASIC module and SLC500 share a backplane interface that allows the transfer of data between these devices. The following data transfers can be done through the backplane:

I/O Image Table transfers (SLC500 and 5/01)

M0 and M1 transfers (SLC5/02 and 5/03 only)

I/O Image Transfers

Data in the SLC 500 and 5/01 processors input and output image tables must be transferred to the BASIC module I/O buffers for processing by the BASIC program. This transfer is accomplished using the calls listed below:

I/O Image Transfer Calls

CALL	Purpose
51	Checks the SLC processor output image buffer.
53	Transfers the eight words in the processor output image table to words 200 to 207 of the BASIC module input buffer.
54	Transfers words 200 to 207 of the BASIC module output buffer to the processor input image table.
55	Checks the SLC processor input image buffer.
120	Clears the BASIC module input and output buffers.

M0 and M1 File Transfers

Data in the SLC 5/02and 5/03 processor M0 and M1 files must be transferred to the BASIC module I/O buffers for processing by the BASIC program. This transfer is accomplished using the calls listed in the table below:

M0 and M1 Transfer Calls

CALL	Purpose
56	Transfers the words in the processor M0 file to words 100 to 163 of the BASIC module input buffer.
57	Transfers words 100 to 163 of the BASIC module output buffer to the processor M1 file.
58	Checks the status of the processor M0 file.
59	Checks the status of the processor M1 file.
120	Clears the BASIC module input and output buffers.

Interfacing BASIC Module with DH-485 Network

Data on the DH-485 network must be transferred to the BASIC module I/O buffers before processing by the BASIC module. Transfer of data is accomplished using the calls listed in the table below. These calls transfer data to the DH-485 interface file. The DTAM Plus reads or writes data into the interface file based upon the application program.

DH-485 Network Data Transfer Calls

CALL	Purpose
84	Transfers the data from the DH-485 interface file to words 0 to 39 of the BASIC module input buffer.
85	Transfers words 0 to 39 of the BASIC module output buffer to the DH-485 interface file.
86	Checks the remote write status of the DH-485 interface file.
87	Checks the remote read status of the DH-485 interface file.
90	Transfers data from a remote DH-485 data file to words 0 to 39 of the BASIC module input buffer.
91	Transfers words 0 to 39 of the BASIC module output buffer to a remote DH-485 data file.
92	Transfers data from a remote DH-485 interface file to words 0 to 39 of the BASIC module input buffer.
93	Transfers words 0 to 39 of the BASIC module output buffer to a remote DH-485 interface file.
120	Clears the BASIC module input and output buffers.

Appendix D

PLC-5 Mnemonics in DPS

The DTAM supports all PLC-5 mnemonics for logical addressing to the sub-element or bit level. The following table defines the default text for bit display fields when a bit display screen is specified.

Note: In DPS these fields can be edited and may contain any text up to 20 characters. Default text is only applicable to mnemonic bit sub-elements where there is a corresponding definition of the bit 0/1 state.

File Type	Bit Sub-Element	0 State Default Text	1 State Default Text
O (Output)	-		
I (Input)	-		
S (Status)	-		
B (Bit)	-		
T (Timer)	.EN		ENABLED
	.TT		TIMING
	.DN		DONE
C (Counter)	.CU		UP COUNTER
	.CD		DOWN COUNTER
	.DN		DONE
	.OV		OVERFLOW
	.UN		UNDERFLOW
R (Control)	.EN		ENABLED
	.ER		ERROR
	.DN		DONE
	.FD		FOUND
	.IN		INHIBIT
	.EM		EMPTY
	.EU		ENABLE UPLOAD
	.UL		UNLOAD
N (Integer)	-		

File Type	Bit Sub-Element	0 State Default Text	1 State Default Text
F (Float)	-		
A (ASCII)	-		
D (BCD)	-		
BT (Blk xfer)	.EN		ENABLED
	.ST		START
	.DN		DONE
	.ER		ERROR
	.CO		CONTINUE
	.EW		ENABLE WAITING
	.NR		NO RESPONSE
	.TO		TIME OUT
	.RW	WRITE	READ
MG (Msg)	.EN		ENABLED
	.ST		START
	.DN		DONE
	.ER		ERROR
	.CO		CONTINUE
	.EW		ENABLE WAITING
	.NR		NO RESPONSE
	.TO		TIME OUT
	.SD		SYNCHRONOUS DONE
	.SE		SYNCHRONOUS ERROR
PD (PID)	.EN		ENABLED
	.CT	SLAVE	MASTER
	.CL		CASCADE LOOP
	.PVT		PV TRACKING
	.DO	PV DERIVATIVE	ERROR DERIVATIVE
	.SWM	AUTO PID	SW MANUAL PID
	.CA	DIRECT	REVERSE
	.MO	AUTO PID CONTROL	MANUAL PID CONTROL
	.PE	INDEPENDENT	DEPENDENT
	.INI		INITIALIZED
	.SPOR	SP IN RANGE	SP OUT OF RANGE
	.OLL		OUTPUT LOW CLAMP
	.OLH		OUTPUT HIGH CLAMP
	.EWD	OUTSIDE DEADBAND	WITHIN DEADBAND

File Type	Bit Sub-Element	0 State Default Text	1 State Default Text
	.DVNA		ERROR EXCEEDS LOW
	.DVPA		ERROR EXCEEDS HIGH
	.PVLA		
	.PVHA		
SC (SFC sts)	.DN		DONE
	.SA		SCAN ACTIVE
	.FS		FIRST SCAN
	.LS		LAST SCAN
	.OV		TIMER OVERFLOW
	.ER		STEP ERROR
ST (ASCII Str)	.LEN .CHAR [1–81]		STEP ERROR

Appendix E

Data Formats

Data Formats

The data selected for a controller address must reflect the same format as the data actually stored in that address. This is the only way you can ensure that correct, consistent information is displayed.

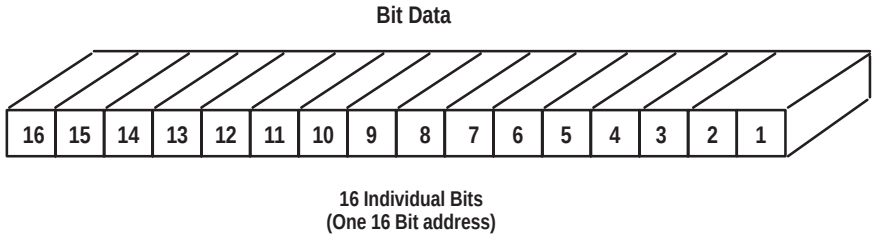
For example, selecting 16 Bit Signed Integer format for address N7:10 displays data one way and selecting 16 Bit BCD format for the same address displays data another way. It is important to understand each data format and its characteristics.

The following table illustrates all data formats supported by PLC and SLC controllers including the point types and ranges applicable to each format, and whether the scaling may be used.

Data Format	PLC Register Range	Scaling	User Input Range
Bit	0,1	No	0, 1, Y, N
16 Bit Signed Integer	-32,768 to +32,767	Yes	-32,768 to +32,767
16 Bit Unsigned Integer	0 to +65,535	Yes	-32,768 to +32,767
16 Bit BCD	0 to 9999	Yes	-32,768 to +32,767 ①
16 Bit Hex	0 to FFFF	No	NA
32 Bit Unsigned Integer	0 to +4,294,967,295	No	0 to +4,294,967,295
32 Bit BCD	0 to +99,999,999	No	0 to +99,999,999
32 Bit Hex	0 to FFFFFFFF	No	NA
ASCII	20 Characters, Max	No	NA
Floating Point ②	$\pm 1.175495E^{-38}$ to $\pm 3.402823E^{+38}$	Yes	$\pm 1.175495E^{-38}$ to $\pm 3.402823E^{+38}$

① 16 Bit BCD is 0-9999 on an SLC, but data can be scaled to -32,768 to +32, 768.
② Not available on SLC controllers.

Bit Format



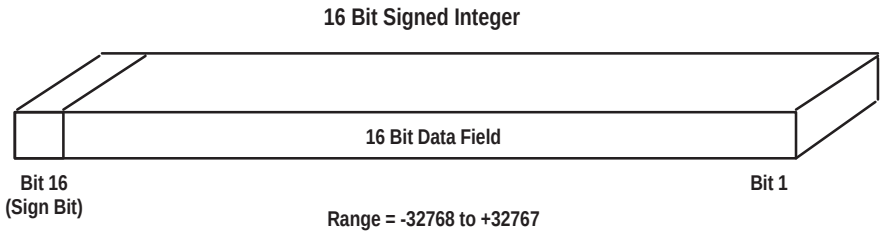
The controller stores a binary (0 or 1) status at each bit address. The DTAM Plus reads a PLC bit address and determines whether the operational status of the bit is ON (1) or OFF (0).

You can specify associated text to be displayed for either state of a specified bit. This description can be up to twenty characters.

For example, the OFF(0) state of a bit might display “Pump is OFF”, and the ON(1) state “Pump is ON”. DTAM Plus Programming Software allocates enough screen characters for the longest of the two text strings. In this example, 11 characters would be allocated to display “Pump is OFF”.

Note: The fewer the characters used, the less memory is required. In the example above, displaying “OFF” (given the appropriate context) conveys the same information in 3 characters as “Pump is OFF” does with 11 characters.

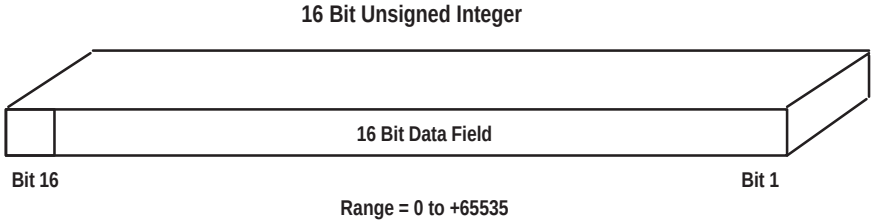
16 Bit Signed Integer



This data format displays a 16 bit register as a signed Integer (two’s complement) value. The 16th bit of the register is the sign bit and is set (1) for a negative and cleared (0) for a positive number.

Note: The 16 bit signed integer values have a range of -32768 to +32767. This data format may also be scaled to different engineering units.

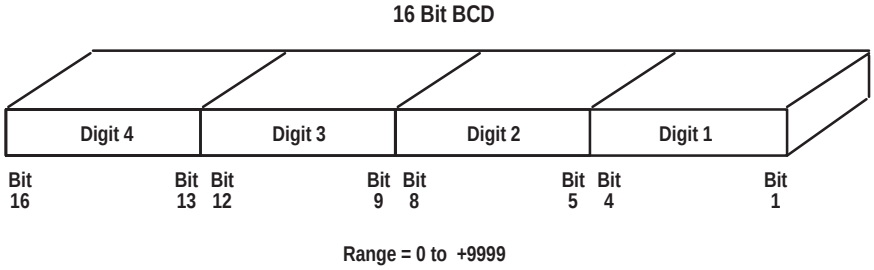
16 Bit Unsigned Integer



This data format displays a 16 bit register as an unsigned integer value.

Note: The 16 bit unsigned integer values have a range of 0 to +65,535. This data format may also be scaled to different engineering units.

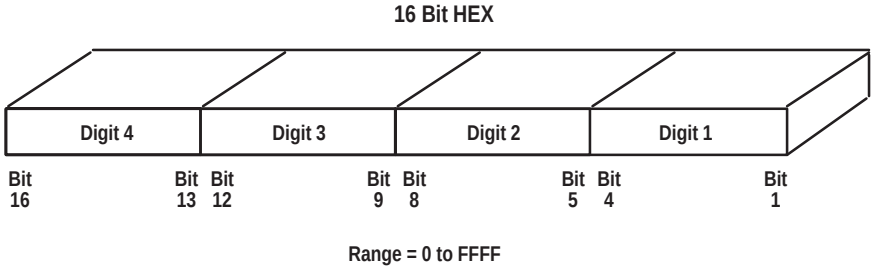
16 Bit BCD



This data format displays a 16 bit register address as a 4 digit Binary Coded Decimal value.

Note: The range for the 16 bit BCD selection is 0 to +9999. This data format may also be scaled to different engineering units.

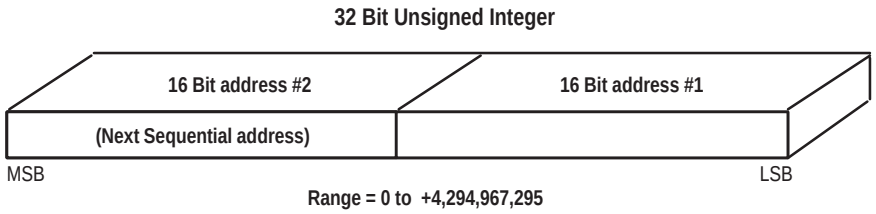
16 Bit HEX (Hexadecimal)



This data format displays a 16 bit register address as a 4 digit hexadecimal value. The range for this format is 0 to FFFF. The Hexadecimal number system is defined as a base of 16 (0-9 and the characters A, B, C, D, E, F).

Note: This data format can't be scaled to different engineering units. Use this format for display-only (non-entry) operations.

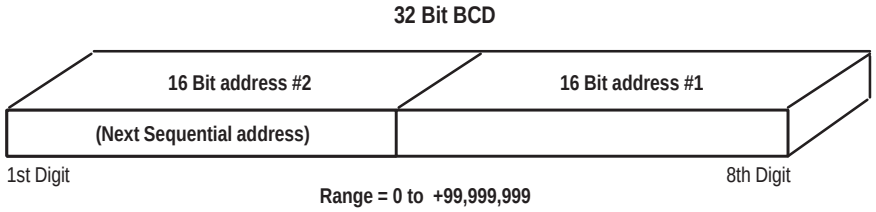
32 Bit Unsigned Integer



This data format displays two consecutive 16 bit register addresses as a 32 bit unsigned integer. It uses a memory register plus the next higher register to form the 32 bit address.

Note: The range for the 32 bit unsigned integer is 0 to +4,294,967,295. This format can't be scaled to different engineering units.

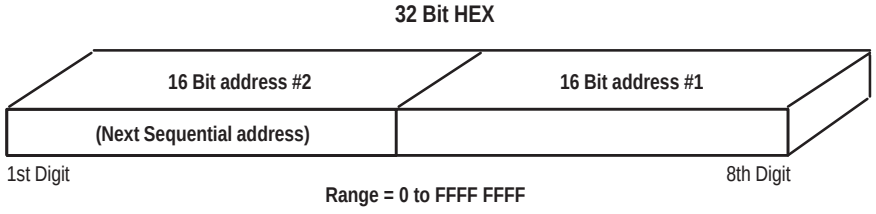
32 Bit BCD (Binary Coded Decimal)



This data format displays two consecutive 16 bit register addresses as a 32 bit BCD value. It uses a memory register plus the next higher register to form the 32 bit address.

Note: The range for the 32 bit BCD value is 0 to +99,999,999. This format may be scaled to different engineering units.

32 Bit HEX (Hexadecimal)

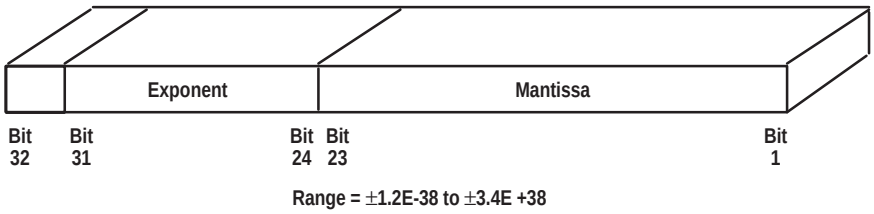


This data format displays two consecutive 16 bit register addresses as a 32 bit Hex value. It uses a memory register plus the next higher register to form the 32 bit address.

Note: The range for the 32 bit HEX value is 0 to FFFFFFFF. This format can't be scaled to different engineering units. Use this data format for display-only (non-entry) operations.

32 Bit Floating Point (PLC Controllers Only)

Floating Point
(Two Consecutive 16 Bit addresses)



Range = ±1.2E-38 to ±3.4E +38

This data format displays data located in two consecutive 16 bit addresses as a 32 bit floating point value. Floating points use a memory register plus the next higher register to form the 32 bit address. The range for the floating point value is $\pm 1.175495E^{-38}$ to $\pm 3.402823E^{+38}$.

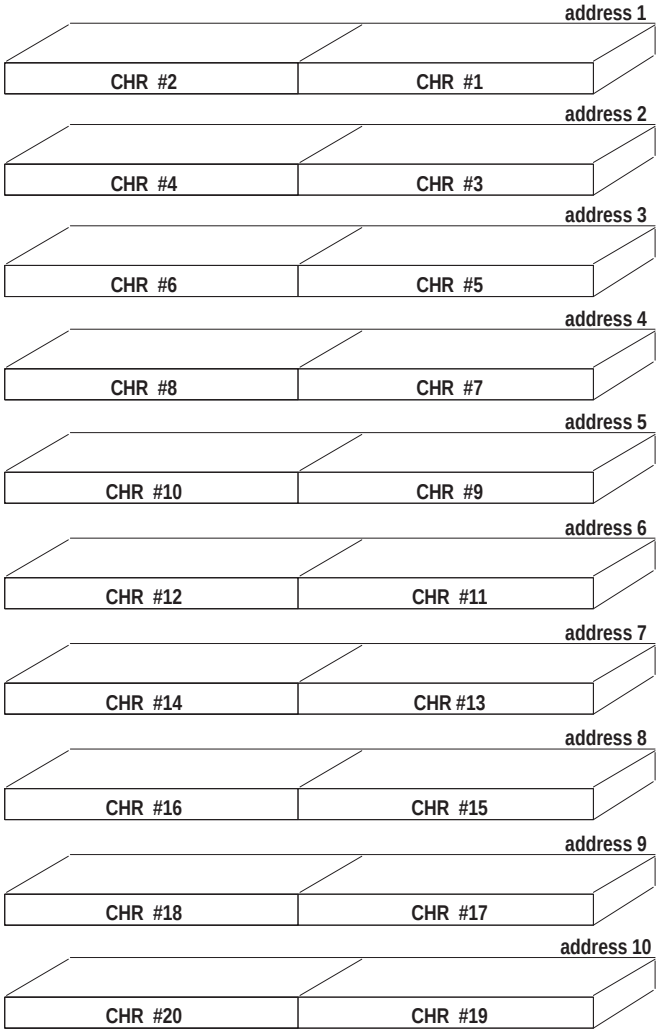
Note: The floating point format adheres to the ANSI/IEEE 754 standard. This data format may be scaled to different engineering units.

ASCII

ASCII data formats are fields up to 20 characters long. Each 16 bit address may contain two ASCII characters (1 byte each). The lowest byte of the base address stores the first character, the highest byte stores the second character, the first byte of the next sequential address stores the third character, and so on. The data held in this range of addresses is expected to be ASCII data.

Note: The ASCII data format is very useful for controller applications reading ASCII data resident in the controller that has been read by bar code readers or data collection terminals.

ASCII Data Field
Maximum 20 Characters - Ten 16 Bit addresses



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