JOHNSON
CONTROLS

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Chapter 1

Introduction to the GX-9100 Software Configuration Tool

Introduction

The GX-9100 Graphic Configuration Software Tool (GX Tool) is used to configure the DX series of extended digital plant controllers, the XT-9100 and XTM-905 extension modules, and the DX Liquid Crystal Display (LCD) Display unit. The GX Tool is part of the M-Tool suite of programming tools.

This user's guide describes the procedures necessary to configure a DX controller (Chapters 3-11) and a DX LCD Display (Chapters 12-16).

This chapter describes:

- GX Tool

- DX controller

- extension modules

- DX LCD Display

- related information

For system requirements and software installation details, refer to the *Metasys® Installation and Platform Requirements Technical Bulletin (LIT-12012).*

Key Concepts

GX Tool

The GX Tool allows you to define job information, global data, input/output and programmable modules, trend logs, and PLC diagrams to configure the DX controller and its XT/XTM extension modules. The GX Tool allows you to define a Point Database for the DX LCD Display.

The GX Tool is used to download configurations to the DX controller and to download data to the DX LCD Display unit (DT-9100).

DX Controller

The DX-9100 is a digital control solution for multiple chiller or boiler plant control applications, for the Heating, Ventilating, and Air Conditioning (HVAC) process of Air Handling Units (AHUs) or for distributed lighting and related electrical equipment control applications. It provides precise direct digital control as well as programmed logic control.

In a standalone configuration, the DX-9100 controller has both the hardware and software flexibility to adapt to the variety of control processes found in its targeted applications. The controller's input and output can communicate with Input/Output (I/O) extension modules on an extension bus and can monitor and control all connected points via its built-in Light-Emitting Diode (LED) display.

The DX controller is available in three versions, Versions 1.x and 2.x for the N2 Bus and Version 3.x for the LONWORKS® network and has eight analog inputs, eight digital inputs and six digital outputs. Version 1 controller has two analog outputs (not available in North America) and Versions 2 and 3 have eight analog outputs. For details, see the *DX-9100 Extended Digital Controller Technical Bulletin (LIT-6364020).*

Extension Modules

The DX controller input/output can be extended by up to 64 remote input/outputs, analog or digital, depending on the type of connected XT-9100 or XTM-905 extension module configuration.

The XTM-905 extension module with an XP expansion module provides either eight analog points or eight digital points. An XT/XTM can be expanded to provide eight additional points in one physical configuration by connecting two to four XP modules to the XT/XTM module.

DX LCD Display

The DX LCD Display unit is a person/controller interface used with the DX-9100 series of controllers. The display can act as a simple adjust and indication unit or be used for more complex tasks often associated with a workstation. The display is designed for the maintenance person who needs a straightforward way to monitor and adjust points in a controller without being limited in capability.

The display can be used as either a portable, hand-held unit for use with more than one controller, or it can be permanently mounted on the wall, on a Universal Packaging Module (UPM) or in a panel as an integral part of the controller application.

Related Information

See the documents in Table 1-1 for more information.

Table 1-1: Related Information

Document	Code Number
DX LCD Display User's Guide	
DX LCD Display Technical Bulletin	*LIT-16284120*
DX-9100 Extended Digital Controller Technical Bulletin	*LIT-6364020*
DX-9100 Configuration Guide	*LIT-6364030*
DX-9200 LONWORKS Compatible Digital Controller Technical Bulletin	*LIT-1162250*
DX Commissioning Using the Point Template Program User's Guide	*LIT-6364080* *LIT-1628480*
XT-9100 Technical Bulletin	*LIT-6364040* *LIT-1628440*
XT-9100 Configuration Guide	*LIT-6364050* *LIT-1628450*
LONWORKS Network Layout Technical Bulletin	*LIT-1162150*
LONWORKS N2E Bus Technical Bulletin	*LIT-6364100*
M-Tool Overview and Installation Technical Bulletin	*LIT-693100*
Metasys Installation and Platform Requirements Technical Bulletin	*LIT-12012*

Chapter 2

Software Details and Hardware Connections

Introduction

This chapter describes the tasks you perform before using the GX Tool.

This chapter describes:

- software details
- connection to the DX controller
- connection to the DX LCD Display

This chapter describes how to:

- switch languages and program defaults

Key Concepts

Software Details

Refer to the *M-Tool Overview and Installation Technical Bulletin (LIT-693100)* for software installation details.

The installation procedure automatically creates or modifies an initialization file named GX9100.INI. It also sets up the program group, called Configuration Tools, and the icons needed for running the GX Tool.

Default Language

The language file set installed determines the default temperature units, frequency, and language. You can switch the language file set without reinstalling the GX Tool.

See *Switching Languages and Program Defaults* in this chapter.

GX9100.INI File Features

Table 2-1 lists the features you can change or enable by adding lines the GX9100.INI file using a standard text editor. For example, Figure 2-2 shows update firmware disabled.
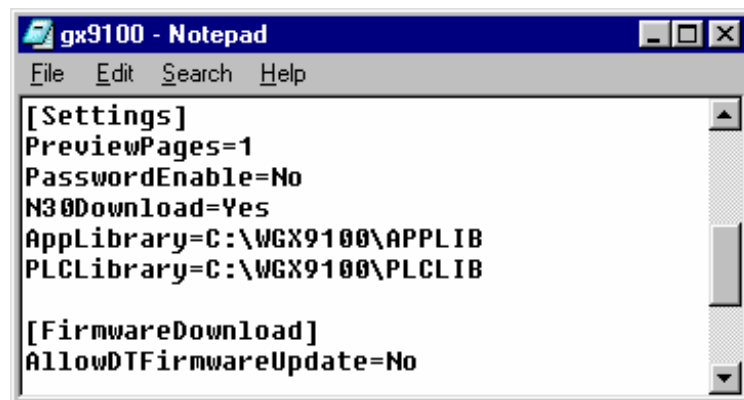
Figure 2-1: Update Firmware Disabled

Figure 2-2 shows update firmware enabled. The GX-9100.INI file is located in the Windows® directory.
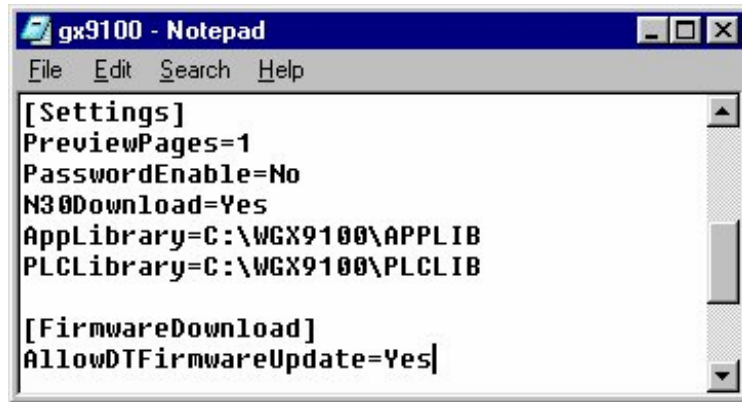
Figure 2-2: Update Firmware Enabled

Table 2-1: GX-9100 Initialization File Features

Feature	Section	Add the Lines	Notes
Password Protection	[Settings]*	PasswordEnable=Yes	The Y must be uppercase. ⚠ Caution: Once the password feature is enabled, you cannot access the controller if the password is lost.
Default Controller	[Settings]*	DefaultControllerVersion= <version number>	Valid entries for the <version number> are: 1.1, 1.2, 1.3, 1.4, 2.0, 2.2, 2.4, 3.0, 3.1, 3.2, 3.3, and 3.4. The version controller will default to 2.4 if the version number is missing or incorrect.
Firmware Update	[Firmware Download]	AllowDTFirmwareUpdate=Yes	
Download and Upload via N30	[Settings]*	N30Download=Yes N30Executable=<path of the LoaderUI.exe program>	The full path in M-Tool is: C:\Program Files\Johnson Controls\System ToolsLoaderui.exe.
Default Directory	[Settings]*	AppLibrary=<path of Application Library directory> PLCLibrary=<path of PLC Library directory>	The path to the first save action is written to the [Settings] section of GX9100.INI.

* If the [Settings] section is not present, add it using square brackets

Connection to the DX Controller

Refer to the *Controller Access Technical Bulletin (LIT-6364013)* or the *DX-9200 LONWORKS Compatible Digital Controller Technical Bulletin (LIT-1162250)* for detailed information about connecting the GX Tool Personal Computer (PC) to a DX controller.

Use the IU-9100 or CVTPRO to connect a PC to the DX-9100's N2 Bus (Bus 91) (Figure 2-3) while the controller is disconnected from the supervisory network.

With this configuration, you can download DX-9100 modules (with connected extension modules) one after the other by entering the appropriate controller address at the GX Tool PC. The appropriate cables are supplied with the IU-9100 converter and CVTPRO units.

Notes: MM-CVT101 is not compatible with Windows NT® software. If you are using Windows NT software, download directly via the RS-232 port (Figure 2-4), or upgrade to CVTPRO.

For connection details when using CVTPRO, refer to *Auxiliary Gear Technical Bulletin (LIT-6363080).*
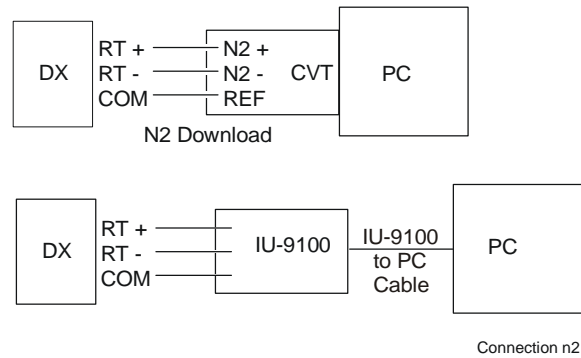
Figure 2-3: Connecting an N2 Bus to a DX Controller
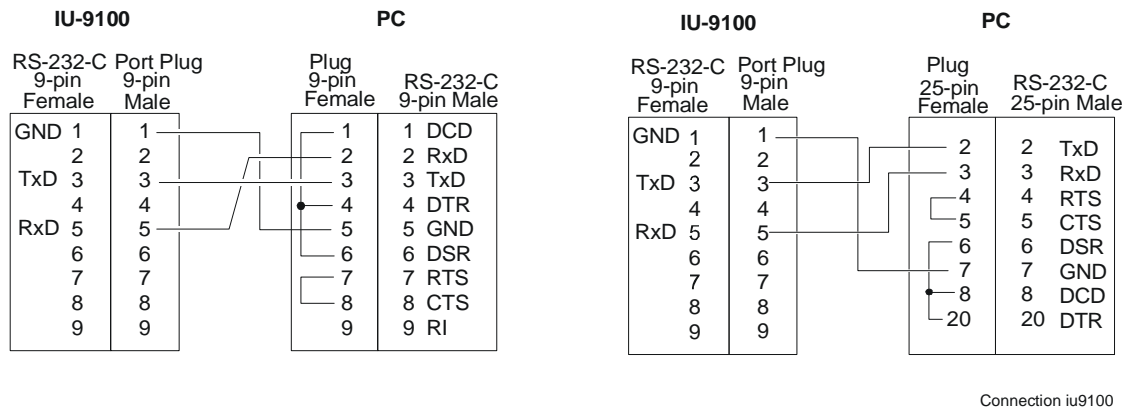
Figure 2-4: PC to IU-9100 Cabling Details

Download the DX-9100 Version 2 or the DX-912x/DX-9200 Version 3 controller, with its connected XT-9100 and XTM-905 modules directly via its RS-232 port (Figure 2-5). With this configuration, only one DX controller and its XT/XTMs can be downloaded.

Note: If you have a LONWORKS DX-912x/DX-9200 (Version 3.x), you cannot download via the LONWORKS trunk from the GX Tool. The only way to download the DX-9200 is via the RS-232 port on the controller. The DX-912x may also be downloaded through a Metasys Operator Workstation (OWS).
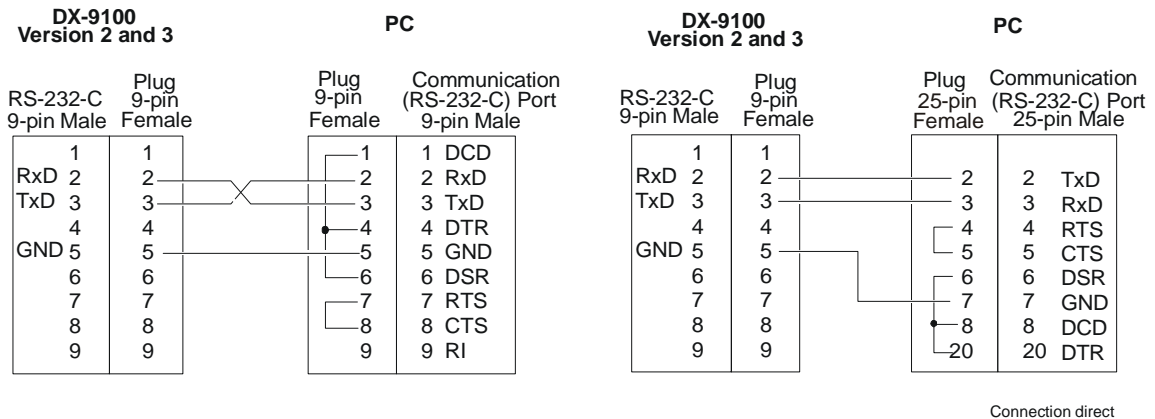
Figure 2-5: Directly Connecting a PC to a DX Controller (Version 2 or 3)

Connection to the DX LCD Display

Configurations download from the personal computer to the DX LCD Display unit via the serial cable provided with the DX LCD Display. The 9-pin female plug labeled DX/PC connects to the COM1 or COM2 serial port of the PC. The other end of the cable is a phone connector and plugs into the phone jack (labeled RS232 INPUT) on the DX LCD Display (Figure 2-6).

Note: Before connecting the serial cable to the PC, power up the DX LCD Display and wait for the Download/Upload screen to appear.
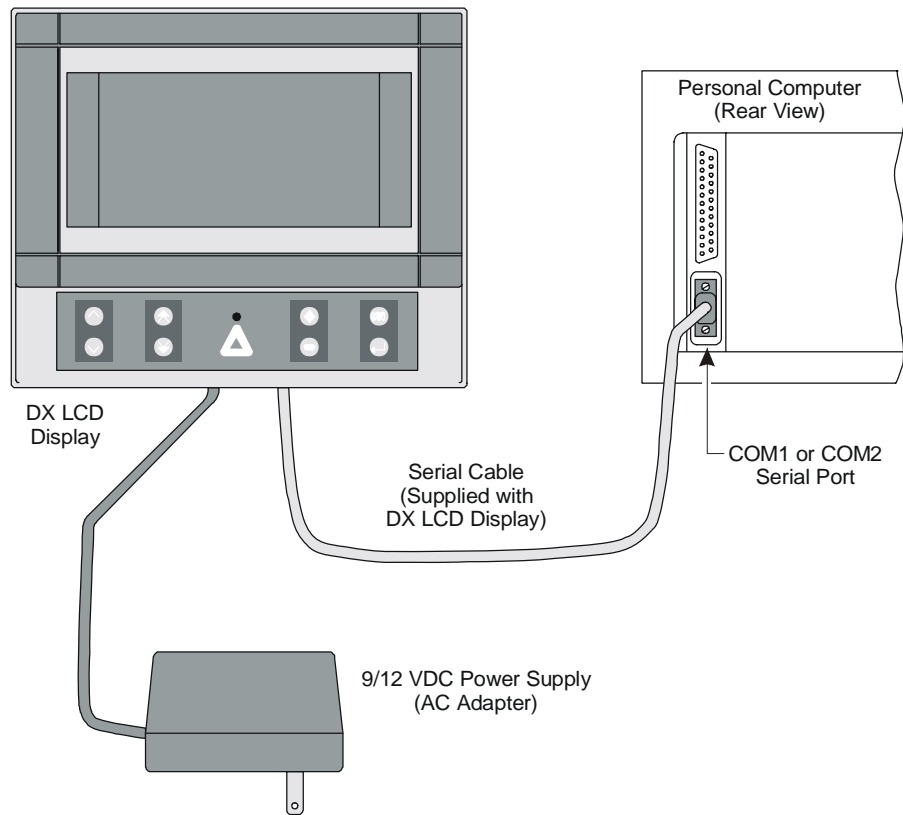
Figure 2-6: Connecting the DX LCD Display to the Serial Port

Detailed Procedures

Switching Languages and Program Defaults

To switch languages and program defaults:

1. Copy the file GXRES.* to GXRES70.DLL

2. Copy the file DXMISC.* to DXMISC.LNG

3. Copy the file DXTEXT.* to DXTEXT.LNG

Note: The * indicates the file extension by the first three letters of
          the language/defaults.
          For example: GXRES.FRE for French.

Chapter 3

Getting Started with the GX Tool and the DX Controller

Introduction

This chapter describes tasks you perform when beginning to use the GX Tool. It describes the GX Tool user interface and outlines the steps necessary to configure a DX controller.

This chapter describes how to:

- start the GX Tool
- define job information
- define the global data

Key Concepts

DX Controller Configuration Process

The first use of the GX Tool is to create a configuration for a DX controller. Figure 3-1 shows the process for configuring a DX controller.

Start the GX Tool.

↓

Choose which version DX to configure.

↓

Define job information.

↓

Define Global Data.

↓

Define Analog Inputs and Digital Outputs.

↓

Define Analog Outputs and Digital Inputs.

↓

Define XT, XTM, and XP modules.

↓

Define network inputs and outputs (Version 3 only).

↓

Define programmable modules.

↓

Define PLC modules.

↓

Make connections.

↓

Define trend log module.

↓

Save the configuration.

↓

Download the configuration.

Figure 3-1: DX Configuration Process

Main Screen

Figure 3-2 shows the GX Tool's main screen. Table 3-1 describes the callouts.
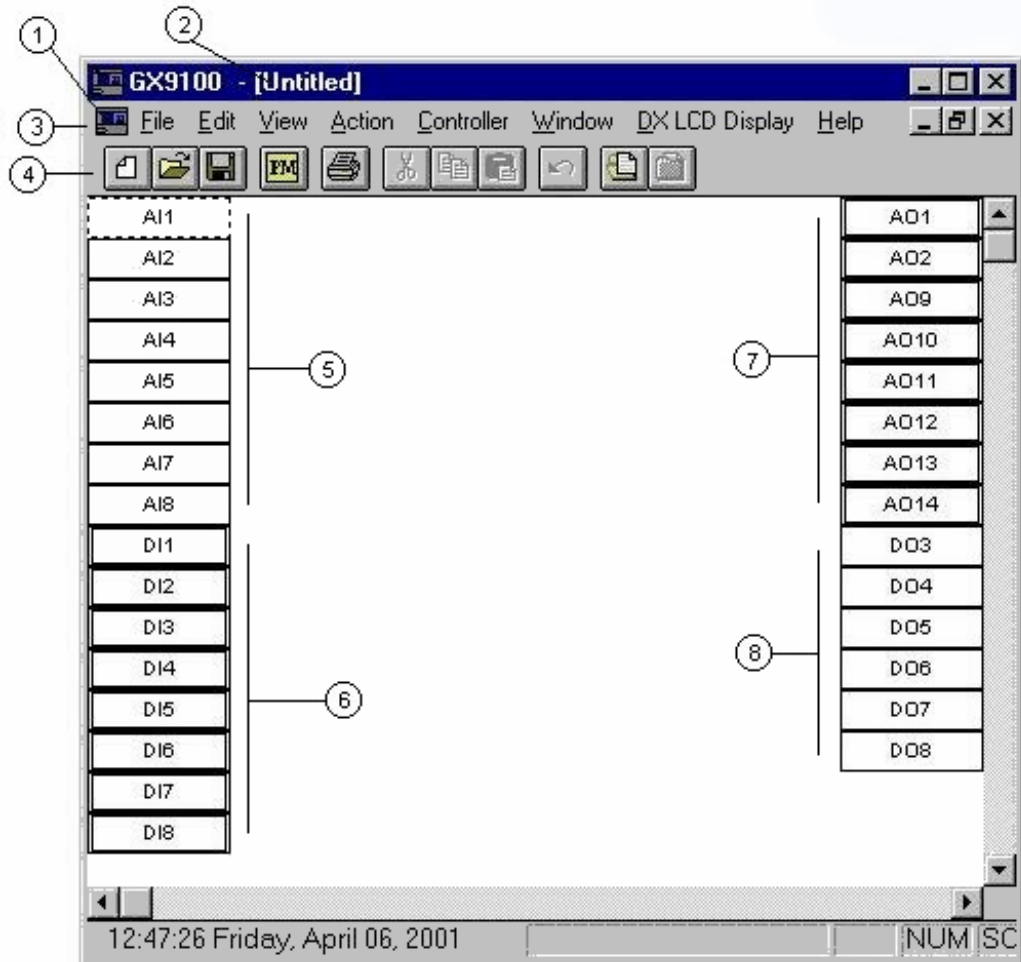
Figure 3-2: Main Screen for a DX Version 2.x or 3.x

Table 3-1: GX Tool Main Screen Callouts

Callout	Name	Description
1	System Menu Box	Provides access to the system menu.
2	Title Bar	Displays the name of the currently open configuration.
3	Menu Bar	Provides access to the eight main menu items.
4	Tool Bar	Provides one button access to commonly used tools.
5	Analog Inputs	Provides eight analog inputs.
6	Digital Inputs	Provides eight digital inputs.
7	Analog Outputs	Provides eight analog outputs.
8	Digital Outputs	Provides eight digital outputs.

Menus

System Menu

Table 3-2 lists System menu options.

Table 3-2: System Menu Options

Menu Option	Description
Restore	Sizes active configuration window to the last size before it was minimized or maximized.
Move	Moves active configuration window.
Size	Resizes active configuration window. Adjust height by clicking and dragging title bar. Adjust width by clicking and dragging scroll bar.
Minimize	Minimizes active configuration window.
Maximize	Maximizes active configuration window.
Close	Closes active configuration window.
Next	Toggles between configuration windows.

File Menu

Table 3-3 lists File menu options.

Table 3-3: File Menu Options

Menu Option	Description
New	Opens a new configuration file.
Open	Opens an existing configuration file.
Import	Imports files generated by the DOS GX Tool, Version 2, into the GX Tool.
Save	Saves the current configuration as a .DXS file.
Save As	Saves a copy of the current configuration under a different name.
Print	Prints the current configuration.
Print Preview	Displays the current configuration as it will print on the page.
Print Setup	Sets print parameters, including default printer, portrait or landscape, paper size and source, and page range.
Header/Footer	Sets up user defined headers.
Read User Names	Reads the contents of an existing Tag name ASCII file into a GX Tool configuration and modifies the configuration Tag names.
Write User Names	Creates a Tag name ASCII file from an existing GX Tool configuration and saves it to disk.
Open from Library	Transfers a file from the application library or PLC library to the clipboard.
Save to Library	Saves the selected set of modules in a configuration to the application library, or saves the selected logic blocks in a PLC page to the PLC library.
DDL File Options	Defines the items written to the DDL files when the configuration is saved.
Exit	Terminates the GX Tool.

Edit Menu

Table 3-4 lists Edit menu options.

Table 3-4: Edit Menu Options

Menu Option	Description
Undo	Cancels the last action of cut or paste.
Cut	Removes selected modules or logic blocks and copies them to the clipboard.
Copy	Copies selected modules or logic blocks to the clipboard.
Paste	Pastes the set of modules or logic blocks from the clipboard.
Add PM	Opens a submenu to add one of several types of programmable modules to the configuration.
Configure	Opens a submenu to configure the highlighted module.
Delete	Deletes the selected module. For hardware I/O modules, only the configuration is deleted and the module remains on the screen.
Data	Opens a data screen with information about the selected module.
Change Module Number	Changes the module number of the highlighted module.
Global Data	Edits information that affects the whole configuration, including temperature units, frequency, initialization on power up, counter type, daylight saving start and end date, password, and the user configuration code.
Add Alarm Disable	Adds an alarm disable function block to the configuration.
Connect	Connects source and destination points.
Disconnect	Disconnects previously made connections.
Calibration	Calibrates analog input and outputs, and trims the accuracy of the realtime clock.
Job Information	Defines information pertaining to the configuration, such as job name, controller name, engineer, and branch.

View Menu

Table 3-5 lists View menu options.

Table 3-5: View Menu Options

Menu Option	Description
Show Selected	Changes the view to show only the modules currently selected and the connections between these modules. To select multiple modules, hold down CTRL while clicking.
Show All	Returns the view to show every module in the configuration.
Show User Names	Displays user defined modules names. Undefined modules display Tag names.
Show Tag Names	Displays the predefined Tag names for all modules.
Show Connections	Shows all connections to the currently selected module.
Trace	Creates a graphical trace of all modules connected to a selected module for easy tracing of a path, without showing lines to and from other modules.
Snap to Grid	Allows snapping boxes to a grid, for easier alignment.

Action Menu

Table 3-6 lists Action menu items.

Table 3-6: Action Menu Options

Menu Option	Description
Upload	Uploads a configuration from a DX controller.
Download	Downloads a configuration to a DX controller.
Upload via N30	Uploads a configuration from a DX controller to the PC via an N30 Supervisory Controller. Only appears if enabled in the GX9100.INI file.
Download via N30	Downloads a configuration to a DX controller from the PC via an N30. Only appears if enabled in the GX9100.INI file.

Controller Menu

Table 3-7 lists Controller menu options.

Table 3-7: Controller Menu Options

Menu Option	Description
DX Version 1.1, 1.2, 1.3	Enables Versions 1.1, 1.2, and 1.3 of the DX-9100 controller
DX Version 1.4	Enables Version 1.4 of the DX-9100 controller (supports Trend)
DX Version 2.0, 2.1, 2.2	Enables Versions 2.0, 2.1, and 2.2 of the DX-9100 controller
DX Version 2.3, 2.4	Enables Version 2.4 of the DX-9100 controller (supports Trend)
DX Version 3.0, 3.1, 3.2	Enables Versions 3.0, 3.1, and 3.2 of the DX-912x LONWORKS compatible controller
DX Version 3.3, 3.4	Enables Version 3.4 of the DX-912x and DX-9200 LONWORKS compatible controllers (supports Trend)

Window Menu

Table 3-8 lists Window menu options.

Table 3-8: Window Menu Options

Menu Option	Description
Cascade	Arranges multiple configurations on the screen in overlapping stair-stepped windows.
Tile	Arranges multiple configurations into equally sized windows that fill the screen but do not overlap.
Arrange	Arranges icons and windows on the screen.

DX LCD Display Menu

Table 3-9 lists the DX LCD Display menu options.

Table 3-9: DX LCD Display Menu Options

Menu Option	Description
Firmware Version	Selects firmware Version 2.01 or Version 3.00 or higher.
Global Data	Edits global data that affects the operation of the display, such as the time-out period of the LCD backlight.
Configuration Name	Edits the configuration name.
Define Default Configuration	Defines the default DX LCD Display configuration used by the DX LCD Display in the event that the stored configuration does not match the DX controller configuration.
Point Database	Opens a new window to define the points shown on the DX LCD Display.
TSn/OSn Description Text	Opens a new window to edit the descriptions for Time Schedule modules and Optimal Start/Stop modules.
Define Trend Data	Opens a new window to define the trend data shown on the DX LCD Display.
Download Display	Downloads the current configuration to the display unit.
Read User Configuration Codes	Reads the configuration codes, names, Home Page data, and trend definitions of all of the configurations currently stored in the DX LCD Display.
Upload Display	Uploads a configuration from the display unit to the GX Tool on the PC.
Update Firmware	Updates Version 3.00 and higher firmware. Only appears if enabled in the GX9100.INI file.

Help Menu

Table 3-10 lists Help menu options.

Table 3-10: Help Menu Options

Menu Option	Description
GX9100 Help Topics	Launches Help window with an index of GX Tool topics.
Help Using	Launches a window containing help topics for Microsoft® Windows Help.
About	Displays copyright and version information for the GX Tool.

Toolbar

Table 3-11 describes Toolbar buttons and functions.

Table 3-11: Toolbar Buttons

Toolbar Button	Menu Bar Equivalent	Description
	File > New	Opens a new configuration file.
	File > Open	Opens an existing configuration file.
	File > Save	Saves the current configuration.
	Edit > Add PM	Opens a submenu to add one of several types of programmable modules to the configuration.
	File > Print	Prints the current configuration.
	Edit > Cut	Removes selected modules or logic blocks and copies them to the clipboard.
	Edit > Copy	Copies selected modules or logic blocks to the clipboard.
	Edit > Paste	Pastes the set of modules or logic blocks from the clipboard.
	Edit > Undo	Cancels the last action of cut or paste.
	File > Open from Library	Transfers a file from the application library or PLC library to the clipboard.
	File > Save to Library	Saves the selected set of modules in a configuration to the application library, or saves the selected logic blocks in a PLC page to the PLC library.

Detailed Procedures

Starting the GX Tool

To start the GX Tool:

1. On the Windows Start menu, click Programs > Johnson Controls > M-Tool > Configuration Tools > GX-9100. The GX Tool main screen appears (Figure 3-3).

2. On the Controller menu, click the controller version you want to configure.
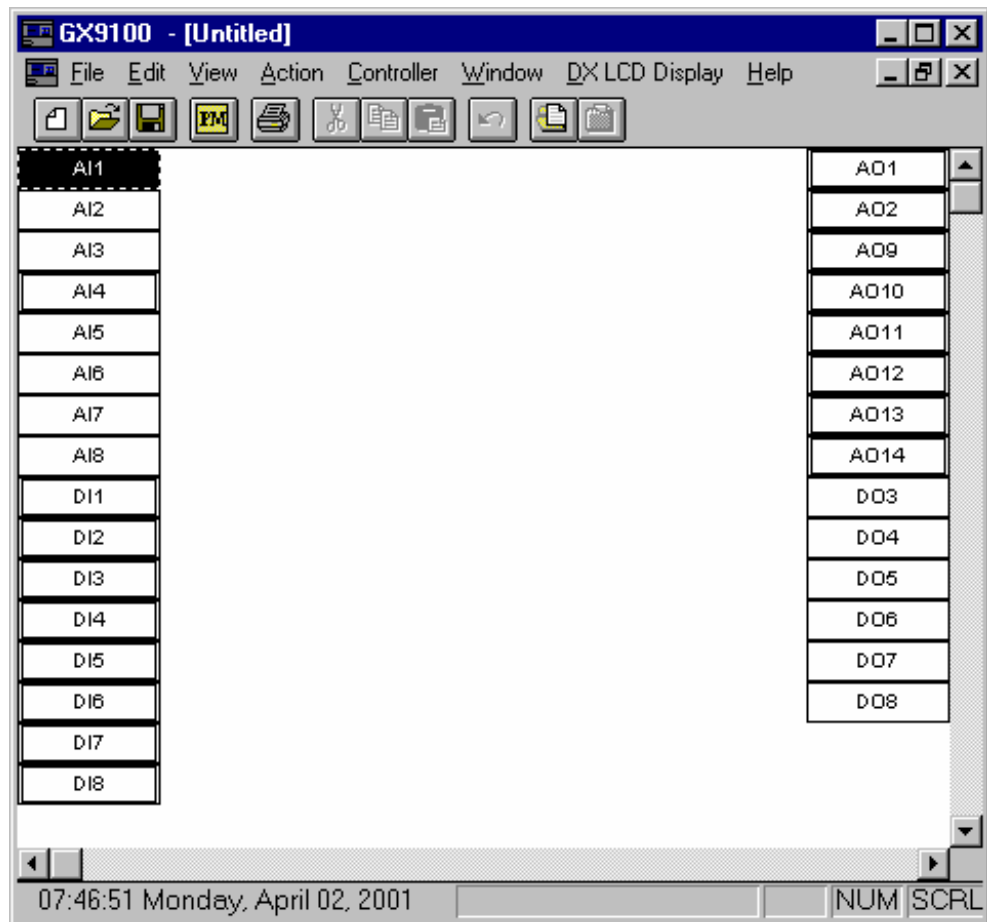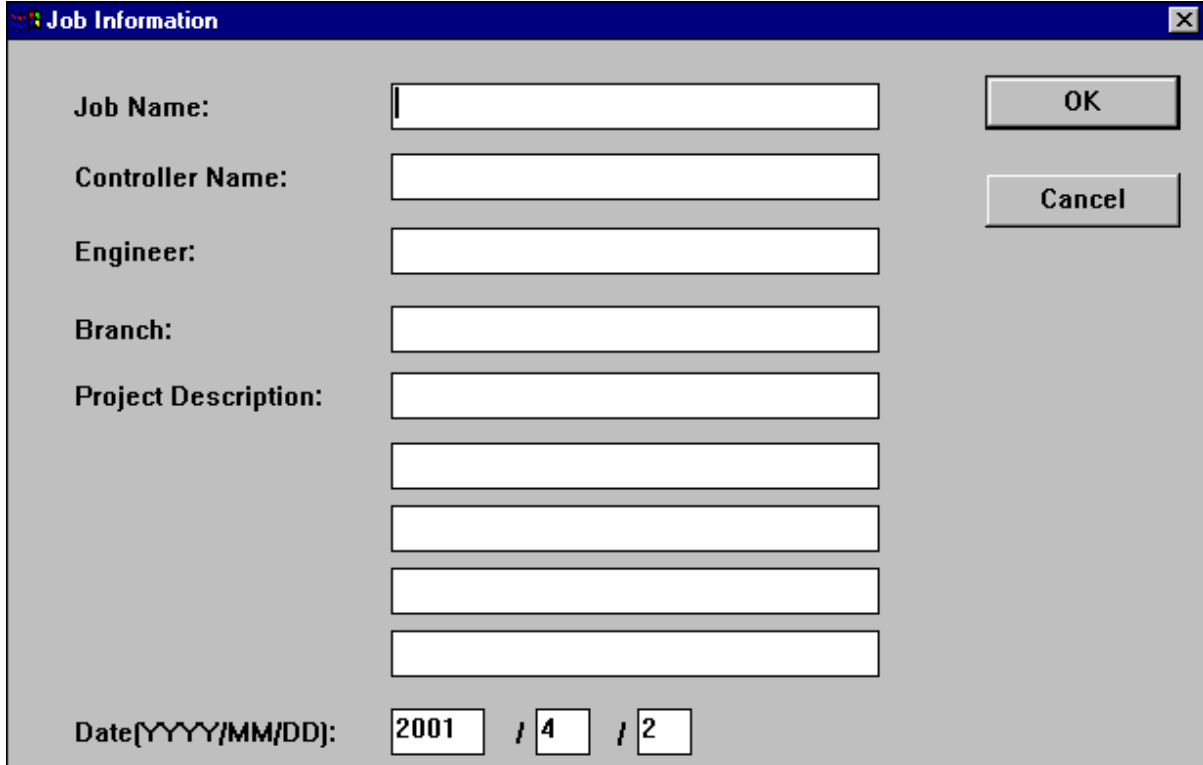
Figure 3-3: GX Tool Main Screen

Defining Job Information

To define job information:

1. On the Edit menu, click Job Information. The Job Information dialog box appears (Figure 3-4).

Figure 3-4: Job Information Dialog Box

2. Complete the data fields.

3. Click OK to save and close the dialog box.

Defining the Global Data

To define the global data:

1. On the Edit menu, click Global Data. The Edit Global Data dialog box appears (Figure 3-5).

Figure 3-5: Edit Global Data Dialog Box

2. Fill in data fields Table 3-12.

> ⚠ CAUTION: Once the Password feature is enabled, you cannot access the controller if the password is lost.
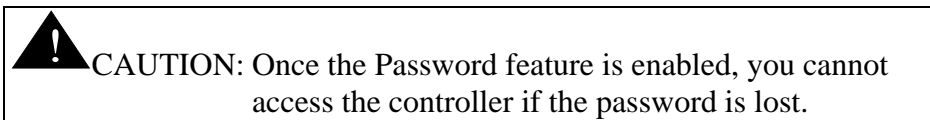
3. Click OK.

Table 3-12: Edit Global Data Fields

Field	Description
Temperature Units	Select Celsius or Fahrenheit.
Frequency	Select current frequency as 50 or 60 Hz.
Init On Power Up	Select Initialize on Power Up.
Counter Type	Select Counter Type as 15 bit or 4 byte.
DL Saving Start Date (MM/DD)	Enter month and day daylight saving time begins.
DL Saving End Date (MM/DD)	Enter month and day daylight saving time ends.
Password*	Enter 4-digit password. Enter 0000 to disable the password.
User Config Code	Enter User Configuration Code between 0 and 9999. This number identifies the configuration being edited and downloaded.

* If the Password field is unavailable, password protection is disabled.

Notes: The User Configuration Code identifies the configuration being edited and is downloaded to the controller and displayed on the front panel of the DX controller at startup (Version 1.1 or later). (The GX Tool accepts numbers up to 65535, but only numbers up to 9999 display correctly on the DX front panel.) The User Configuration Code is also used by the DX LCD Display unit to identify the configuration, so it displays the correct screens.

The password protects a configuration loaded into a controller. Once the password is downloaded into the controller along with the configuration, the controller only allows another download or upload when the same password is entered. Enter a 0000 as the password to disable the password function.

The Password field is unavailable and cannot be edited if the Password feature has not been enabled in the GX9100.INI file (see the *Software Details and Hardware Connections* chapter of this guide).

Chapter 4

Defining Inputs, Outputs, and Programmable Modules

Introduction

The GX Tool configures the DX controller using 12 multi-purpose programmable modules, the Programmable Logic Controller (PLC), Time Schedule modules, and Optimal Start/Stop modules.

This chapter describes how to:

- configure inputs and outputs

- delete modules

- add programmable and extension modules

- define a user name

- define input, output, and programmable module data

- name a connection point

- calibrate analog inputs and outputs

Key Concepts

User Names

Each I/O point, connection source point, destination point, and programmable module has a predetermined Tag name (e.g., TS1). You can define an 8-character User Name to identify the function of each point and programmable module in the configured application. You can also enter a 24-character description for the data window.

I/O Modules

Configure an Analog Input (AI) as active or passive and configure a Digital Output (DO) as P.A.T., D.A.T. On/Off, Sta/Sto, or Pulse before defining a user name.

Note: Configure all digital outputs as On/Off or Pulse even if they are not used. The exceptions are the 4-output relay modules (XP-9107 and XPE-4x4, x=4, 5, 6,or 7). When only one 4-output module is installed, select 8DO, but only configure DO1-DO4. When two 4-output modules are installed, configure both as one 8DO module, and configure DO1-DO8.

IMPORTANT: Configure XPM-4x1, XPL-4x1, and XPE-4x1 modules as On/Off. The action of the output is determined by the hardware, not the configuration.

Ranges

The GX Tool accepts any real number between -32750 and 32750. Numbers with a modulus greater than 2048 may be rounded up or down by as much as 0.1 percent as shown in Table 4-1.

Table 4-1: Rounding Factors

Range	Rounding (+/-)
2049-4096	2
4097-8192	4
8193-16384	8
16385-32750	16

Module Type Limits

A limited number of modules are available in a configuration. Modules at the limit and unsupported modules do not appear in the Add PM menu. Table 4-2 shows the maximum number of modules by type you can use in a configuration.

Table 4-2: Module Type Limits

Type of Module	Maximum Number Allowed
Control	12 total
Numeric	
Totalization	
Sequencer	
Binary Sequencer	
XT or XTM	8 total
Time Schedule	8
PLC	8
Optimum Start/Stop	2
Analog Constants	1
Digital Constants	1
Exception Days	1
LRS1-32	1
LRS33-64	1
Trend Log	1
NDO Network Module	8
NDI Network Module	8
NAO Network Module	16
NAI Network Module	16

Network Modules (DX Version 3.x Only)

Network modules hold numeric (analog) or logical (digital) values from its associated LONMARK™ network variable.

The network variables transmit data between DX-912x controllers on the same LONWORKS N2E network. The LONWORKS N2E network supports DX-9120 **or** DX-9121 controllers, but not both on one network. The GX Tool provides all data to the controllers for the LONWORKS network configuration. No third-party tool is required.

The network variables transmit data between DX-9200 controllers on an open LONWORKS network. They also transmit data from any other LONMARK compliant devices on the network to the DX. Refer to the *DX-9200 LONWORKS Compatible Digital Controller Technical Bulletin (LIT-1162250)* for details on the use of each network variable before defining network modules. When configuring a DX-9200 controller, the GX Tool does not define network module destinations. Network connections between network variables in different controllers (source and destination) must be defined by a third-party LONWORKS network configuration tool.

PLC Modules

The DX-9100 operating system provides a software-implemented PLC. Every second, the PLC module executes a user-defined program that operates on a 2,048-bit memory area containing an image of the hardware digital inputs/outputs, logic variable from each module, and digital constants. In the memory area, each input, output, and logic variable has its own pre-allocated address. Variables in the memory area are frozen before the execution of the program in the PLC module, and the resulting changes in the logic variables are transferred out of the memory area to the appropriate hardware or function modules at the end of the module execution.

The GX Tool's software-implemented PLC supports most of the functions available in dedicated PLCs. Define PLC functions using ladder diagrams. In the GX Tool, the PLC ladder diagram is subdivided into eight pages: PLC1 to PLC8. A separate ladder diagram and a separate module block on the screen represent each PLC. Refer to the *Creating PLC Ladder Diagrams* chapter for more information.

XT, XTM, and XP Modules

The DX controller can be extended by up to 64 remote inputs/outputs, analog or digital, depending on the connected XT-9100 or XTM-905 extension module configuration. Figure 4-1 shows the DX controller with inputs added by an XT module. Table 4-3 describes the figure labels.

XP inputs/outputs are connected to the first XT or XTM module. An expanded digital XT or XTM (EXP) represents the inputs/outputs of the second XP on the preceding XT or XTM. The first XT/XTM software module represents two hardware modules.

Table 4-3 lists XT and XTM modules available with the GX Tool.

Notes: Some XT, XTM, and XP modules described in this document are unique to local markets and may not be available on a global basis.

Analog inputs and digital outputs added by an extension module need to be configured.
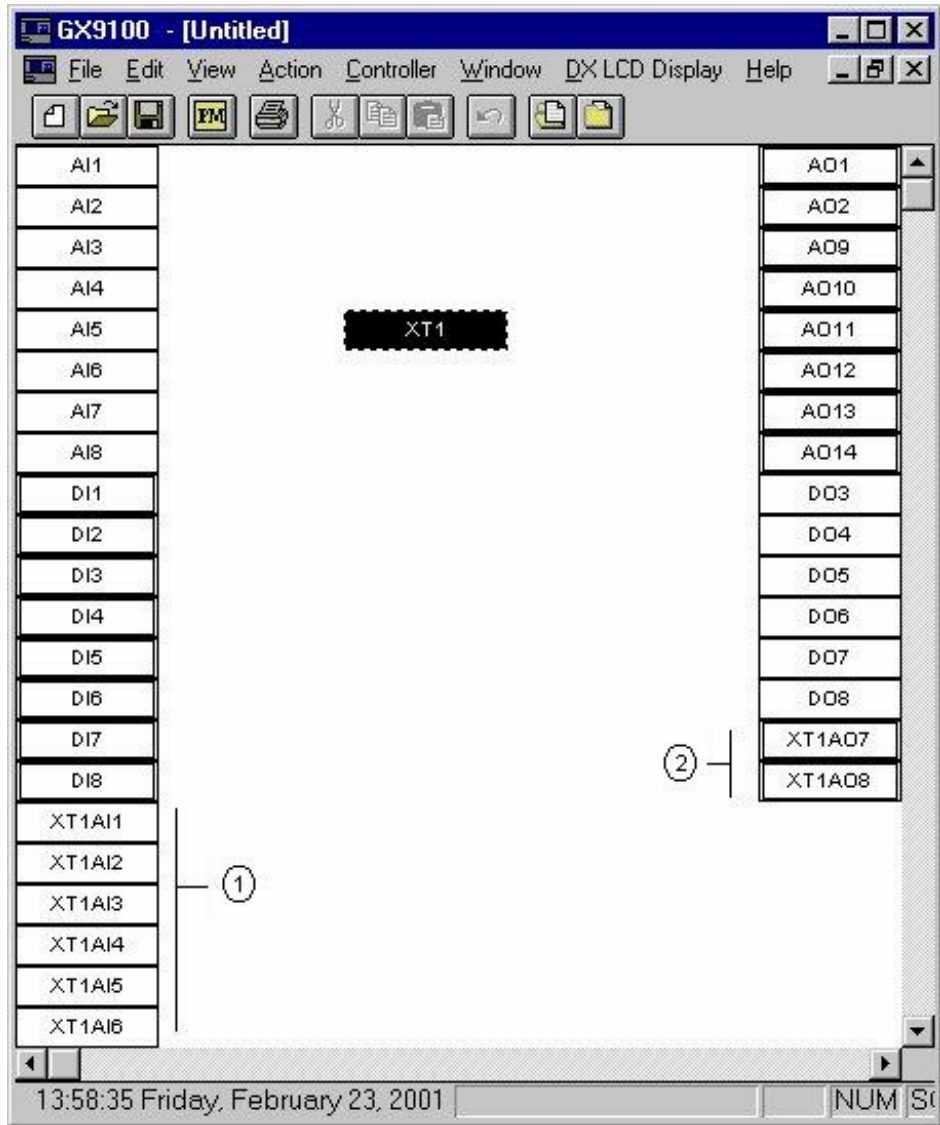
Figure 4-1: Inputs and Outputs Added by XT Module

Table 4-3: XT Module Callouts

Callout	Name	Description
1	Analog Inputs	Inputs added for XT module
2	Analog Outputs	Outputs added for XT module

Table 4-4: XT and XTM Modules

Module	Description
XT	
6AI 2AO	Six analog inputs and two analog outputs
4DI 4DO	Four digital inputs and four digital outputs
8DI	Eight digital inputs
8DO	Eight digital outputs
EXP 4DI 4DO	Four digital inputs and four digital outputs
EXP 8DI	Eight digital inputs
EXP 8DO	Eight digital outputs
XTM	
4AI	Four analog inputs
4AO	Four analog outputs
4AI 4AO*	Four analog inputs and four analog outputs (two XP modules)
8AI*	Four analog outputs (two XP modules)
8AO*	Four analog outputs (two XP modules)
6AI 2AO	Six analog inputs and two analog outputs
4DI 4DO	Four digital inputs and four digital outputs
8DI	Eight digital inputs
8DO	Eight digital outputs
XPM	Momentary output relay
XPL	Magnetically latched output relays
XPE	Electrically latched output relays

Notes: XP Expanded digital options (preceded with EXP) only appear if the preceding module is an XT or XTM and not defined as EXP.

XPE-4x4 (x=0,1,2, or 3) must be configured as 4DI 4DO and XPE-4x4 (x=4,5,6, or 7) as 8DO.

* Not available in North America.

Detailed Procedures

Configuring Inputs and Outputs

Note: See also *Defining Input, Output, and Programmable Module Data* section.

To configure AIs and DOs:

1. Right-click on the AI or DO you want to configure. A pop-up menu appears.

2. Choose an option from Table 4-5.

Table 4-5: Configuration Options for AI and DO

Analog Inputs	
Active	Accepts voltage or current.
Passive	Accepts Resistance Temperature Device (RTD).
Digital Output	
P.A.T. (Position Adjust Type)	Uses a pair of triacs and a numeric source.
D.A.T. (Duration Adjust Type)	Provides a time-based duty cycle proportional to the value of the numeric source.
On/Off	Provides a single maintained On/Off triac input.
Sta/Sto (Start/Stop)	Uses a pair of triac outputs and requires a logic source.
Pulse	Provides a single momentary triac output from a logic source.

3. Follow the procedure in *Defining a User Name*.

Note: Configure all DOs as On/Off or Pulse regardless of whether or not they are used. The only exceptions are the 4-output relay modules (XP-9107 and XPE-4x4, x=4, 5, 6, or 7). When only one 4-output module is installed, select 8DO, but only configure DO1-DO4. When two 4-output modules are installed, configure both as one 8DO module, and configure DO1-DO8.

IMPORTANT: Configure XPM-4x1, XPL-4x1, and XPE-4x1 modules as On/Off. The action of the outputs is determined by the hardware, not by the configuration.

Deleting Modules

To delete modules:

1. Right-click on a module. The pop-up menu appears.

2. Click Delete. An Untitled dialog box appears to confirm the deletion.
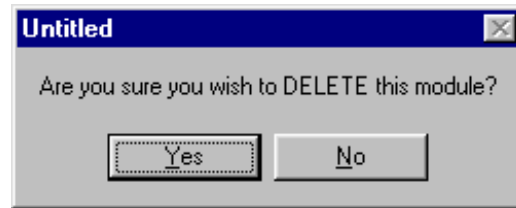
Figure 4-2: Untitled Delete Confirmation Dialog Box

3. Click Yes.

Note: A deleted AI or Do remains on the screen, but is no longer configured.

Adding Programmable and Extension Modules

To add programmable and extension modules:

1. Click the Add PM button on the toolbar. The Add PM menu appears.

2. Select the type of module from the menu. If opting for a XT, XTM, control, or numeric module, a submenu appears.

3. Once you select the type, a highlighted box containing the type name and module number appears next to the pointer.

4. Move the module to the desired location and click. You can move the module at any time by clicking and dragging it to a new position on the screen.

Defining a User Name

Note: This process is the same for programmable modules, AIs, DOs, AOs, and DIs.

To define a user name:

1. On the GX Tool main screen, right-click on a configured module or input/output. A pop-up menu appears.

2. Select Data. A Data dialog box appears (Figure 4-3).

Figure 4-3: Data Dialog Box Example

3. Enter an 8-character name in User Name field.

4. Enter a 24-character description in Description field.

Note: Other data fields are described in *Defining Input, Output, and Programmable Module Data* in this chapter.

5. Click OK.

Defining Input, Output, and Programmable Module Data

To define input, output, and programmable module data:

1. Right-click on the programmable module and select Data from the module pop-up menu that appears. The module Data dialog box appears (Figure 4-4).

Figure 4-4: Module Data Dialog Box Example

2.   Enter values into the data fields. Refer to the *DX-9100 Configuration Guide (LIT-6364030)* for data field details.

Notes: Fields proceeded by an arrow (->) are used for connecting modules. Refer to *Connecting and Disconnecting Modules* chapter for details.

3.   Click the Input-Tag button to assign user names to the destination points (if applicable).

4.   Click the Output-Tag button to assign user names to the source point (if applicable).

5.   Click the Data-2 button to access the second page if the module has two pages and a second Data dialog box appears (Figure 4-5).

Figure 4-5: Module Data Second Dialog Box Example

6. Enter the desired values in the empty data fields of the second data dialog box. Refer to the *DX-9100 Configuration Guide (LIT-6364030)* for data field details.

7. Click OK to save the new values and return to the first Data dialog box.

8. Click OK to save all values and exit the Data dialog box.

Naming a Connection Point

Note: This procedure is the same for AIs, AOs, DIs, DOs, and programmable modules. Not all modules have input and output connection points.

To name a connection point:

1. On the GX Tool main screen, right-click on the module with connection points you want to name. Module pop-up menu appears.

2. Select Data. Module Data dialog box appears (Figure 4-3).

3. Click Output Tag (or Input Tag) from Module Data box. Output-Tag dialog box appears (Figure 4-6).
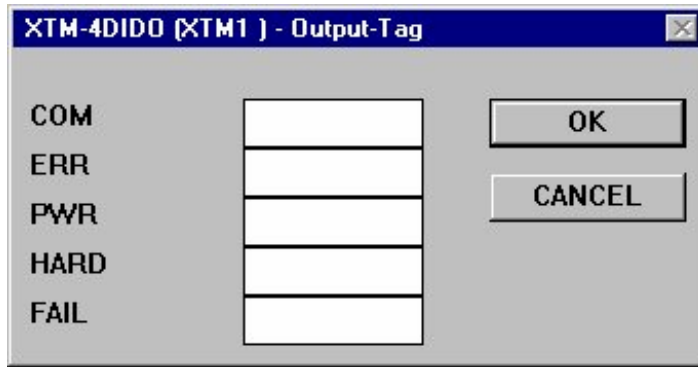
Figure 4-6: Output-Tag Dialog Box Example

4. Enter a name (up to eight characters) into the User Name box for each connection point.

5. Click OK. Module Data dialog box appears.

6. Click Input Tag (if applicable) or click OK.

Calibrating Analog Inputs and Outputs

To calibrate analog inputs and outputs:

1. Upload a configuration from the controller with Calibration as the selected item in the Upload dialog box.

Note: See *Downloading to the DX Controller* chapter for details.

2. On the Edit menu, click Calibration. The Calibration dialog box appears (Figure 4-7).

Note: To save calibration data, create a file for each DX controller. The calibration data for each controller is different.
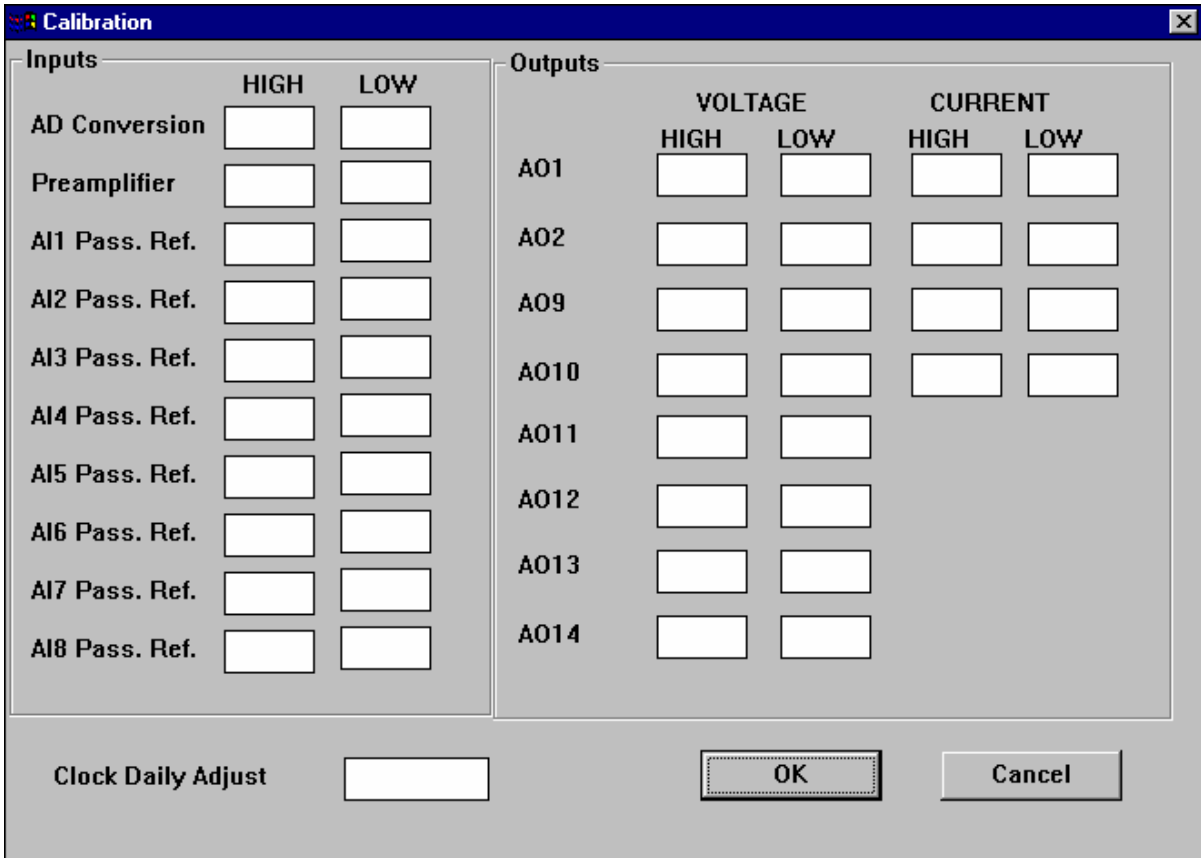
Figure 4-7: Calibration Dialog Box

3.   Enter Values according to Table 4-6.

Table 4-6: Calibration Values

Field/Group	Values
Input	0–32767
Output	0–32767
Clock Daily Adjust	-32767–32767

Note: Reversing High and Low output values reverses the action of the controller.

4.   Download the configuration to the controller with Calibration as the selected item in the Download dialog box.

Troubleshooting

Download/Upload Errors

Table 4-7: Downloading/Uploading Configurations Error

Error	Cause
Data window values delete upon exiting window.	You may have exited the window by clicking CANCEL or by pressing Esc before saving changes. Be sure to save changes before exiting data windows.

During N30 downloads and uploads, unexpected errors are logged in a file called errorlog.txt. Errolog.txt is generated in the directory in which the GX9100 software is installed. Table 4-8 describes the error codes.

Table 4-8: Error Codes

Error Code	Error Description
0	System is out of memory, executable file is corrupt, or relocations are invalid.
5	Application tried to dynamically link to a task, or there is a sharing or network-protection error.
6	Library requires separate data segments for each task.
8	There is insufficient memory to start the application.
10	Windows® Operating System (OS) version is incorrect.
11	Executable file is invalid. Either it is not a Windows OS application or there is an error in the .EXE image.
12	Application is designed for a different operating system.
14	Type of executable file is unknown.
15	Application tried to load a real-mode application (developed for an earlier version of Windows OS).
16	Application tried to load a second instance of an executable file containing multiple data segments that are not marked read-only.
19	Application tried to load a compressed executable file. The file must be decompressed before it can be loaded.
20	Dynamic-Link Library (DLL) file is invalid. One of the DLLs required to run this application is corrupt.
21	Application requires Microsoft® Windows OS 32-bit extensions.

Chapter 5

Creating PLC Ladder Diagrams

Introduction

The GX Tool software-implemented PLC supports most of the functions available in dedicated PLCs. PLC functions are defined in ladder diagrams. In the GX Tool, the PLC is subdivided into eight pages: PLC1 to PLC8.

This chapter describes how to:

- access the ladder diagram

- add instructions to the ladder diagram

- create logic blocks within a line

- create an OR loop within a logic block

- add associated logic variables to instructions

- delete a PLC instruction

- cut, copy, and paste logic blocks

- insert a line into the PLC diagram

- save to PLC library

- open from PLC library

- save the PLC ladder diagram

Key Concepts

Ladder Diagrams

The top of the ladder diagram screen is numbered PLC1 to PLC8 (Figure 5-1). The User Name and Description fields can only be changed from the PLC block's data window.

The diagram has eight rows. Each row has eight dots called hot points. Instructions start on the hot spots at the left and end at the right. Table 5-1 lists PLC instructions.

Double-click on the control box at the left side of the menu bar to exit the diagram. A separate ladder diagram and a separate module block on the screen represent each PLC.
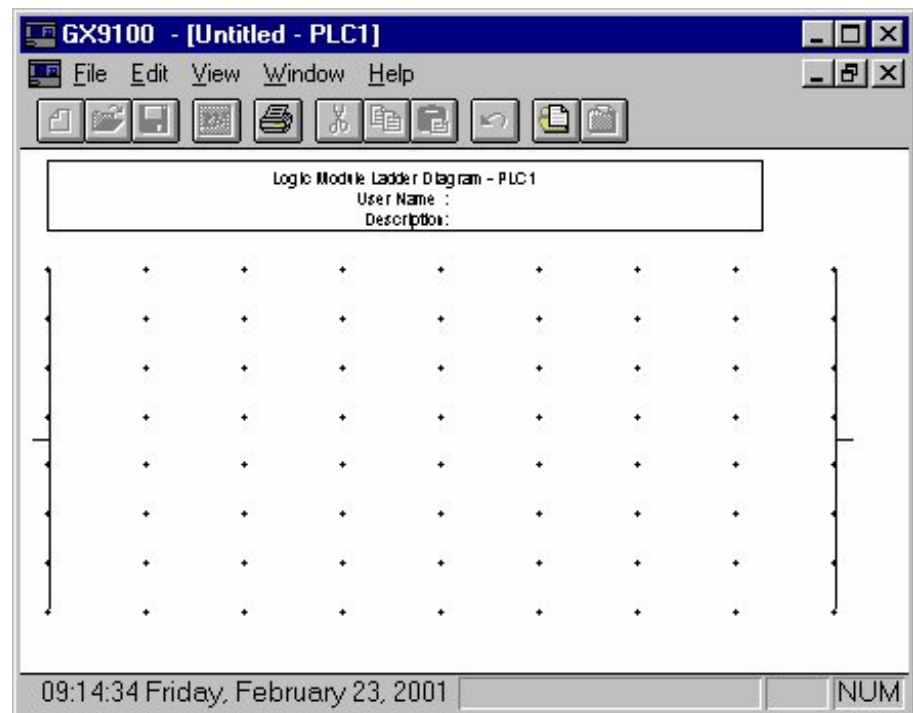
Figure 5-1: Ladder Diagram

Table 5-1: PLC Instructions

Module	Instructions
NOP	No operation
LOAD	Loads the value of the addressed logic variable into the result status.
LOAD NOT	Loads the inverted value of the addressed logic variable into the result status.
AND	Logical AND between the value of the addressed logic variable and the result status
AND NOT	Logical AND between the inverted value of the addressed logic variable and the result status
OR	Logical OR between the value of the addressed logic variable and the result status
OR NOT	Logical OR between the inverted value of the addressed logic variable and the result status
ANDB	Logical AND operation between two blocks
ORB	Logical OR operation between two blocks
OUT	Transfers the result status to the addressed logic variable.
OUT NOT	Transfers the inverted result status to the addressed logic variable.
COS	Change-of-state of the result status set the result status to 1 for one program cycle.
SET	Sets the addressed logic variable to the logical 1 if the result status is 1.
RST (RESET)	Resets the addressed logic variable to the logical 0 if the result status is 1.
RSR (RESTART)	Allows you to create a power up routine starting in Row 1 of Page 1 and ending the row before the RSR instruction.
	The RSR symbol marks the beginning of a PLC program instruction. Rows and pages before the RSR instruction execute only when the DX controller is powered up after a power failure.
	You can define only one RSR instruction. If no RSR exists, the PLC begins at Row 1 on Page 1.

PLC Menus and Toolbar

The PLC screen (Figure 5-1) contains five menus and a toolbar. The View menu, Window Menu, Help Menu, and the toolbar are identical to the main Windows screen. Refer to the *Getting Started with the GX Tool and the DX Controller* chapter for menu details.

The File menu (Table 5-2) and the Edit menu (Table 5-3) contain PLC specific options.

Table 5-2: File Menu Options- PLC

Menu Option	Description
Save	Saves the current PLC ladder diagram.
Close	Closes the current PLC page.
Print	Prints the current PLC page.
Print Preview	Displays the current PLC ladder diagram as it will appear printed.
Print Setup	Sets PLC print parameters, including default printer, portrait or landscape, paper size and source, and page range.
Header/Footer	Defines headers and footers.
Open from Library	Reads the selected file from the PLC library onto the clipboard. The insert action is completed by selecting the destination location and executing the paste command.
Save to Library	Saves the selected logic blocks in a PLC page to the PLC library.

Table 5-3: Edit Menu Options- PLC

Menu Option	Description
Undo	Cancels the last action of cut or paste.
Cut	Removes logic blocks and places them on the clipboard.
Copy	Copies logic blocks to the clipboard.
Paste	Pastes logic blocks from the clipboard.
Select All	Selects all logic blocks on the page.
Insert Line	Inserts a blank line in the ladder diagram at the first hot spot of an existing logic block.
Page Reformat	Moves all blank lines to the bottom of the page.
Delete	Deletes the selected logic blocks.
Clear Page	Deletes the whole page. (To restore, close without saving and reopen PLC module.)

Detailed Procedures

Note: All procedures except *Accessing the Ladder Diagram* are performed within the PLC screen.

Accessing the Ladder Diagram

To access the ladder diagram:

Double-click on the PLC module. A ladder diagram appears (Figure 5-1).

Adding Instructions to the Ladder Diagram

To add instructions to the ladder diagram:

1. Click on the top left hot point and the PLC List Box appears (Figure 5-2).
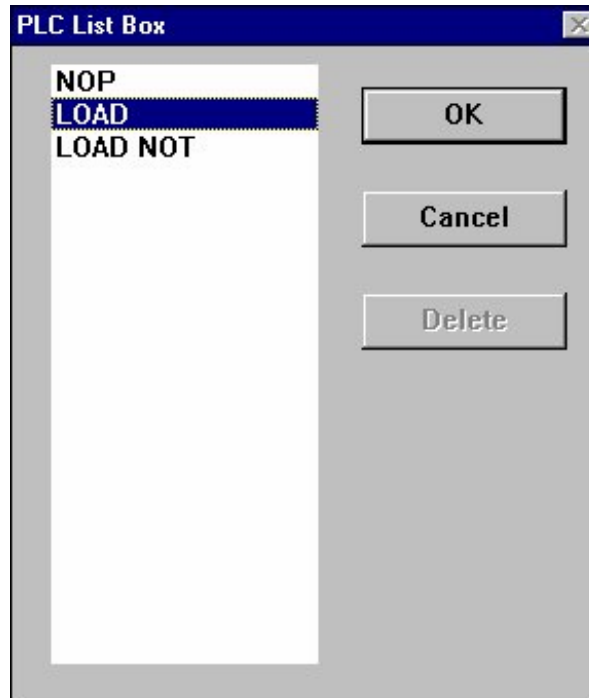
Figure 5-2: PLC List Box

2. Select LOAD as the first instruction and click OK. The LOAD symbol appears within the ladder diagram (Figure 5-3).
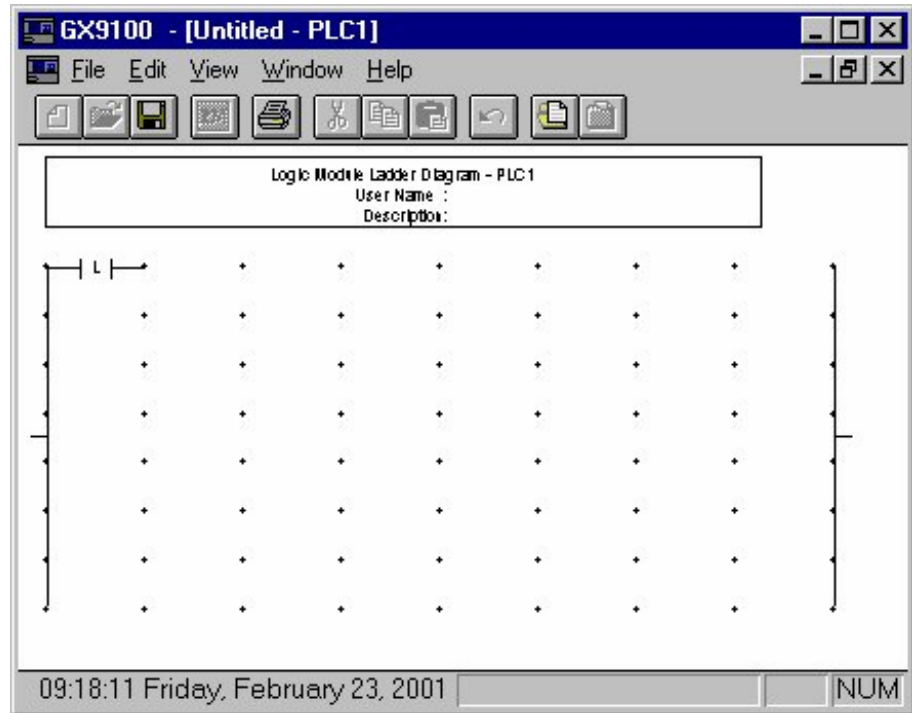
Figure 5-3: Adding the LOAD Symbol

3. Continue to click on unused hot points and add instructions to the ladder diagram until the PLC program is complete (Figure 5-4).

Note: It is impossible to select a hot point preceded by a blank column or if the row above the point is empty.
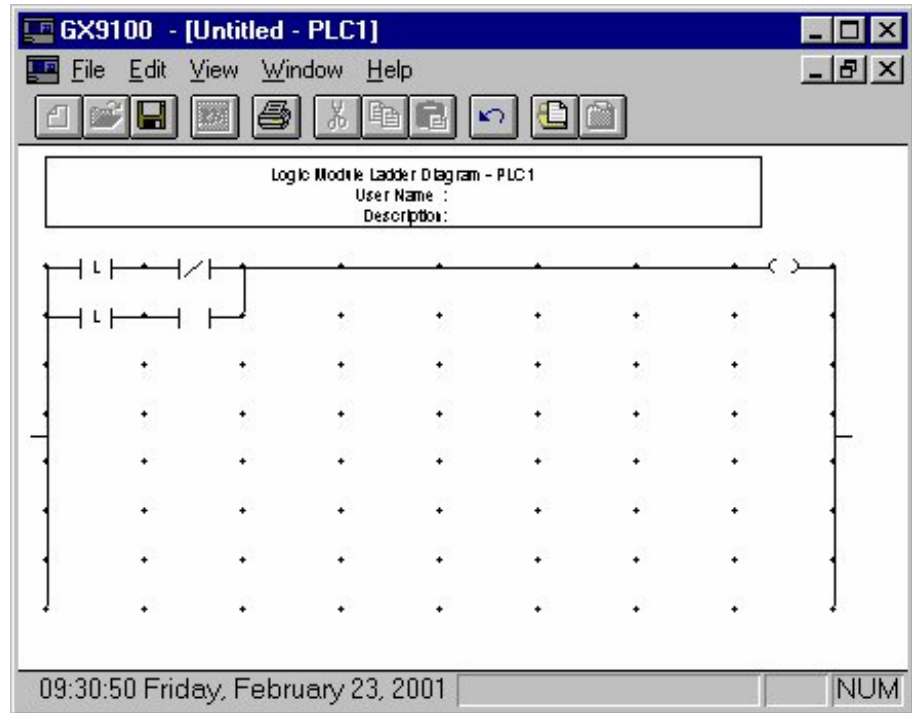
Figure 5-4: PLC Ladder Diagram Example

Creating Logic Blocks within a Line

To create a logic block within a line:

1. Click a hot spot in a line. The PLC instruction list box appears (Figure 5-2).

2. Select LOAD to begin the block.

3. Add instructions to the logic block.

4. Select ANDB to end the block. The letter B marks the end of the block.

Creating an OR Loop within a Logic Block

To create an OR loop within a logic block:

1. Click a hot spot within the logic block. The PLC instruction list box appears (Figure 5-2).

2. Select ORB.

3. Select LOAD or LOAD NOT.

4. Add instructions after the LOAD or LOAD NOT instruction (Figure 5-5).
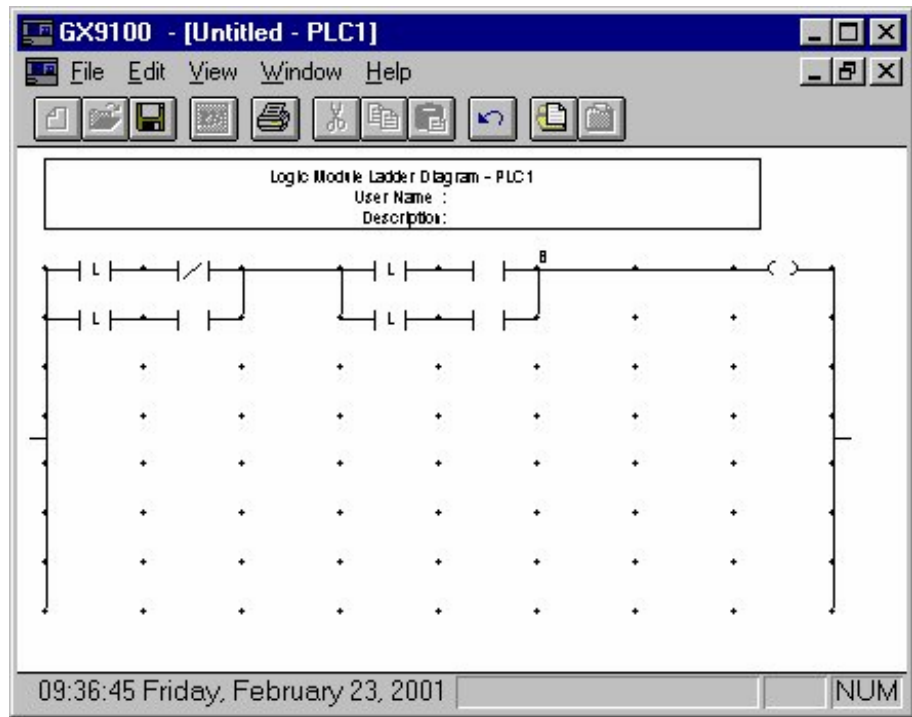
Figure 5-5: Example of a Logic Block within a Line

Adding Associated Logic Variables to Instructions

To add associated logic variables to instructions:

Note: This is also the procedure to modify associated logic variables.

1. Click on the center of the first PLC instruction. The intermediate PLC List Box showing all configured modules appears (Figure 5-6).
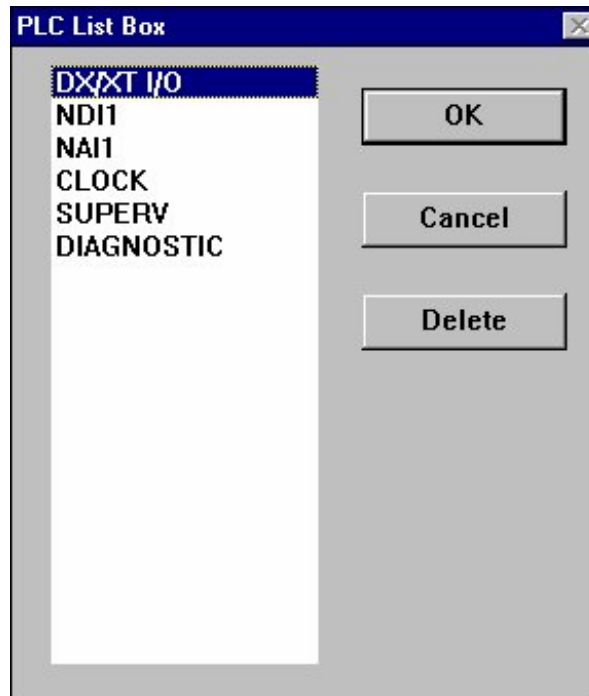
Figure 5-6: PLC List Box for Configured Modules

2. Select a module from the intermediate menu and click OK. For example, if you select DX/XT I/O from the PLC List Box (Figure 5-6), the PLC List dialog box for DX/XT I/O appears (Figure 5-7).
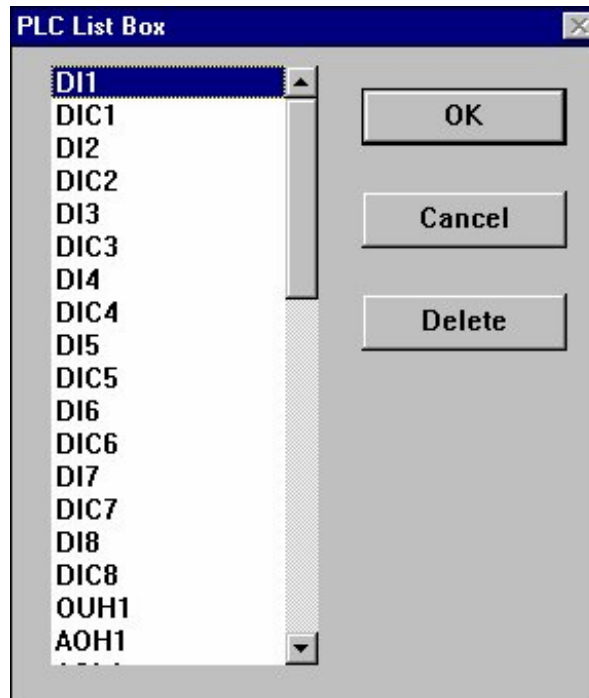
Figure 5-7: PLC List Box Showing All Logic Variables Under DX/XT I/O

3. Select one of the logic variables and click OK. If you select DI1, the ladder diagram contains the DI1 variable (Figure 5-8).
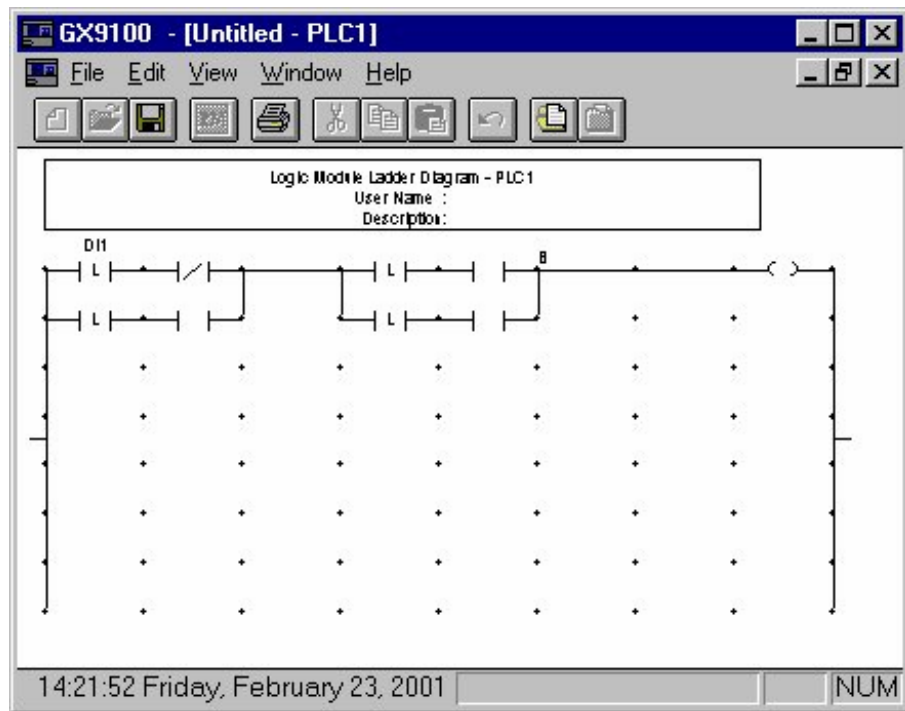
Figure 5-8: LOAD Symbol with Associated Variable DI1

4. Continue to add associated variables to all remaining logic instructions (Figure 5-9).
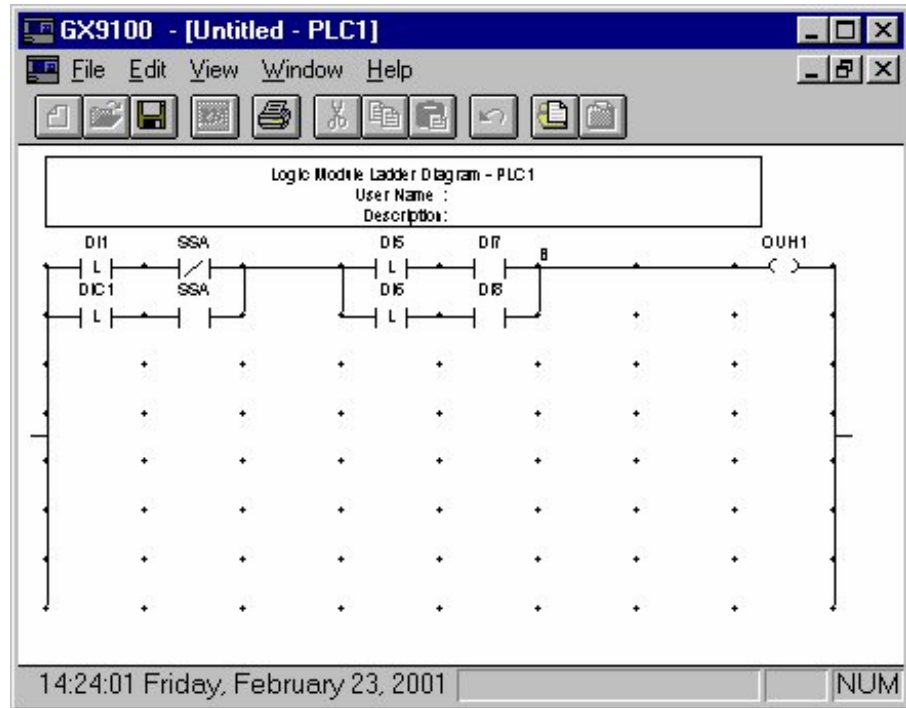
Figure 5-9: Ladder Diagram with PLC Instructions and Associated Values

Deleting a PLC Instruction

To delete a PLC instruction:

Notes: Only Load, Load Not, And, and And Not instruction can be deleted.

All instruction after the deleted Load and Load Not instructions are also deleted.

1. Click on a PLC instruction. PLC List Box appears.

2. Click Delete. The Modify dialog box appears to confirm deletion.
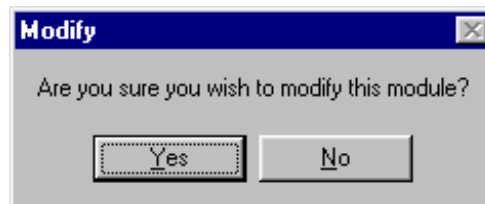
Figure 5-10: Modify Dialog Box

3. Click Yes.

Cutting, Copying, and Pasting Logic Blocks

To cut, copy, and paste logic blocks:

1. Click on a hot spot within a logic block while holding Ctrl. The logic block turns red.

Note: You can select multiple logic blocks at once.

2. Right-click on a hot spot within the selected logic block and the Edit menu appears.

3. Click Cut or Copy. The logic block is copied to the clipboard.

4. Move the cursor to a hot spot on the left side of the page and right-click. The Edit menu appears.

5. Select Paste.

Notes: If you insert a block within a page, blocks below will move down for the inserted line.

An error message appears if there are not enough free lines in the PLC page.

Inserting a Line into the PLC Diagram

To insert a line into the PLC diagram:

1. Right-click on a hot spot to open the PLC Edit menu.

2. Select Insert Line.

3. Repeat to insert multiple lines.

Note: Blank lines move to the bottom of the page when you exit the PLC diagram.

Saving to PLC Library

Note: The PLC library is used to save a selected module or selected modules.

To save to PLC library:

1. On the File menu, click Save to Library. The Save to PLC Library dialog box appears (Figure 5-11).
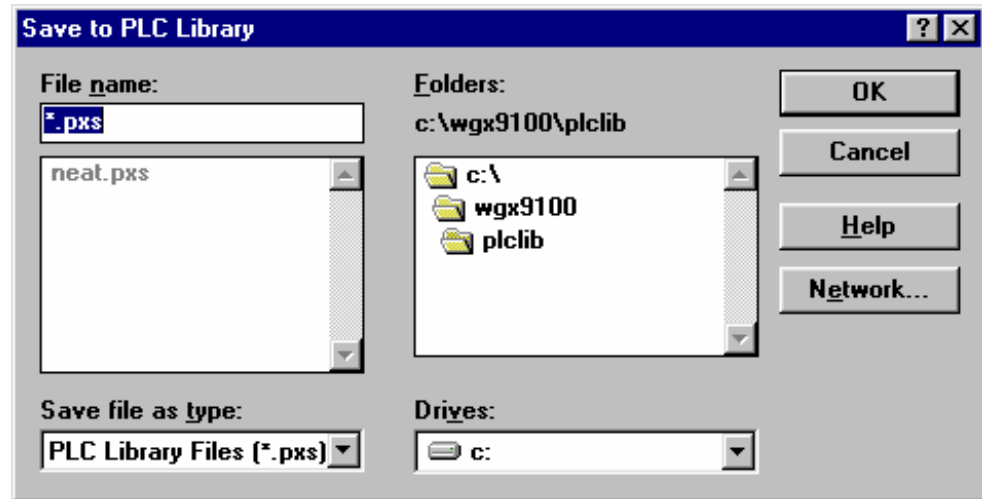
Figure 5-11: Save to PLC Library Dialog Box

    2.   Change the library directory path if desired.

    3.   Enter name into File Name field.

    4.   Click OK.

Opening from PLC Library

To open from PLC library:

    1.   On the File menu, click Open. The Open from PLC Library dialog box appears (Figure 5-12).
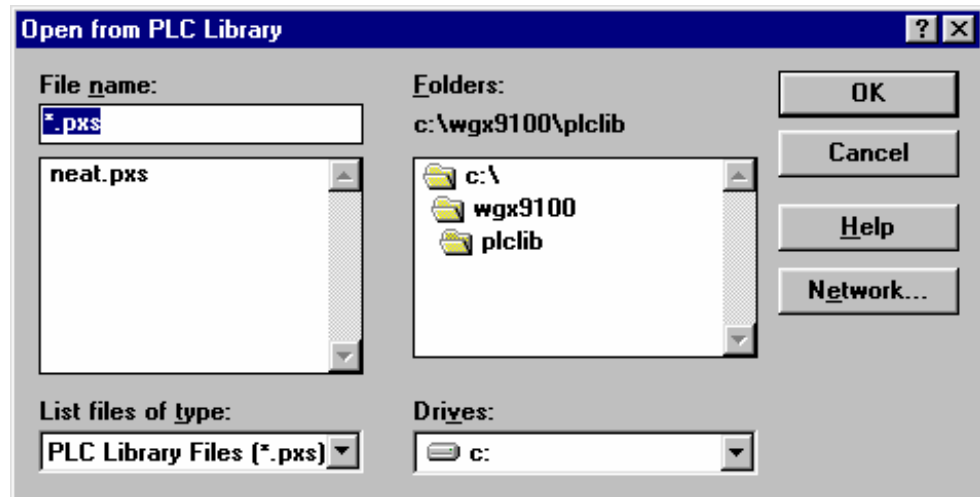
Figure 5-12: Open from PLC Library Dialog Box

    2.   Select a file with the extension .PXS.

    3.   Click OK. The logic block is copied to the clipboard.

4. Move the cursor to a hot spot on the left side of the page and right-click. The Edit menu appears.

5. Select Paste.

Notes: If you insert a block within a page, blocks below will move down for the inserted line.

An error message appears if there are not enough free lines in the PLC page.

Saving the PLC Ladder Diagram

To save the PLC ladder diagram, on the File menu, click Save.

Chapter 6

Connecting and Disconnecting Modules

Introduction

A configuration comprises a set of parameters for each module. The controller stores modules in a series of memory locations. The GX Tool assigns each module a type and connects module outputs (source points) to module inputs (destination points). See *Appendix A* for lists of source and destination points.

This chapter describes how to:

- connect modules

- disconnect modules

- show module connections

- view selected points and modules in a configuration

- trace modules in a configuration

Key Concepts

Connected Modules

An input with a logical connection to an output is a connected module. The GX Tool screen (Figure 6-1) shows a line between connected modules.
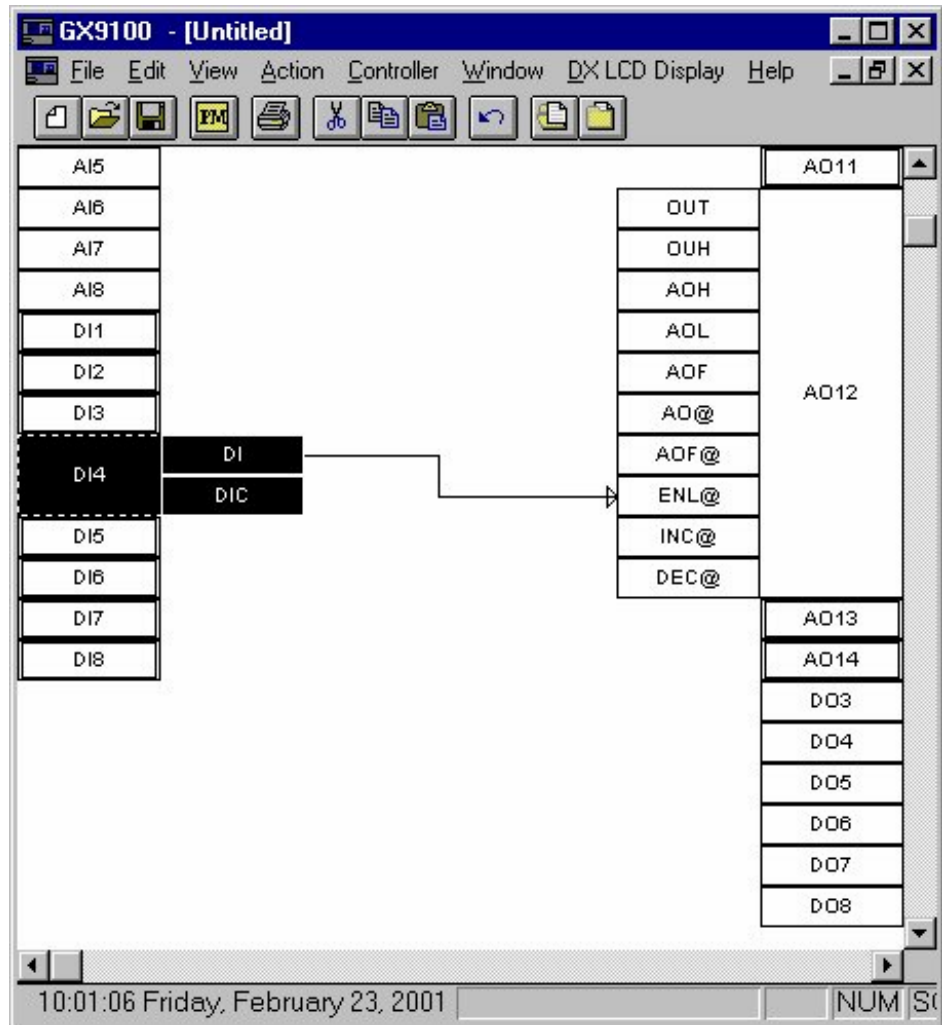
Figure 6-1: Example of Connected Modules

Procedure Overview

Table 6-1: Connecting and Disconnecting Modules

To Do This	Follow These Steps:
Connect Modules Using the Click-Drag Method	Double-click both modules to maximize and show points. Place bent arrow cursor on source point. Click and drag cursor to destination point. Release Button. Inverted connection dialog box appears (digital inputs only). Click Yes or No. Line appears connecting modules.
Connect Modules Using the Connect Option	Right-click source point module. Select Connect from the module menu. Module Connect dialog box appears. Select source point and click OK. Right-click destination module. Select Connect from the module menu. Module Connect dialog box appears. Choose destination point and click OK. Inverted connection dialog box appears (digital inputs only). Click Yes or No. Line appears connecting modules.
Connect Modules within the Data Dialog Box	Right-click on destination point module. Select Data from the module menu. The module data window appears. Select the data field corresponding to the desired connection. Type an asterisk (*) in the field. A menu listing the valid configuration modules appears. Highlight the desired configuration module and click OK. A window listing all valid module outputs appears. Highlight the desired output and click OK. A line appears showing the connection between the two modules.
Disconnect Modules Using the Scissors Cursor	Double-click both modules to maximize and show points. Place the cursor on the connected point. The cursor turns into the Scissors cursor. Click on the connection. An Untitled delete confirmation box appears. Click Yes to confirm. The connection is removed.
Disconnect Modules Using the Disconnect Option	Right-click on the destination module. Select Disconnect from the module menu. The Disconnect dialog box appears showing all connected module destination points. Choose the destination point you wish to disconnect and click OK. A dialog box appears to confirm connection deletion. Click Yes. The connection line is removed from the screen.
Disconnect Modules within the Data Dialog Box	Right-click on the module that contains the connection. Select Data from the module menu. The module data window appears. Highlight a name in the data field and press the Delete key. You are returned to the data window. Click OK. The connection line is removed from the screen.
Show Module Connections	• Double-click module to maximize and show source and destination points. Double-click to minimize. • Select module. Select Edit > Data. Module Data window appears. Click OK to close. • Select module. Select View > Show Connections. Connections dialog box appears and shows all source point connections. Click OK.
View Selected Points and Modules in a Configuration	Select the points and modules by clicking on them. Hold down Ctrl and click to select multiple points. On the View menu, click Show Selected. On the View menu, click Show All to see all points on modules on the screen.
Tracing Modules in a Configuration	Click the module to trace. On the View menu, click Trace. Click another module to trace connections to that module. Hold down Ctrl and click to trace multiple modules. On the View menu, click Trace to turn off the Trace function.

Detailed Procedures

Connecting Modules

Using the Click-Drag Method

To connect modules using the click-drag method:

1. Double-click both modules to maximize and show points.

2. Place bent arrow cursor on source point.

3. Click and hold source point.

4. Drag cursor to destination point.

5. Release button. Inverted Connection dialog box appears (digital inputs only) (Figure 6-2).

Figure 6-2: Inverted Connection Dialog Box

6. Click Yes or No. A line appears (Figure 6-1) between modules to show connection.

Using the Connect Option

To connect modules using the Connect option:

1. Click the module that contains the source point.

2. Right-click outside of the highlighted module. The pop-up module menu appears.

3. Select Connect from the module menu. The module connect dialog box appears (Figure 6-3) containing source points for the selected module.
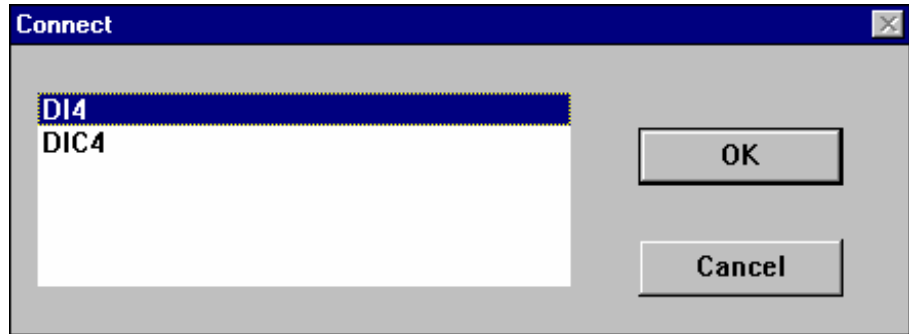
Figure 6-3: Module Connection Dialog Box Example

4. Choose a source point and click OK.

5. Click the destination module.

6. Right-click outside the module. The pop-up module menu appears.

7. Select Connect from the module menu. The module connect dialog box appears (Figure 6-4) containing destination points for the selected module.
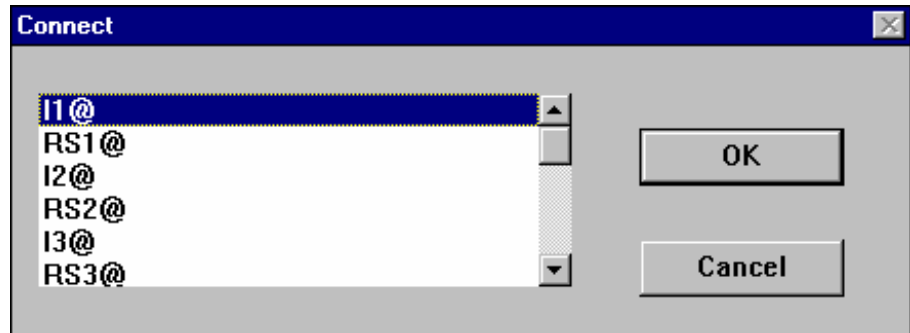
Figure 6-4: Destination Point Dialog Box Example

8. Choose a destination point and click OK. Untitled inverted connection dialog box appears (digital inputs only) (Figure 6-2).

Note: Only unused destination points appear in the Connect destination points box. To reuse a destination point, first delete the old connection.

9. Click Yes or No. A line appears showing the connection between the two modules.

Making Connections within the Data Dialog Box

To make connections within the Data dialog box:

1. Right-click on the module that contains the destination point. The module pop-up menu appears.

2. Select Data from the module menu. The module data window appears (Figure 6-5).

Figure 6-5: Module Data Window Example

3. Select the data field corresponding to the desired connection. The blinking cursor appears in the box.

Note: Only descriptions followed by an arrow (->) accept connections.

4. Type an asterisk (*) in the field. A menu listing the valid configuration modules for the selected field appears (Figure 6-6).
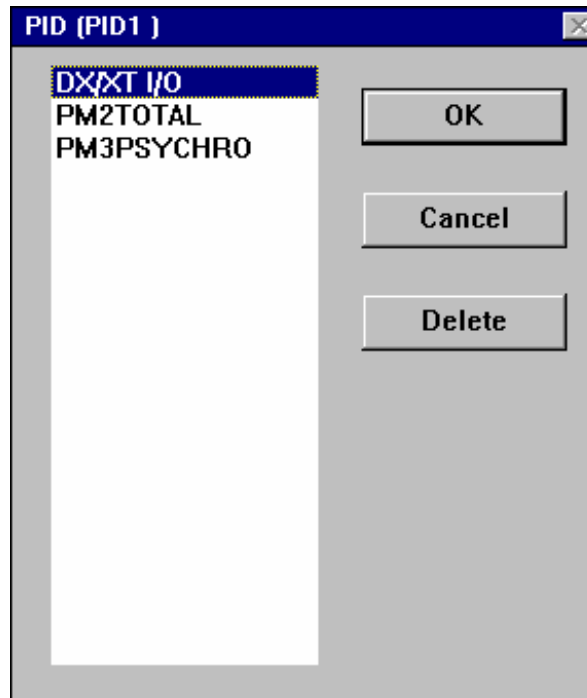
Figure 6-6: List of Valid Configuration Modules Example

5. Highlight the desired configuration module and click OK. A window listing all valid module outputs appears (Figure 6-7).
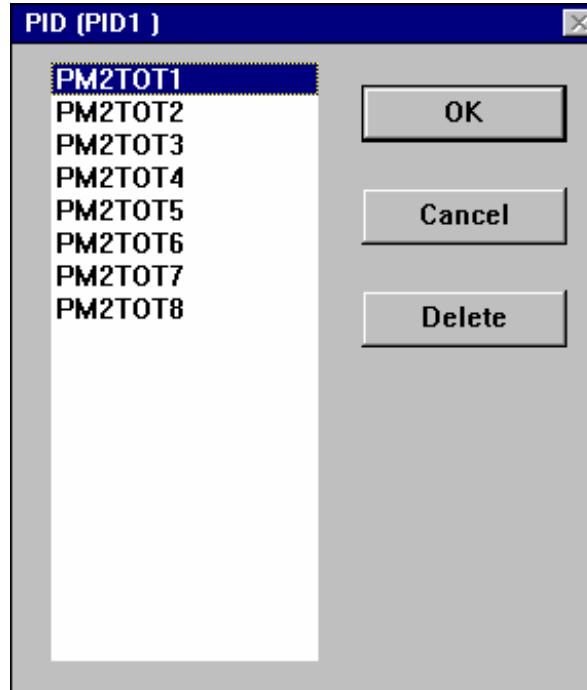
Figure 6-7: Valid Outputs Window Example

6. Highlight the desired output and click OK. A line appears (Figure 6-1) showing the connection between the two modules.

Disconnecting Modules

Using the Scissors Cursor

To disconnect modules using the scissors cursor:

1. Double-click both modules to maximize and show points.

2. Place the cursor on the connected point. The cursor turns into the Scissors cursor.

3. Click on the connection. An Untitled delete confirmation box appears (Figure 6-8).
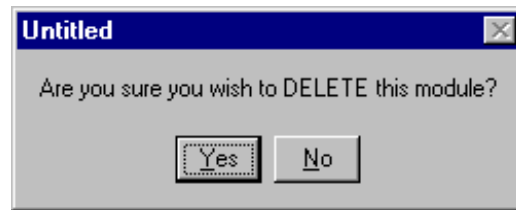
Figure 6-8: Delete Confirmation Dialog Box

4. Click Yes to confirm. The connection is removed.

Using the Disconnect Option

To disconnect modules using the Disconnect option:

1. Click on the destination module.

2. Right-click outside the module. The module pop-up menu appears.

3. Select Disconnect from the module menu. The Disconnect dialog box appears (Figure 6-9) showing all destination points of the selected module that are currently connected.
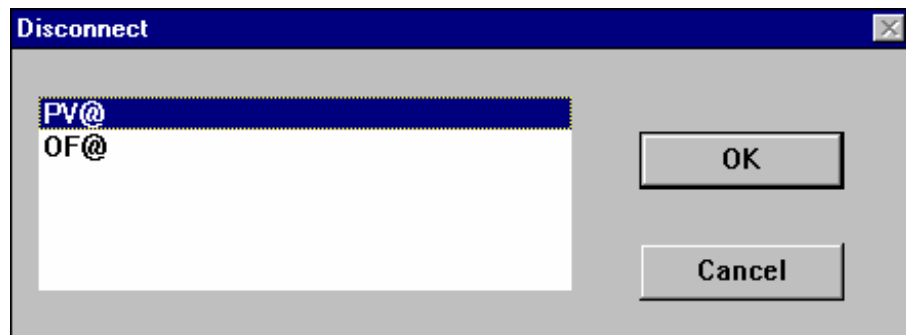
Figure 6-9: Destination Point Dialog Box Example

4. Choose the destination point you wish to disconnect and click OK. A dialog box appears (Figure 6-8) to confirm connection deletion.

5. Click Yes to delete. The connection line is removed from the screen.

Disconnecting within the Data Dialog Box

To disconnect the modules using the Data dialog box:

1. Click on the module that contains the connection.

2. Right-click outside of the highlighted module. The module pop-up menu appears.

3. Select Data from the module menu. The module data window appears (Figure 6-5).

4. Highlight the entire name in the data field you want to delete and press the Delete key.

5. Data window appears. Click OK. The connection line is removed from the screen.

Showing Module Connections

There are three ways to show module connections:

Double-click Module

To show module connections by double-clicking:

1. Double click connected module to maximize and show source and destination point connections.

2. Double-click to minimize.

Module Menu

To show connections using the Module menu:

1. Select module.

2. On the Edit menu, click Data. Module Data window appears.

3. Click OK to close.

View Menu

To show connections using the View menu:

1. Select module.

2. On the View menu, click Show Connections. Connections dialog box appears (Figure 6-10) and shows all source point connections.

3. Click OK.
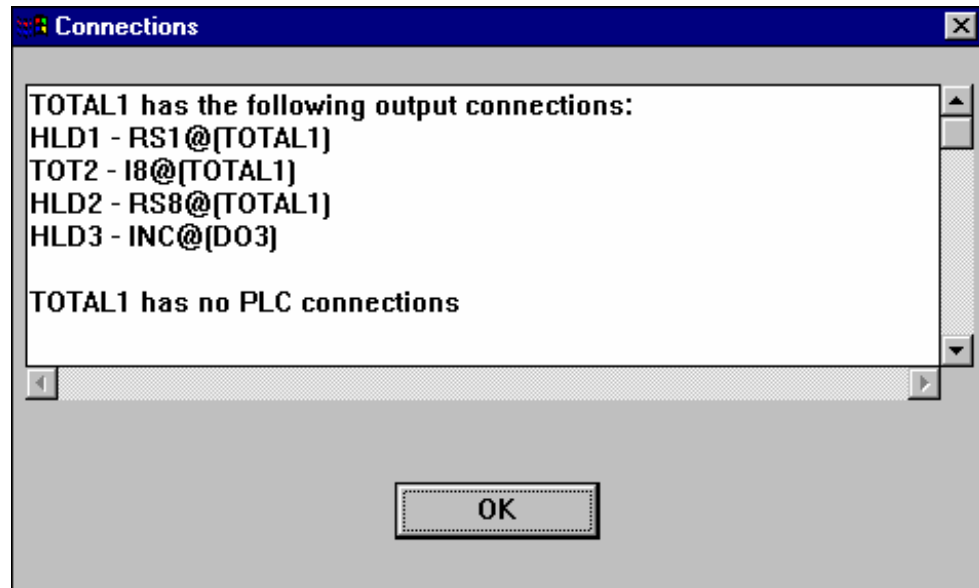
Figure 6-10: Connections Dialog Box Example

Viewing Selected Points and Modules in a Configuration

To view selected points and modules in a configuration:

1.   Select the points and modules to view by clicking on them. To select multiple points, hold down Ctrl and click points.

2.   On the View menu, click Show Selected.

3.   On the View menu, click Show All to see all points and modules on the screen.

Tracing Modules in a Configuration

To trace modules in a configuration:

1.   Click the module to trace.

Note: To select multiple modules, press hold Ctrl while clicking.

2.   On the View menu, click Trace. The selected module connections remain visible for easy tracing. All other connections become invisible.

3.   Click on another module to trace the connections path for that module. To trace multiple modules at the same time, Ctrl+click on each subsequent module.

4.   On the View menu, click Trace to turn off the Trace function.

Troubleshooting

Table 6-2: Connecting Modules Error Message

Message	Cause
`The source and destination points do not match!`	The source and destination points are not of the same type (analog or digital). Choose a new source and/or destination point for this connection.

Chapter 7

Defining Trend Log Modules

Introduction

The Trend Log module provides Metasys Point History data for remotely connected DX controllers or for a local DX LCD Display. The module provides 12 trend log channels, each records data from either 1 analog item or from a set of 8 logical variables (logic variable byte).

This chapter describes how to:

- define the Trend Log module channels

- configure the Dial function for Metasys Point History

Key Concepts

Trend Data

The DX controller collects and stores trend data for up to 12 analog and logic variables. An analog variable corresponds to an analog item in the DX controller, such as an analog output. A logic variable in the DX controller is a byte value representing eight digital bits, such as the eight digital inputs DI1 to DI8. Trend data is collected for all eight bits of the logic variable experiences a Change-of-State (COS).

You must satisfy three prerequisites before you can define trend data:

- The configured DX controller must support trend data. Table 7-1 lists DX controllers and trend data support.

- The Trend Log module must exist in the controller configuration.

- You must define points in the Trend Log module. These points are automatically inserted into the same positions of the DX LCD Display Trend Data window.

Table 7-1: Controller/Trend Data Support

DX Controller Version	Supports Trend Data
1.1, 1.2, 1.3	No
1.4	Yes
2.0, 2.1, 2.2	No
2.3, 2.4	Yes
3.0, 3.1, 3.2	No
3.3, 3.4	Yes

Metasys Point History

When an NDM dialer connects the DX controller to a Metasys system, the trend data is read whenever the Metasys system makes a connection. The data is stored in the point history file of Analog Input (AI), Analog Output Setpoint (AOS), and Binary Input (BI) objects when they are mapped to the items being recorded. When you select the Metasys Point History option for a trend log channel, only those items mapped to Metasys objects are allowed, and the trend parameters are set by the GX Tool to default values for the Point History feature in the Metasys system.

You must link the Historical Trend Read Request (HTRR) logic variable to the DIAL request logic variable in a PLC module to initiate a dial-up connection when the trend record buffer is full.

DX Version 3.x controllers cannot be connected to a Metasys system by the NDM dialer and telephone lines. Trend logs cannot be configured for Metasys Point History in these versions.

For more information about Metasys Point History, refer to the *Point History Technical Bulletin (LIT-636112)*.

DX LCD Display without Metasys Point History

Trend channels excluded from the Metasys Point History are freely configurable. For analog items, enter the sampling rate and the stored values as average, maximum, or minimum values during the period or the instantaneous value at the time of reading. Logic variables receive a time and date stamp when the values change. All channels display on the DX LCD Display.

Trend Log Items

Table 7-2 lists the analog items and logic variables available in a Trend Log module for Metasys Point History. On the Metasys system, the analog inputs are mapped to AI objects, the analog outputs to AOS objects, and the logic variables to BI objects.

Table 7-3 lists the analog items and logic variables available in a Trend Log module for the DX LCD Display.

A logic variable set is recorded when any one of its variables change state. We recommend assigning Logical Result Status (LRS) logic variable bytes to the trend log and then connecting the source variables you want to trend to the LRS variables in a PLC module (Figure 7-1).
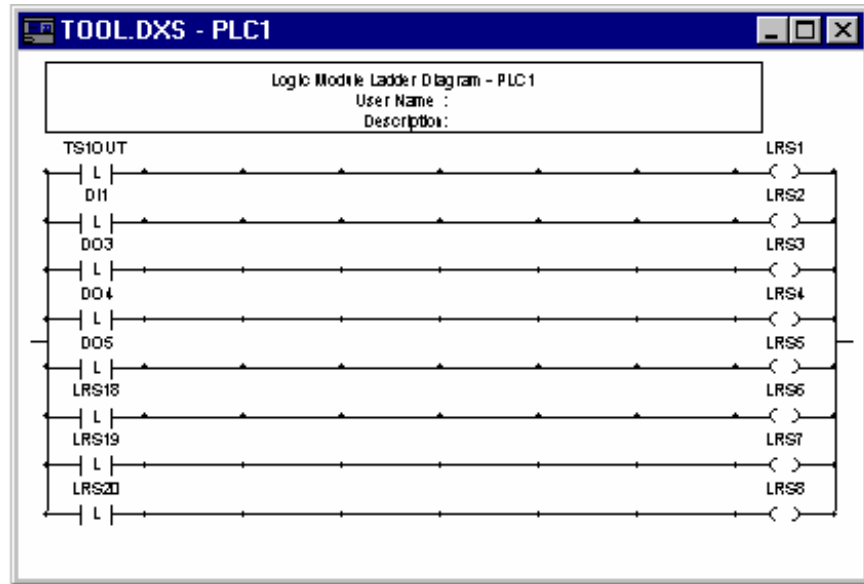
Figure 7-1: Example of Assigning LRS Logic Variable Bytes

Table 7-2: Trend Log Items for Metasys Point History

DX Version	Analog Items	Logic Variables
1.4, 2.4, and Later	AI1 to AI8	DI1..8
	OUT1 to OUT8	LRS1..8
	ACO1 to ACO8	LRS9..16
	XTnAI1 to XTnAI8*	LRS17..24
	XTnAO1 to XTnAO8*	LRS25..32
		XTnDI1..XTnDI8*
2.4 and Later	OUT9 to OUT14	–

* Requires Metasys Person-Machine Interface (PMI) Release 11.00 or later.

Table 7-3: Trend Log Items for DX LCD Display

DX Version	Analog Items	Logic Variables
2.4, 3.4, and Later	AI1 to AI8	DI1..8
	OUT1 to OUT14	LRS1..8
	ACO1 to ACO8	LRS9..16
	XTnAI1 to XTnAI8	LRS17..24
	XTnAO1 to XTnAO8	LRS25..32
	PMnK1 to PMnK34	LRS33..40
	PMnOU1 to PMnOU8	LRS41..48
	PMnAX1, PMnAX2	LRS49..56
		LRS57..64
		DO3..8
		DCO1..8
		DCO9..16
		DCO17..24
		DCO25..32
		XTnDI1..8
		XTnDO1..8
		AIH1..4
		AIH5..8
		AIL1..4
		AIL5..8
		XTnAIH1..4
		XTnAIH5..8
		XTnAIL1..4
		XTnAIL5..8
		PMnDO1..8
3.4 and Later	NAI1 to NAI16	NDI1-1..8
		NDI1-9..16
		NDI2-1..8
		NDI2-9..16
		NDI3-1..8
		NDI3-9..16
		NDI4-1..8
		NDI4-9..16
		NDI5-1..8
		NDI5-9..16
		NDI6-1..8
		NDI6-9..16
		NDI7-1..8
		NDI7-9..16
		NDI8-1..8
		NDI8-9..16

Detailed Procedures

Defining the Trend Log Module Channels

To define the Trend Log module channels:

1. From the GX Tool main screen, double-click on the Trend Log module block. The Trend Log data window appears (Figure 7-2).
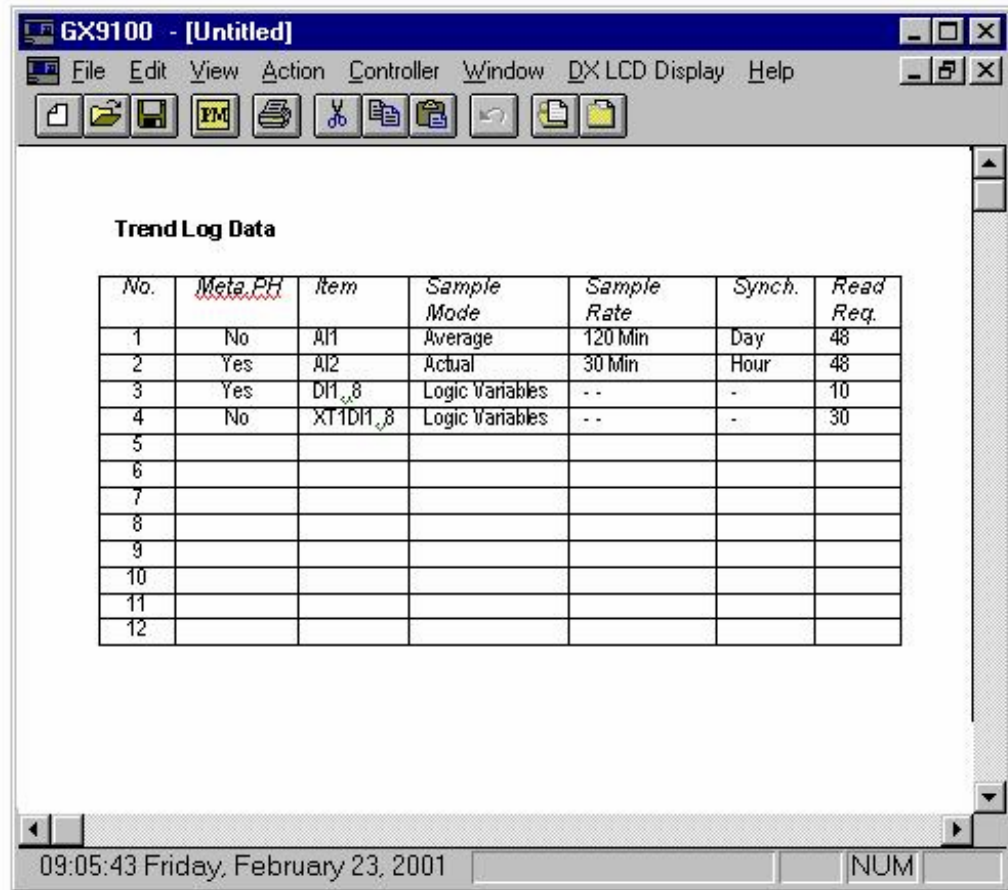
Figure 7-2: Trend Log Data Window Example

2. Right-click the channel to configure, and select Data from the pop-up menu that appears. The Data dialog box for the Trend Log channel appears (Figure 7-3).
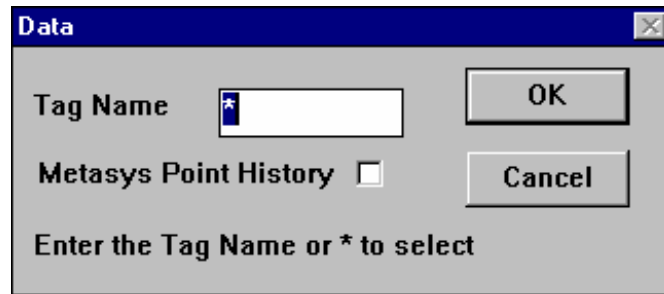
Figure 7-3: Data Dialog Box for Trend Log Channel

3. Type a Tag Name or an asterisk (*) to select a Tag Name from a list. Check the Metasys Point History box if required.

4. Click OK and a Select item category dialog box appears (Figure 7-4).

Note: If you enter a specific Tag Name, the next dialog box is the appropriate Trend Data dialog box. Proceed to Step 8.
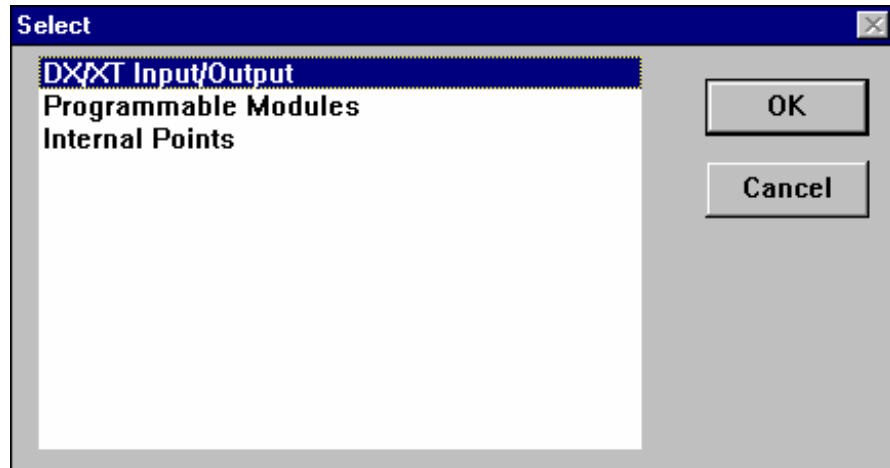
Figure 7-4: Select Item Category Dialog Box

5. Highlight a category and click OK. A Select subcategory dialog box appears (Figure 7-5).
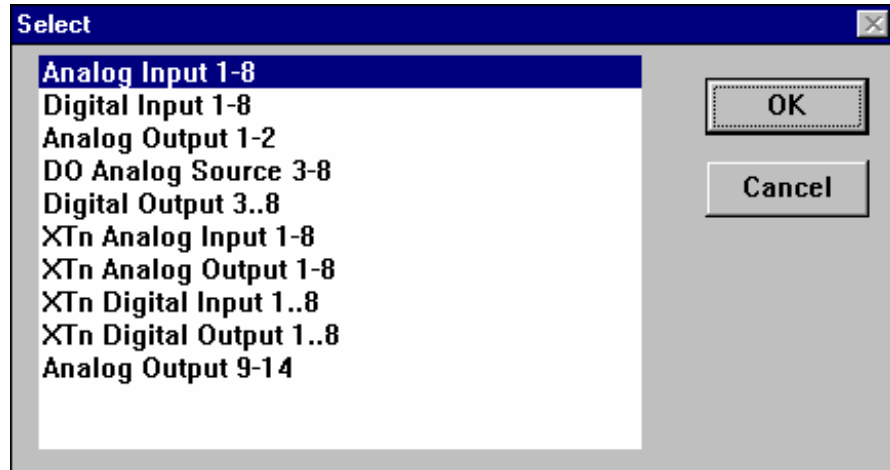
Figure 7-5: Select Subcategory Dialog Box

6.   Highlight a subcategory and click OK. A Select item dialog box appears (Figure 7-6).

Note: Several subcategory dialog boxes may appear before you reach the Select item dialog box.
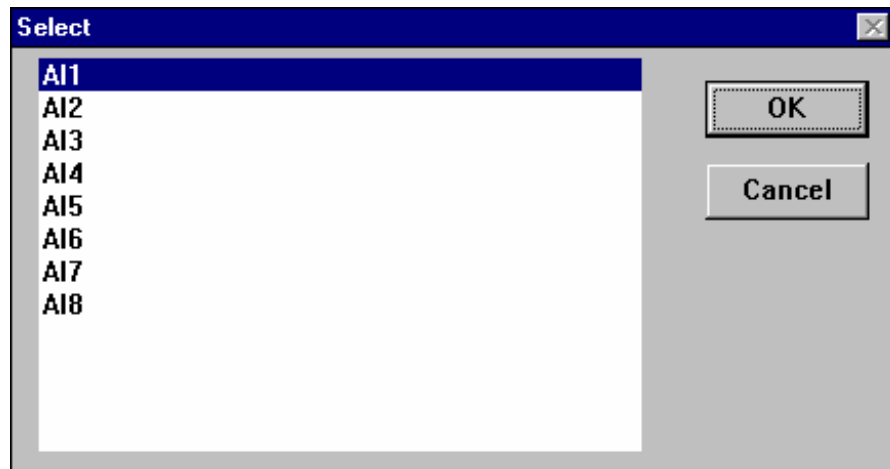
Figure 7-6: Select Item Dialog Box

7.   Highlight the item you want to add to the table and click OK. An analog item or a logic variable set Trend Data dialog box appears (Figure 7-7 or Figure 7-8).
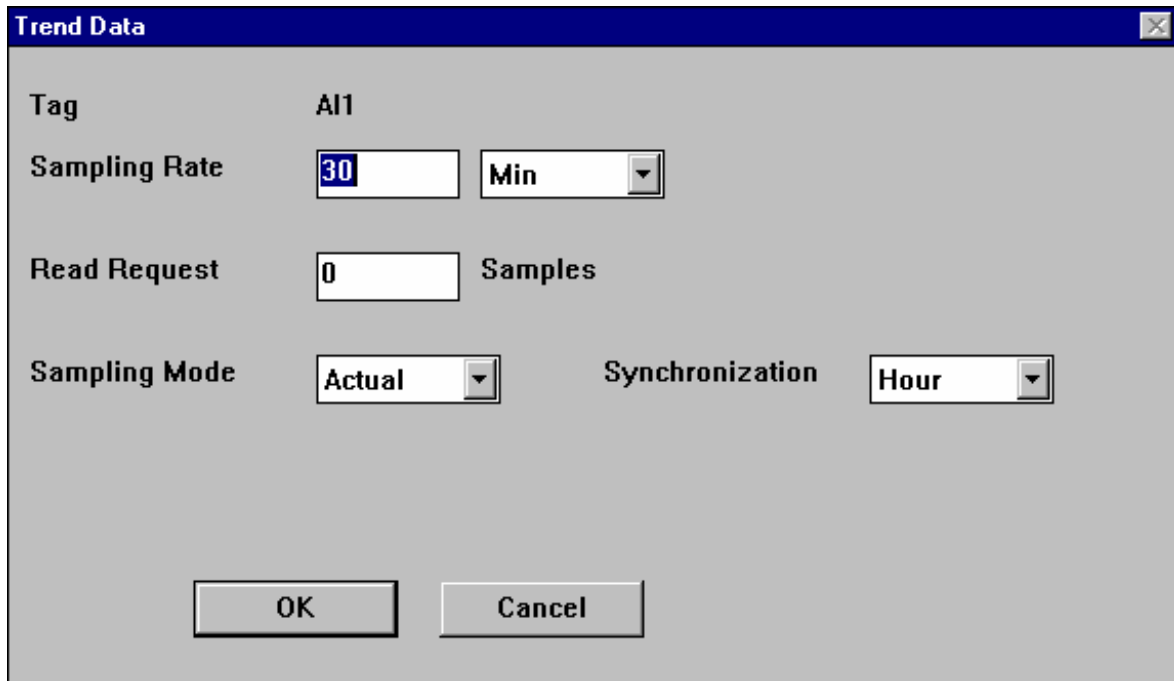
Figure 7-7: Analog Item Trend Data Dialog Box
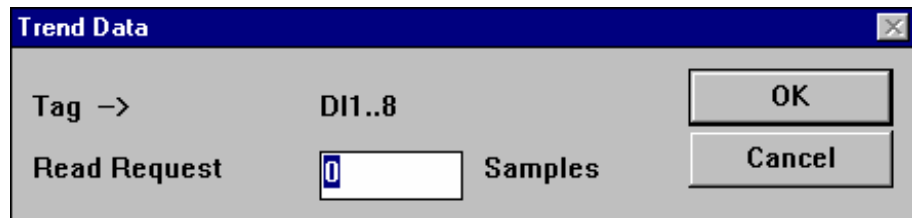
Figure 7-8: Logic Variable Set Trend Data Dialog Box

8. Fill-in data fields or select from the drop-down lists according to Table 7-4.

Table 7-4: Trend Data Entries and Options

Dialog Field	Possible Values	Default (Metasys Point History Setting)
Sampling Rate* (period of time between records)	5, 10, 15, 20, 60 Seconds** 1 to 1440 Min	Analog Input: 30 Analog Output: 30
Units for Sampling Rate	Seconds Minutes	Minutes
Read Request*** (number of new samples to set HTRR)	Analog: 0 to 61**** Logic Variables: 0 to 30	Analog Input: 48 Analog Output: 48 Logic Variables: 10
Sampling Mode (analog value to record at end of each period)	Actual Average Maximum Minimum	Actual
Synchronization (exact time of the start of trend recording)	None Day (midnight 00:00:00) Hour (xx:00:00) Minute (xx:xx:00)	Hour

*   Logic Variable bytes are read each second but only recorded when there has been a change-of-state in at least one bit.

**   When seconds are selected, the GX Tool automatically increases the entered value to one of the specified values and gives an error if the value is over 60.

***   A Read Request value of 0 disables the Read Request feature for the Item or Logic Variable.

****   The GX Tool sends the first 48 read requests in one transmission. The rest are sent in a second transmission. To prevent a second transmission, enter 48 as the maximum Read Request.

9.   Click OK to save the channel data and return to the Trend Log definition table.

Configuring the Dial Function for Metasys Point History

To configure the DIAL function for Metasys Point History:

1. Add a LOAD element to any free line of a PLC module.

2. Assign the LOAD element with the logic variable Historical Trend Read Request (HTRR), listed under Diagnostic.

3. Add a SET element to the line.

4. Assign the SET element the logic variable DIAL, listed under SUPERV.

Notes: If other logic variables have already been configured to set the DIAL variable, add the HTRR variable as an OR element to the ladder diagram (Figure 7-9).

For more information on this application, refer to the *DX-9100 Configuration Guide (LIT-6364030)* or the *NDM Configurator Application Note (LIT-6364090).*
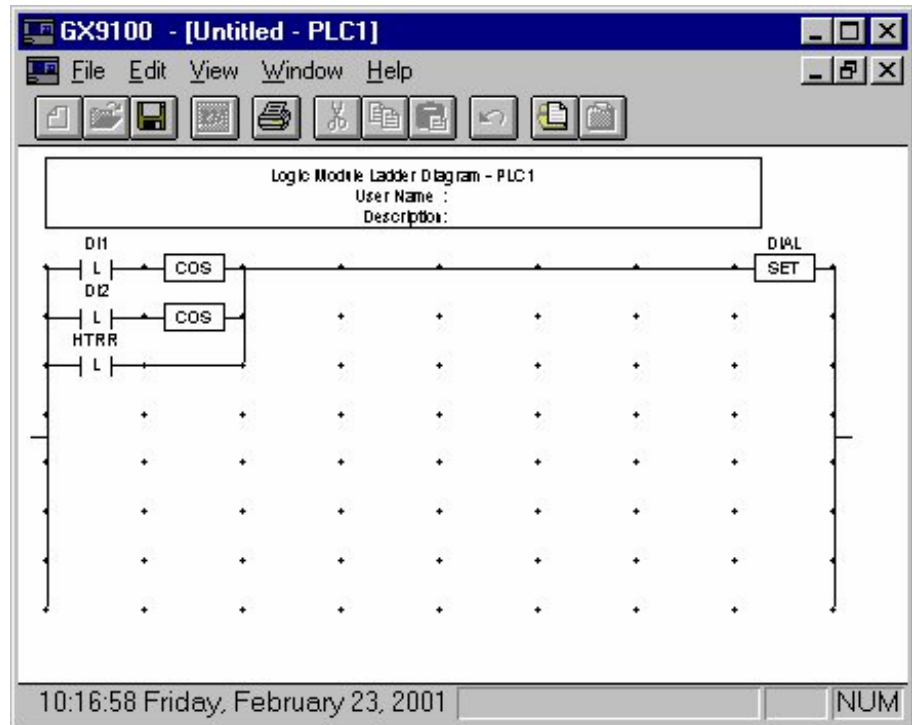
Figure 7-9: Ladder Logic to Set DIAL from Trend Log

Chapter 8

Reusing Configurations

Introduction

The GX Tool allows you to reuse and manipulate the modules and data that define configurations. The first step in working with a configuration is to upload a configuration from the DX controller or to open a previously saved configuration file.

This chapter describes how to:

- upload a configuration from the DX controller

- open a previously saved configuration file

- save a configuration file

- save modules to the Application Library

- open modules from the Application Library

Key Concepts

Download and Upload Files

The file extension indicates if the file is being downloaded or uploaded. It also indicates the data it contains. Refer to Table 8-1 for download and upload file extensions and the data they contain.

Table 8-1: Download and Upload File Extensions

File Extension	Configuration Data
Download Files	
DXF	DX and XT
XTF	XT/XTM only
CLF	Calibration only
Upload Files	
DXU	DX and XT
XTU	XT/XTM only
CLU	Calibration only

Paste Process

You can reuse a set of modules in a configuration or transfer them to a new configuration. The GX Tool uses a series of dialog boxes to modify connections and modules during the pasting process (Figure 8-3 and Figure 8-1).

Connections between selected modules transfer to the target configuration. The data content of I/O modules replaces the data content of I/O modules in the target configuration. The paste process deletes connections to items that do not exist in the target configuration.

Notes: If the module is an Analog Input (AI) that is already referenced by a connection in another module, the type of the AI module (Active or Passive) cannot be overwritten and the paste action must be cancelled.

If the module is an output module with an existing connection, the module cannot be overwritten unless you delete the connection first.

Select Analog Constants (ACO), Digital Constants (DCO), and Logic Result Status modules only if they do not exist in the target configuration. Redefining connections to these modules is part of the transfer process. Enter values for ACO and DCO items once the transfer process is complete.

Each programmable and time schedule module number changes to the number of the next available unused module in the target configuration during the transfer process, and can be changed by the user. The references to connections between modules in the selected set are changed automatically and cannot be modified during the transfer process.

The PLC module cannot be pasted.

I/O Module Modification

When I/O modules (e.g., AI1, DO3) are part of the set of modules you are reusing or transferring, sufficient modules of the same type must be available in the target configuration. If XT or XTM I/O modules are included, create the appropriate number of XT or XTM modules in the target configuration before reusing or transferring modules.

Use the Modify I/O Modules dialog box (Figure 8-1) to modify I/O modules pasted into the configuration. This box lists the Original and New connection points of the I/O modules about to be pasted.

All connections between the selected modules are transferred to the target configuration.

Connections to modules not included in the selected set must be deleted or changed during the paste process to fit the target configuration to complete the transfer. See *Programmable Module Modification.*

The data content of I/O modules included in the selected set replaces the data content of I/O modules in the target configuration. If the module is an output module with an existing connection, the module cannot be overwritten until the connection is first deleted.

To reuse I/O modules that exist in the target configuration and preserve the existing data in the modules, do not select them.

Double-click the New point for a list of available points.

Refer to Table 8-2 for options when modifying I/O module connections.
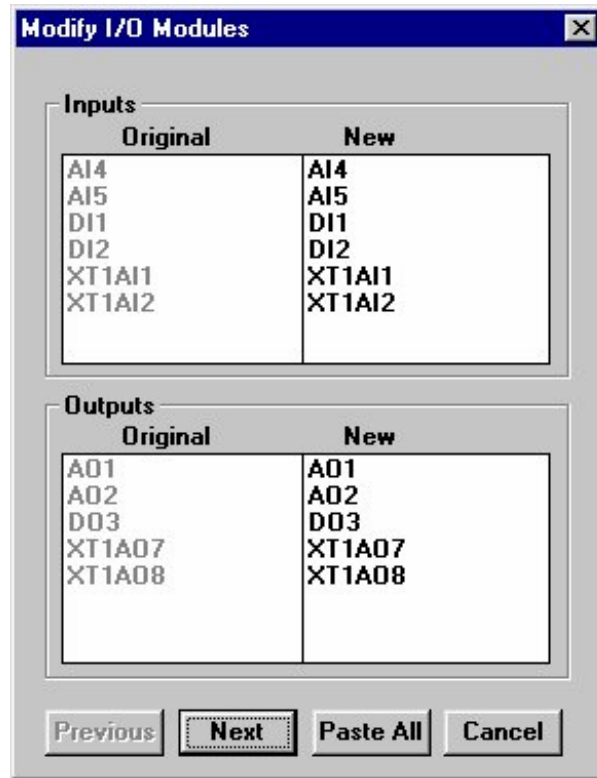
Figure 8-1: Modify I/O Modules Dialog Box Example

Table 8-2: Modifying I/O Modules

Option	Description
Inputs Original	Displays originally connected Input modules.
Inputs New	Displays newly connected modules. Double-click to select new connections from a pop-up list.
Outputs Original	Displays originally connected modules.
Outputs New	Displays newly connected modules. Double-click to select new connections from a pop-up list.
Previous	Displays previous dialog box.
Next	Displays next dialog box.
Paste All	Pastes the selected modules. The paste action cannot change a connection to an output module that already exists in the target configuration. A warning box appears (Figure 8-2) showing all connections that cannot be overwritten.
	If the warning appears, you must change the output module number to an unused output module, cancel the paste action and delete the existing connection in the target configuration, or remove the output module from the selected set of modules.
Cancel	Aborts the paste process. The selected set of modules remains available on the clipboard.
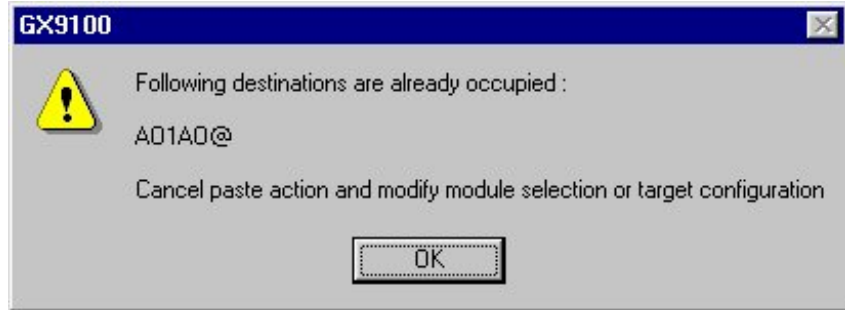
Figure 8-2: Destinations Occupied Warning Box

Programmable Module Modification

Use the Modify Programmable Modules dialog box (Figure 8-3) to modify programmable modules pasted into the configuration. This box lists the connection and source points of the programmable modules about to be pasted.

Double-click the source point for a list of available points.

Refer to Table 8-3 for programmable module data fields.
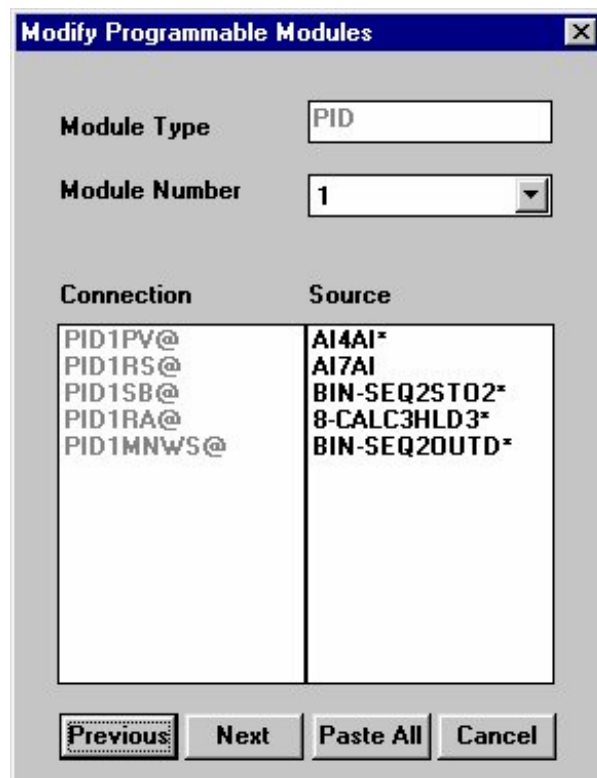
**Figure 8-3: Modify Programmable Modules
Dialog Box Example**

Table 8-3: Programmable Module Data Fields

Option	Description
Module Type	Displays the type of module being modified.
Module Number	Displays the module number. Change using drop-down menu.
Connection	Displays the connected module points.
Source	Shows the destination points. Double-click to select new points from a list of Source points.
Previous	Displays Modify Programmable Modules dialog box.
Next	Displays next dialog box. A warning box appears if any of the new references do not exist in the target configuration.
Paste All	Pastes the selected modules without displaying individual dialog boxes. A warning box appears if any of the selected modules cannot be pasted.
Cancel	Aborts the paste process. The selected set of modules remains available on the clipboard.

Note: Source points marked with an * cannot be changed.

Detailed Procedures

Uploading a Configuration from the DX Controller

To upload a configuration from the DX controller:

Note: We recommend saving the current configuration before uploading. The configuration you upload from the controller replaces the current configuration on the screen.

1. Close all PLC, Trend, and DX LCD Display definition windows.

2. On the Action menu, click Upload. The Upload dialog box appears (Figure 8-4).
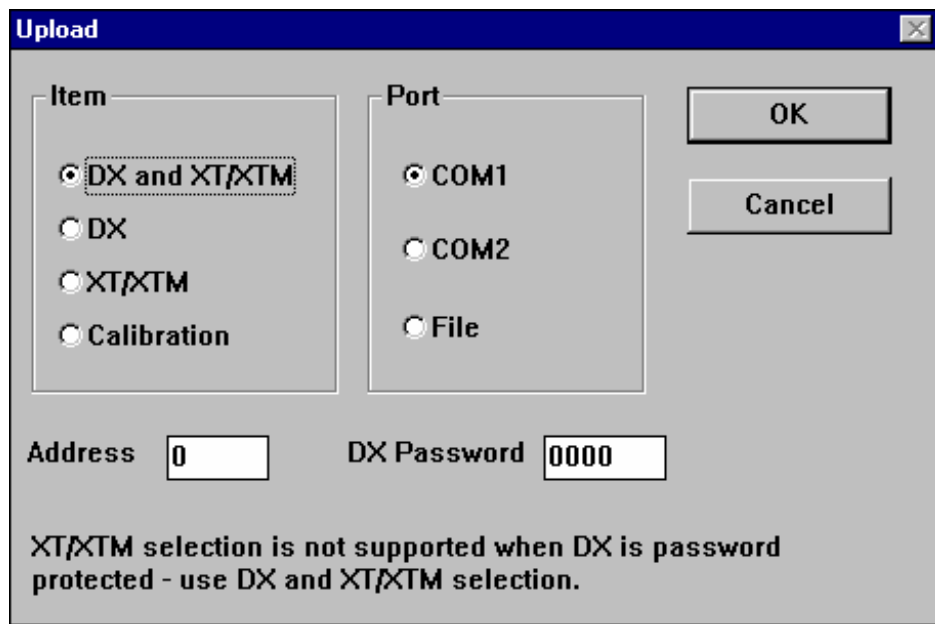
Figure 8-4: Upload Dialog Box

3. Click the option buttons to select the item to upload and the port to which the DX controller is connected.

Note: The File option under Port is only available if the GX Tool is running on a PC with M-Tool software where .dxu, .xtu, or .clu files are stored. These files are created when uploading a configuration via an N30 using the Loader UI program. To upload from a file, select File and click OK. The Choose File for Upload dialog box appears (Figure 8-5). Select a file and proceed to Step 6.
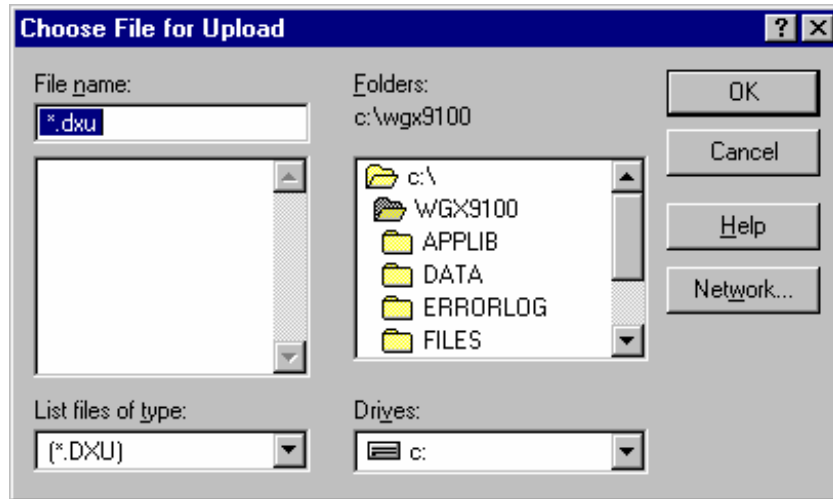
Figure 8-5: Choose File for Upload Dialog Box

4. Enter the address of the controller from which you are uploading into the Address field. If you are uploading an XT/XTM that is directly connected to the N2 Bus (not connected to the XT Bus of a DX controller), enter the address of the XT/XTM module.

5. Enter the password number of the configuration you are uploading in the DX Password field (only for DX Versions 1.4, 2.4, 3.4, or later). The upload fails if the password number is incorrect.

Note: The Password field only appears if password protection is enabled.

6. Click OK. Upload checks if the configuration in the tool matches the configuration in the controller. If the check fails, the GX9100 modules do not match dialog box appears (Figure 8-6).
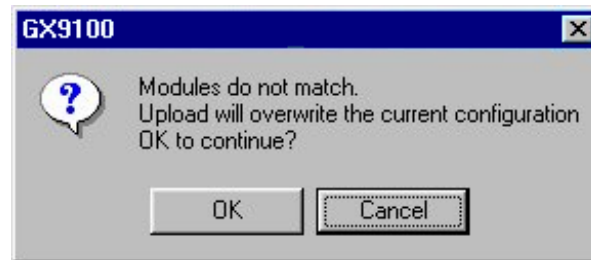
Figure 8-6: Modules Do Not Match Dialog Box

7. Select OK to continue uploading the configuration. The configuration displays on the screen when the upload is completed.

Open a Previously Saved Configuration File

To open a previously saved file:

1. On the File menu, click Open. The File Open dialog box appears (Figure 8-7).
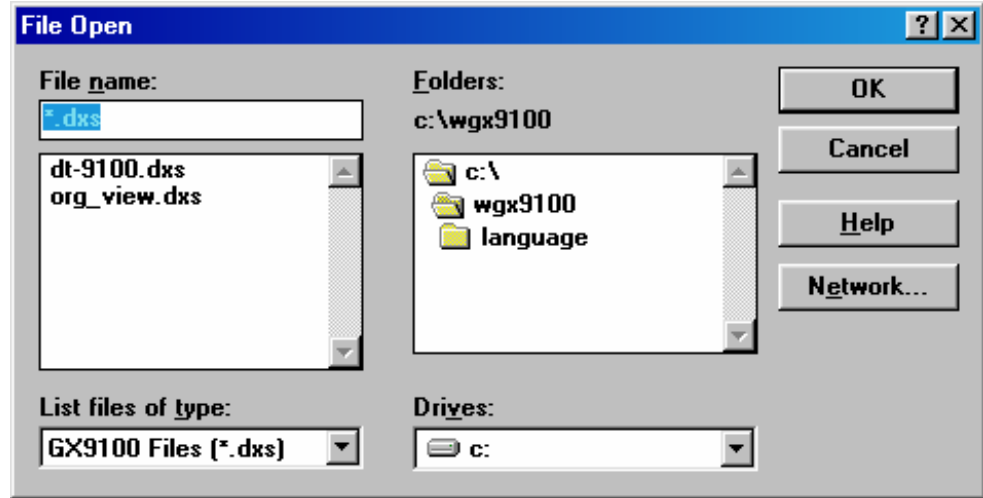
Figure 8-7: File Open Dialog Box

2. Select the configuration from the File Name list.

Note: If the configuration does not appear in the list, browse to the proper folder using the dialog box.

3. Click OK.

Save a Configuration File

To save a configuration file, on the File menu, click Save.

Notes: The configuration saves under the current file name. If you are saving for the first time, the File Save As dialog box appears.

If you save a configuration while in Show Selected mode, the entire configuration saves in this mode. When opening the file, on the View menu, click Show All to see the entire configuration.

Save Modules to the Application Library

To save modules to the Application Library:

1.   Click while holding Ctrl and select the modules you want to save.

2.   On the File menu, click Save to Library. The Save to Application Library dialog box appears (Figure 8-8).
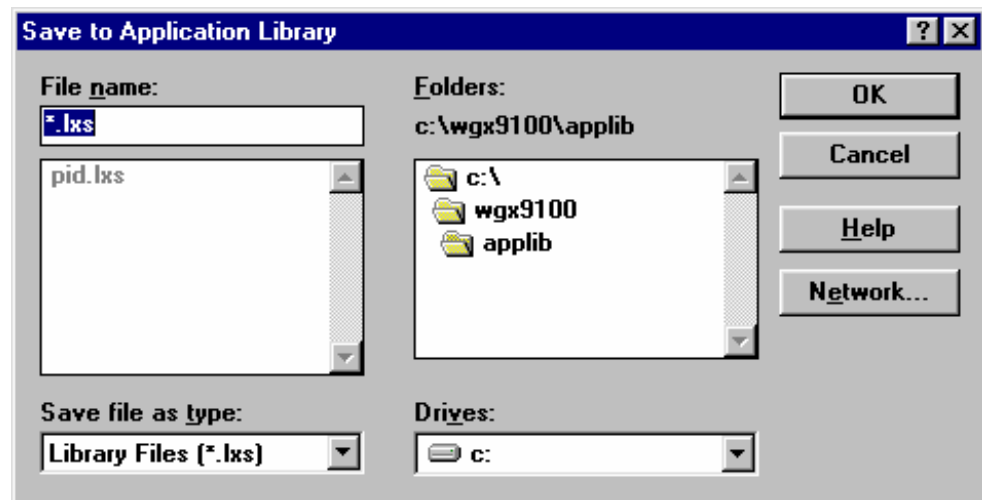
Figure 8-8: Save to Application Dialog Box

3.   Type a name in the File Name box.

Note: Library files save as an .lxs file.

4.   Click OK.

Open Modules from the Application Library

To open modules from the Application Library:

1. On the file menu, click Open from Library. The Open from Application Library dialog box appears (Figure 8-9).
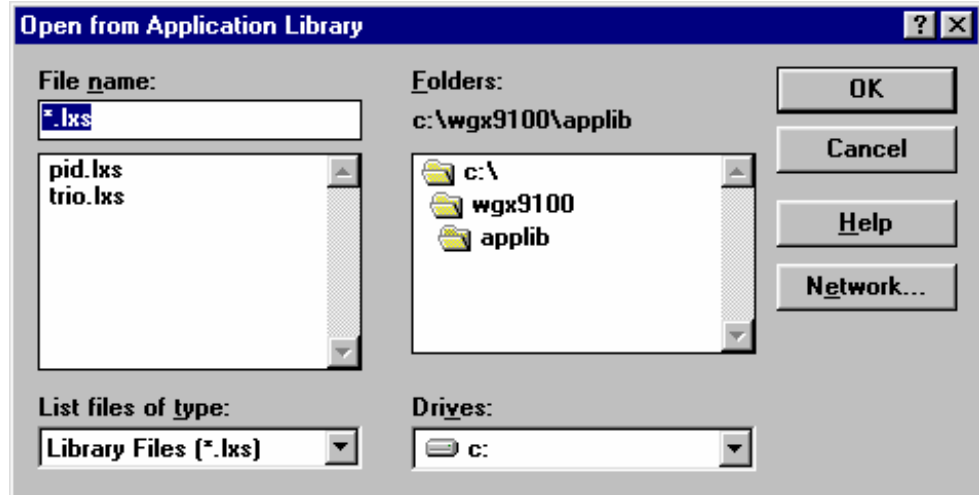
Figure 8-9: Open from Application Dialog Box

2. Select a file from the File Name list. Modules from the file are copied to the clipboard.

3. On the Edit menu, click Paste.

Troubleshooting

Table 8-4: Troubleshooting Errors

Error/Condition	Cause
Error message: `The file could not be opened!`	• The software could not find this file. Check that the disk is properly inserted in drive. • The software could not open the file; the file could possibly be corrupted. Use the backup file instead.
Data window values delete upon exiting window.	You may have exited the window by clicking Cancel or by pressing Esc before saving changes. Be sure to save changes before exiting data windows.
When opening a *.dxs file, message: `Error: Language File DXTEXT is missing, cannot load GX-9100` **appears on the screen.**	You are opening a *.dxs file not located on the C: drive with Windows Explorer or Program File Manager in Advanced Installation Management (AIM) Tools. Open the file within the GX Tool using File > Open.

Chapter 9

Downloading the DX Controller

Introduction

The GX Tool downloads a configuration to the DX controller. The GX Tool also uploads from the DX controller to reuse, print, and manipulate the modules and data that define configurations.

This chapter describes how to:

* download a configuration to the DX controller

For information on the Loader UI, refer to the *M-Tool Overview and Installation Technical Bulletin (LIT-693100)*. For information on the N30 Supervisory Controller, refer to the *N30 Supervisory Controller Technical Manual*.

Key Concepts

Operator Workstation (OWS)

If downloading a configuration from the OWS, it must be DX or XT/XTM and the port must be File. This creates a file with a .DFX extension. Move the file from the GX9100 directory to the Metasys® System 91 subdirectory so it can be downloaded from a DX Device Object Focus window in the OWS.

You cannot download a DX-9200 controller from the OWS.

Download and Upload Files

The file extension indicates if the file is being downloaded or uploaded. It also indicates the data it contains. Refer to Table 9-1 for download and upload file extensions and the data they contain.

Table 9-1: Download and Upload File Extensions

File Extension	Configuration Data
Download Files	
DXF	DX and XT
XTF	XT/XTM only
CLF	Calibration only
Upload Files	
DXU	DX and XT
XTU	XT/XTM only
CLU	Calibration only

Detailed Procedures

Downloading a Configuration to the DX Controller

To download a configuration to the DX controller:

1. On the Action menu, click Download. The Download dialog box appears (Figure 9-1).
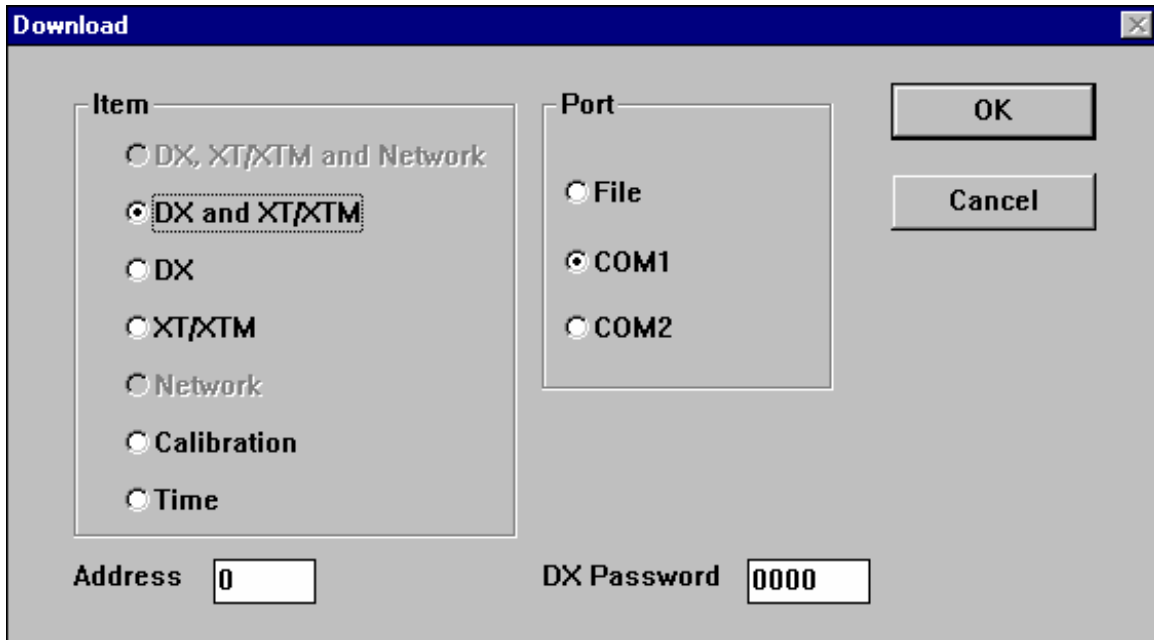
Figure 9-1: Download Dialog Box

2. Select the item to download and the proper port.

Note: When you are downloading Time from the GX Tool with Windows® 2000 Operating System, the Time value downloaded to the DX is taken from the time maintained by the GX application, and not directly from the current Personal Computer (PC) time. The GX application time is synchronized with the PC time when the GX Tool is started. If you change the PC time while the GX Tool is running, you need to close and restart the GX Tool application to enable the GX Tool to synchronize itself with the new time on the PC. The Time download feature in the GX Tool is intended for synchronizing the time of day in multiple DX controllers that are not connected to a Metasys supervisory system. When you want to repeatedly change the time in the DX for testing time functions, such as scheduling, when running on Windows 2000 operating system, you need to restart the GX Tool for each time change before downloading.

3. Enter the address of the controller in the Address data field to download the configuration. The address must be a number between 1 and 255.

Notes: If you are downloading XT/XTM modules, the address is stored in the configuration and the Download dialog box address field is unavailable.

Address 255 is reserved for the DX LCD Display on the N2 Bus. If 255 is entered, the GX9100 dialog box appears (Figure 9-2) to confirm the address. Click Yes or No.
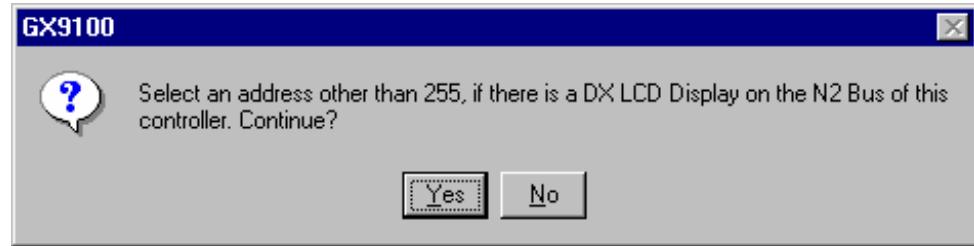
Figure 9-2: Address Warning Dialog Box

4. Enter password.

Notes: If the global data password in the configuration being downloaded is different from the controller password, the password is changed in the controller.

Download fails if the password is incorrect.

5. Click OK. The hourglass appears on the screen until the configuration has downloaded.

Chapter 10

Creating ASCII Tag Name Files and DDL Files

Introduction

The GX Tool allows you to reuse, print, and manipulate the modules and data that define configurations. The first step in working with a configuration is to upload a configuration from the DX controller or to open a previously saved file.

This chapter describes how to:

- write user names to the ASCII Tag file

- read user names from the ASCII Tag file

- create DDL files

Key Concepts

Tag Name ASCII Files

The Tag name file is an ASCII text file of the current GX Tool configuration file information. The GX Tool creates this file and saves it on the local drive for offline editing. The GX Tool reads the single file back into multiple configurations.

Edit the Tag name file using a standard text editor. Define names following the equal signs (Figure 10-1). The names you enter become user names when you read the file into the next configuration. User names change for matching modules only.

Refer to Table 10-1 for information and character limits of the ASCII Tag name file.

Table 10-1: ASCII Tag Name File Character Limits

Information	Number of Characters
Project Description	50 characters per line
Tag Name	8 characters
Tag Description	24 characters per line

```
[File]
File=A:\AHU601.TAG

[Job Information]
Job Name=507 E. MICHIGAN
Controller Name=AHU-601
Engineer=WARREN JOHNSON
Branch=MILWAUKEE
Project Description1=
.
.
.
Project Description5=

[AI1]
User Name=DA-T
Description=
* Output Tag
AI=da-t
AI%=
AIH=
AIL=
OVR=
UNR=

[AIn]
User Name=RM-T
Description=
```

```
[TS1]
User Name=
Description=
* Input Tag
TSOV@=
TSON@=
TSOF@=
* Output Tag
EXS=
OUT=

[TSn]
User Name=
.
.
.
[LRSnn-mm]
User Name=
Description=
* Output Tag
LRSnn=
etc.
.
.
.
```

typ_tag

Figure 10-1: Partial Example of a Typical Tag Name File

DDL Files

Data Definition Language (DDL) is a text-based program used to identify the components on a Metasys Network, organize how these components connect to each other, and attach the various hardware and software objects to the appropriate system.

When you save the configuration, the GX Tool creates two DDL files. Refer to Table 10-2 for DDL file details.

Table 10-2: DDL Files

DDL File	Extension	Description
Model File	.DMO	Maps CS objects and commissions templates in HVAC PRO™ software.
NC File	.DNC	Maps hardware items AIn, DIn, AOn, and DOn to Metasys objects.

Detailed Procedures

Writing User Names to the ASCII Tag File

To write user names to the ASCII Tag file:

1. On the Select File menu, click Write User Names. A Tag Name Dialog box appears (Figure 10-2).
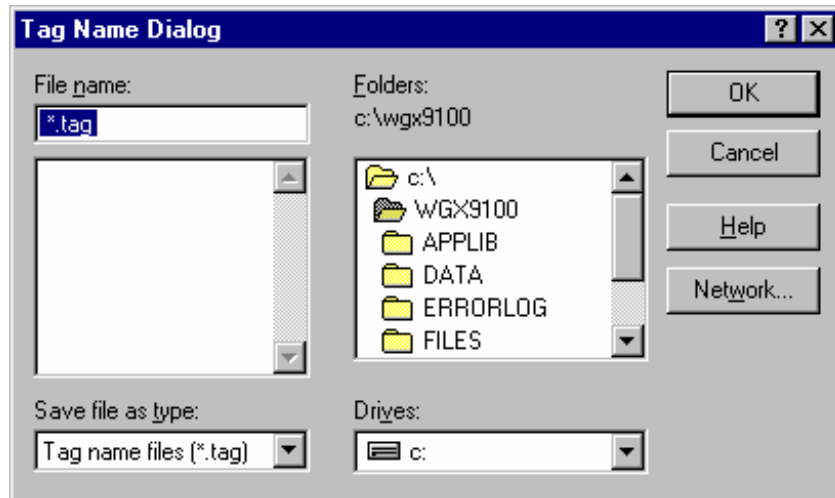
Figure 10-2: Tag Name Dialog Box (Write User Names)

2. Enter a file name.
3. Select a location.
4. Select OK.

Reading User Names from the ASCII Tag File

To read user names from the ASCII Tag file:

1. On the File menu, click Read User Names. A Tag Name Dialog box appears (Figure 10-2).

2. Select the drive and directory containing the file.

3. Select the desired Tag file from the list in the left side box. Click OK. The Tag and user-defined names are imported into the open configuration.

Creating DDL Files

To create DDL files:

1. On the File menu, click DDL File Options. The DDL File Options dialog box appears (Figure 10-3).
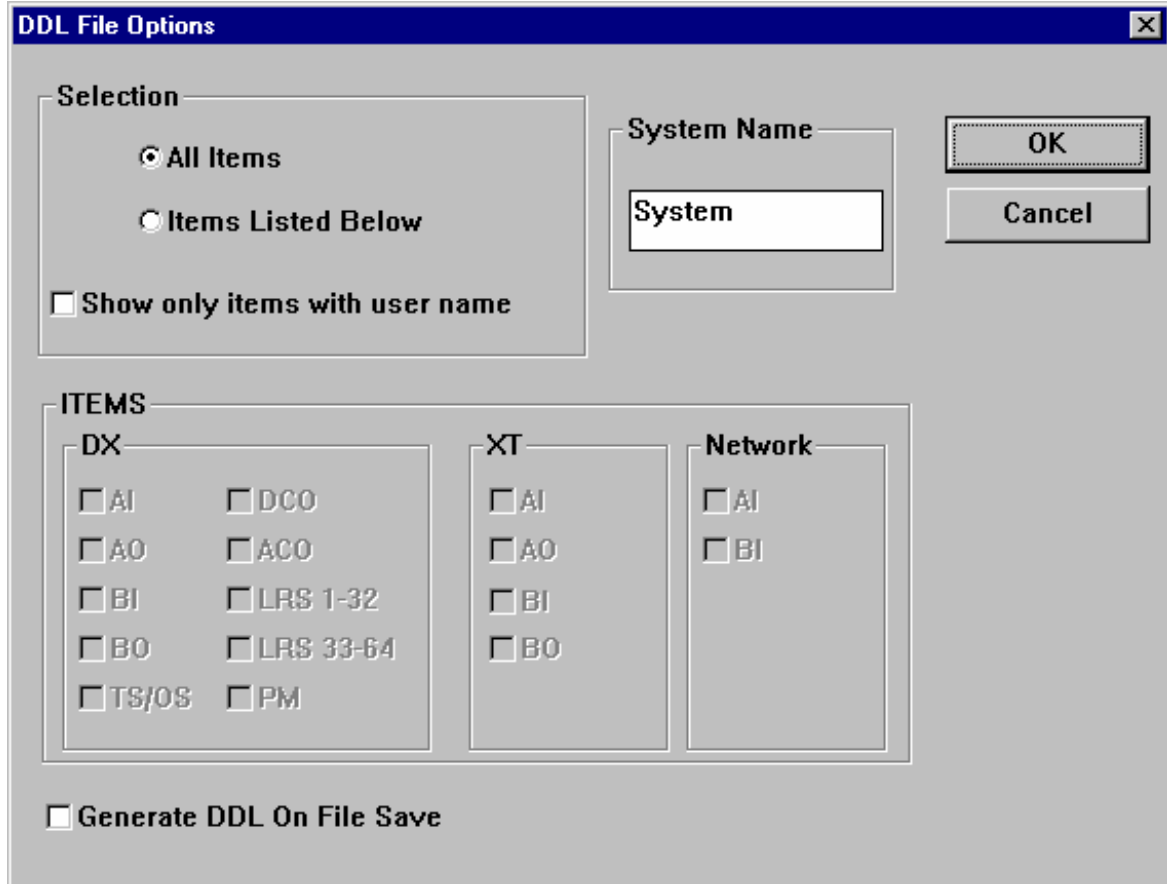
Figure 10-3: DDL File Options Dialog Box

2. Select All Items, Items Listed Below, or Show only items with user name.

3. If you selected Items Listed Below, check those items you want to include in the DDL file.

4. Enter the desired 8-character Metasys System Name.

5. Clear Generate DDL On File Save check box to disable the automatic generation of DDL files.

6. Click OK.

Chapter 11

Downloading and Uploading a DX Controller via an N30 Supervisory Controller

Introduction

The GX Tool can be used to download a configuration to and to upload a configuration from the DX controller via an N30 Supervisory Controller.

This chapter describes how to:

- download to a DX controller via an N30

- upload from a DX controller via an N30

For information on the Loader UI, refer to the *M-Tool Overview and Installation Technical Bulletin (LIT-693100).* For information on the N30 Supervisory Controller, refer to the *N30 Supervisory Controller Installation Technical Bulletin (LIT-6891100).*

Key Concepts

XT/XTM Module Download via N30

GX Tool Release 7 or later supports the download of XT/XTM module configurations as part of a DX controller configuration via the N30 using DX and XT/XTM. Download via N30 does not support the download of the XT/XTM configuration alone in any version.

You cannot download the XT/XTM configuration individually in any system.

Download and Upload Files

The file extension indicates if the file is being downloaded or uploaded. It also indicates the data it contains. Refer to Table 11-1 for download and upload file extensions and the data they contain.

Table 11-1: Download and Upload File Extensions

File Extension	Configuration Data
Download Files	
DXF	DX and XT
XTF	XT/XTM only
CLF	Calibration only
Upload Files	
DXU	DX and XT
XTU	XT/XTM only
CLU	Calibration only

Detailed Procedures

Downloading to a DX Controller via an N30

To download to a DX controller via an N30:

1. On the Action menu, click Download via N30. The Download Via N30 dialog box appears (Figure 11-1).
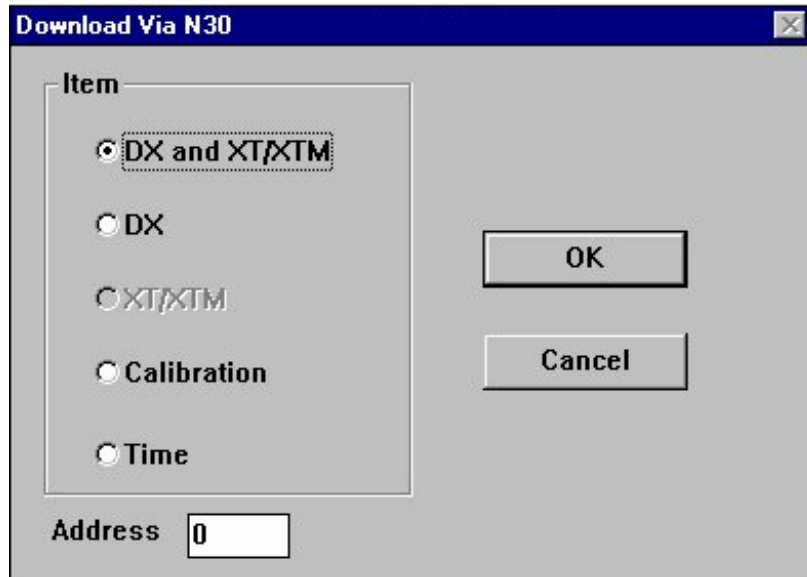
Figure 11-1: Download Via N30 Dialog Box

2. Select the item to download.

3. Enter the controller address to download to in the Address data field. The address must be a number between 1 and 255.

4. Click OK. The Loader UI program appears (Figure 11-2).

Note: The File Name field is the path of the open configuration in the GX Tool with an extension .dxf, .xtf, or .clf. The file name cannot be changed.
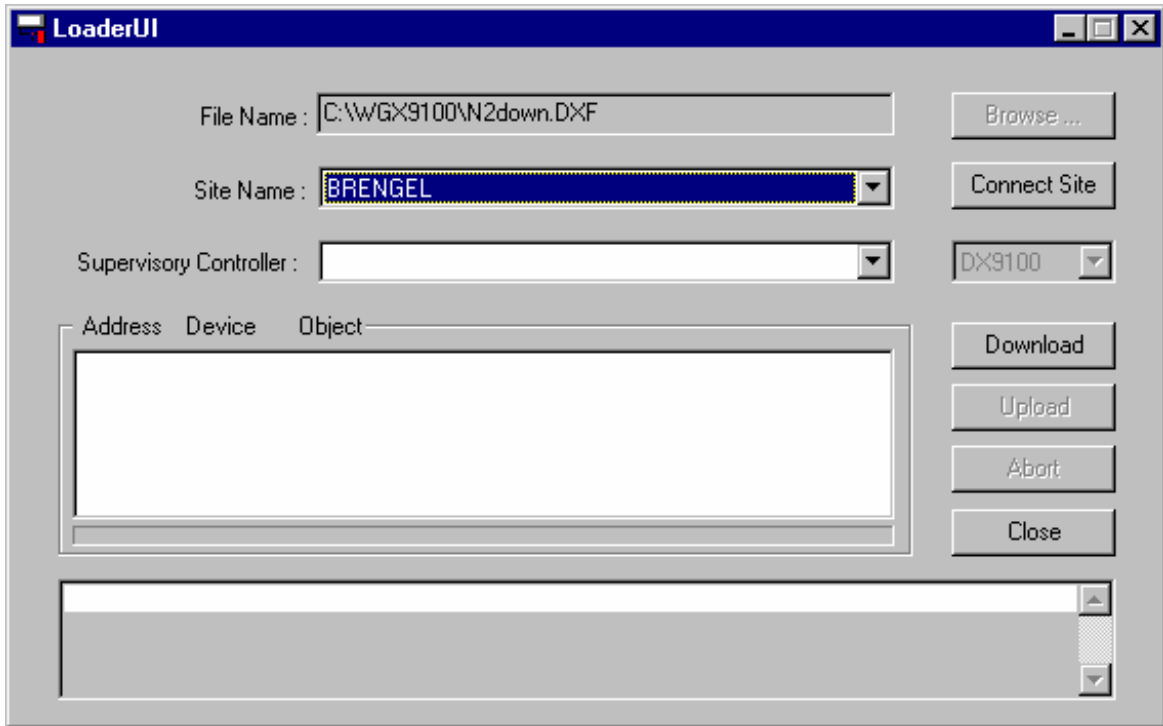
Figure 11-2: Loader UI Dialog Box for Download

5. Click the down arrow in the Site Name field to select site.

6. Click Connect Site. The Site Manager appears minimized on the Windows taskbar and establishes a connection with the Site shown in the Site Name field of the Loader UI dialog box.

7. Select the N30 controller connected to the DX controller in the Supervisory Controller field. A list of the DX controllers connected to the Supervisory Controller appears in the window.

8. Select a DX controller from the list.

9. Click Download to initiate the download process. The DX Download dialog box appears (Figure 11-3).

Note: When the Log File option is selected (default), the program writes a series of messages to errorlog.txt in the C: \root directory.
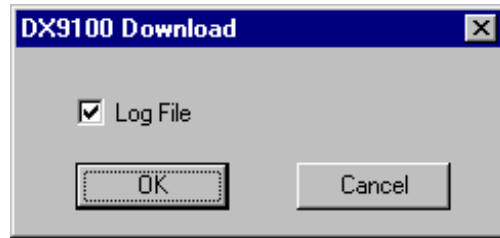
Figure 11-3: Download Dialog Box

10. Click OK to continue. The Password dialog box appears
    (Figure 11-4) asking for the password.
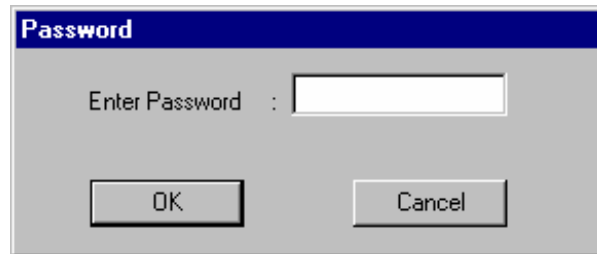
Figure 11-4: Password Dialog Box

11. Enter the password and click OK. If the DX is not password
    protected, click OK.

Notes: If the Password feature is disabled, but the DX controller is
          password protected, the download fails.

          If the password is incorrect, the GX Download Password
          dialog box reappears. After three incorrect entries, the
          download process is cancelled automatically.

          The progress bar in the Loader UI dialog box indicates the
          download progress.

12. Click Close when the download is complete. If the download fails,
    refer to the errorlog.txt file for probable causes.

Uploading from a DX Controller via an N30

Note: We recommend saving the current DX and XT/XTM
         configuration before uploading. The configuration you
         upload from the controller replaces the current configuration
         on the screen.

To upload from a DX controller via an N30:

1. On the Action menu, click Upload Via N30. The Upload Via N30
    dialog box appears (Figure 11-5).
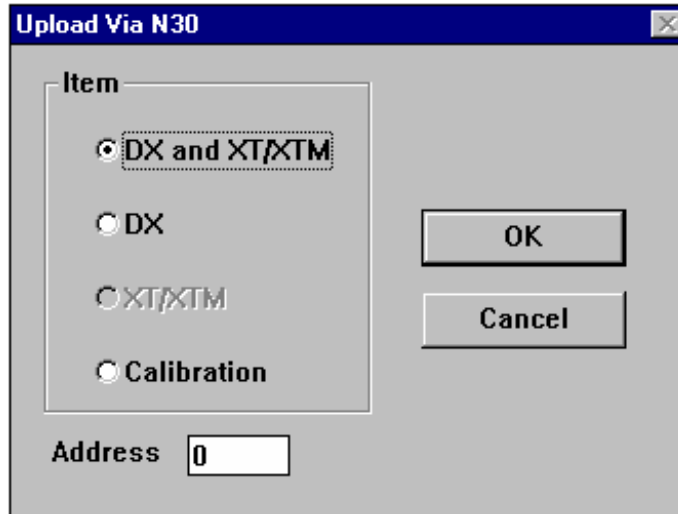
Figure 11-5: Upload Via N30 Dialog Box

2. Select the item to upload.

3. Enter the controller address from which the configuration is to be
    uploaded in the Address field. The address must be a number
    between 1 and 255.

4. Click OK. When the Loader UI dialog box appears (Figure 11-6).

Note: The File Name field is the path of the open configuration in
         the GX Tool with the extension .dxu, .xtu, or .clu. The file
         name cannot be changed. The default name of an unopened
         configuration file is n2up.xxx.
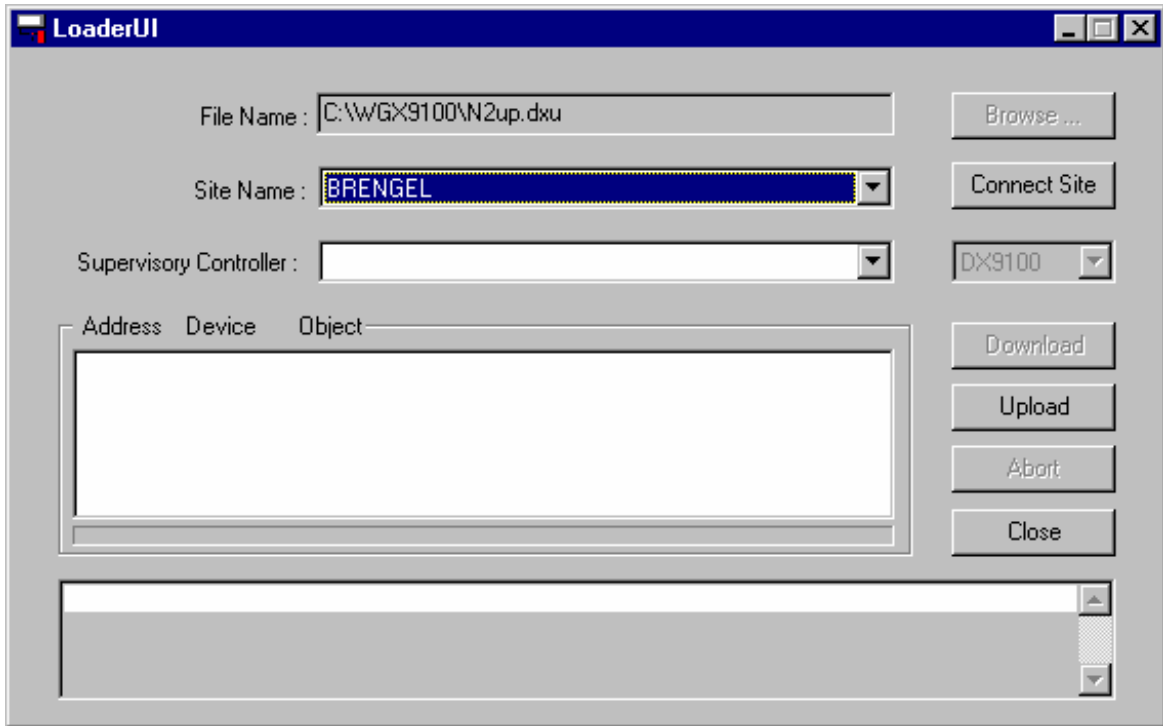
Figure 11-6: Loader UI Dialog Box for Upload

5. Click Connect Site.

6. Click the down arrow in the Site Name field to select another site.

7. Select the N30 controller connected to the DX controller. A list of the DX controllers connected to the selected Supervisory Controller appears in the field. Select the DX controller from the list.

8. Click Upload to initiate the upload process. The DX9100 Upload dialog box appears (Figure 11-7).

Note: When the Log File option is selected (default), the program writes a series of messages to errorlog.txt in the C: \root directory.
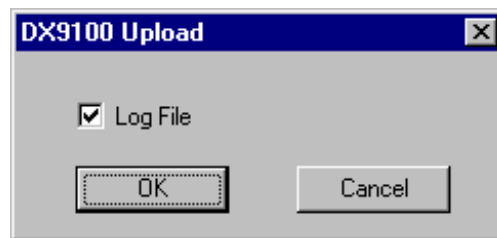
Figure 11-7: GX Upload Dialog Box

9.   Click OK to continue. If the password feature is enabled, the Password dialog box appears (Figure 11-4) asking for the password.

Note: If the Password feature is disabled, but the DX controller is password protected, the download fails.

10. Enter the password and click OK. If the DX is not password protected, click OK.

Notes: If the password is incorrect, the GX Download Password dialog box reappears. After three incorrect entries, the download process is cancelled automatically.

The progress bar in the Loader UI dialog box indicates the upload progress.

11. Click Close to close the Loader UI programs and terminate the Site Manager and Loader UI programs when the upload is complete. If the upload fails, refer to the errorlog.txt file for probable causes.

12. Click OK if the upload is successful. Upload checks whether the configuration open in the GX Tool matches the configuration uploaded from the controller (unless you are uploading a calibration). Upload checks only for DX elements, and Upload XT/XTM checks against XT/XTM and their associated EXPs; Upload DX and XT/XTM checks both. If the check fails, the MYCONFIG dialog box appears (Figure 11-8).
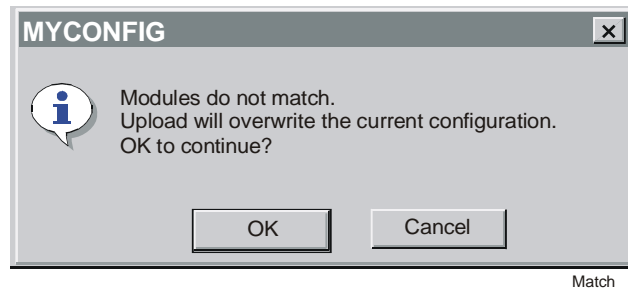
Figure 11-8: MYCONFIG Dialog Box

13. Select OK. The configuration appears on the screen when the upload is complete.

Troubleshooting

Table 11-2: Downloading/Uploading Configurations Error

Error	Cause
A download or upload fails.	If the DX controller is password protected, while the Password feature is disabled in the GX Tool, the download or upload will not succeed.

Chapter 12

Getting Started with the GX Tool and the DX LCD Display

Introduction

The DX LCD Display unit displays up to 96 data points from the DX controller configuration. It displays alarm data, time schedules, trend logs, and user defined graphics screens. The GX Tool selects data points and defines user text for all DX LCD Display screens.

This chapter describes how to:

- start the GX Tool

- define the global data for the DX LCD Display

- define the DX LCD Display configuration name

- define the default configuration

- customize the DX LCD Display main menu

Key Concepts

DX LCD Display Configuration Process

The second use of the GX Tool is to create a configuration for a DX LCD Display. Figure 12-1 shows the process for configuring the DX LCD Display.

Start the GX Tool.
↓
Load configuration.
↓
Define a User Config Code.
↓
Define the Global Data for the display.
↓
Define the configuration name for the display configuration.
↓
Define the Point Database for the display.
↓
Define TSn/OSn module descriptions.
↓
Define Trend Data.
↓
Set the default configuration.
↓
Download configuration and/or Home Page to the display.
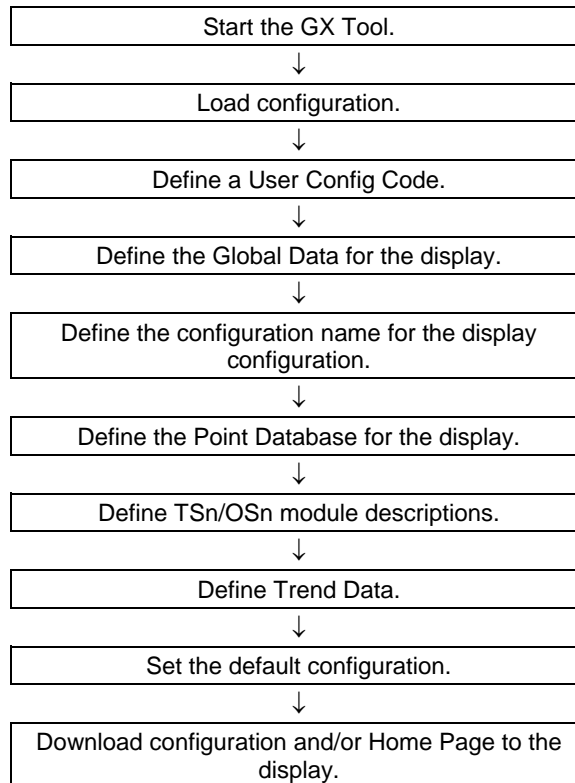
Figure 12-1: DX LCD Display Configuration Process

DX LCD Display Menu

The DX LCD Display menu contains all options required to define a configuration for the DX LCD Display. Table 12-1 describes the DX LCD Display menu options.

Table 12-1: DX LCD Display Menu Options

Menu Option	Description
Firmware Version	Lists firmware Version 2.01 or Version 3.00.00 or higher.
Global Data	Edits global data that affects the operation of the display as a whole, such as the time-out period of the LCD backlight.
Configuration Name	Edits the configuration name.
Define Default Configuration	Defines a default configuration used by the DX LCD Display if the configurations stored in the unit do not match the DX controller configuration.
Point Database	Defines the points shown on the DX LCD Display.
TSn/OSn Description Text	Edits the descriptions for Time Schedule modules and Optimal Start/Stop modules.
Define Trend Data	Defines the Trend Data points shown on the DX LCD Display.
Download Display	Downloads the current configuration to the display unit.
Read User Configuration Codes	Reads the configuration codes, names, Home Page data, and Trend definitions of the configurations currently stored in the DX LCD Display unit.
Upload Display	Uploads a configuration from the display unit to the GX Tool.
Update Firmware	Updates Version 3.00 and higher firmware. Only appears if enabled in the GX9100.INI file.

DX LCD Display Data Entry Menu Bar

The active DX LCD Display window changes the menu bar options.
Table 12-2 through Table 12-5 describe the options of each menu.

File Menu

Table 12-2 describes the File menu options.

Table 12-2: File Menu Options

Menu Option	Description
New	Unavailable
Open	Unavailable
Save	Saves the data in the data entry window within the current controller configuration in memory. Note: This **does not** save the current configuration.
Print	Prints the data in the data entry window in tabular form.
Print Preview	Displays the data in the data entry window as it will print on the page.
Exit	Unavailable

Edit Menu

Table 12-3 describes the Edit menu options.

Note: You can access the Edit menu by right-clicking on a line in the point database table.

Table 12-3: Edit Menu Options

Menu Option	Description
Data	Enters and/or edits the data of the currently selected (highlighted) line in the data entry window.
Cut	Removes the currently selected data and places it on the clipboard.
Copy	Copies the currently selected data to the clipboard.
Paste	Pastes the data from the clipboard into the currently selected line.
Delete	Deletes the currently selected data without placing it on the clipboard.

Window Menu

Table 12-4 describes the Window menu options.

Table 12-4: Window Menu Options

Menu Option	Description
Cascade	Arranges multiple windows on the screen in an overlapping stair-stepped fashion.
Tile	Arranges multiple windows on the screen in a non-overlapping fashion.
Arrange	Arranges aligned icons (minimized windows) at the bottom of the screen.

Help Menu

Table 12-5 describes the Help menu options.

Table 12-5: Help Menu Option

Menu Option	Description
Using GX9100 Help Topic	Launches a Help window with an index of GX Tool topics.
Help Using	Launches window containing help topics for Microsoft Windows Help.
About	Displays copyright and version information for the GX Tool.

Default Display Configuration

The DX LCD Display stores up to eight separate display configurations. Each configuration has a Configuration Name and a Configuration Code.

When you attach the DX LCD Display to a DX controller, the display attempts to match one of its stored configuration codes with the Configuration Code defined in the DX controller's configuration. If it finds a match, the DX LCD Display uses the corresponding display configuration.

If the display does not find a match or the default configuration is disabled, a `Configuration not found` message appears. You can define a default configuration using one of the eight stored configurations.

Detailed Procedures

Starting the GX Tool

To start the GX Tool:

On the Windows Start menu, click Programs > Johnson Controls > M-Tool > Configuration Tools > GX-9100. The GX Tool main screen appears.

Defining the Global Data for the DX LCD Display

To define the global data for the DX LCD Display:

1. On the DX LCD Display menu, click Global Data. The DX LCD Display - Global Data dialog box appears (Figure 12-2).

Figure 12-2: DX LCD Display - Global Data Dialog Box

2. Complete the fields using Table 12-6.
3. Click OK.

Table 12-6: Global Data Fields

Field	Description
Passwords	Enter a Level 1 password (allows the user to perform all functions) and a Level 2 password (only allows the user to perform adjust commands). Both passwords are 4-digit numbers from 0000 to 9999.
Password Time-out	Enter the time of user inactivity after which the password must be re-entered. The range is from 1 to 1440 minutes (24 hours). Enter 0 to disable the password time out.
LCD Backlight Time-out	Enter the time of user inactivity after which the display panel's backlight is automatically switched off. The range is from 1 to 30 minutes.
PC Port	Select the serial port that connects the display panel to the PC running the GX Tool. COM1 is Serial Port 1 and COM2 is Serial Port 2.
	Select File to save the configuration data to a file instead of downloading it directly to the display panel. Click Choose Dir. to specify folder to store downloaded files.*
Clock Format	Select the display panel to show the time in 12 or 24 hour format.
Device Poll	Enter addresses and/or ranges to be polled, separated by commas. Choose to enable N2 Bus operation.
Home Page**	Choose whether all custom home pages can be accessed from an active configuration.

* File name is the Configuration Code and the extension .dse (e.g., 99.dse) The GX Tool also creates three additional files to provide information for the emulator: h99.dse, common.dse, and fonts.dse.

** The Enable Multiple Home Page Display option is intended primarily for monitoring a single DX that controls multiple equipment. It allows an individual graphic representation of up to eight items of equipment.

If the DX LCD can connect to more than one DX controller, you must make sure that the source items for dynamic data in all Home Pages are configured in the same way in each controller. For example, if a Home Page shows "Outdoor Temperature" and is mapped to Item AI1, then you must configure each DX controller such that AI1 measures the outdoor temperature.

Defining the DX LCD Display Configuration Name

To define the DX LCD Display configuration name:

1. On the DX LCD Display menu, click Configuration Name. The DX LCD Display - Change/Edit Configuration Name dialog box appears (Figure 12-3).
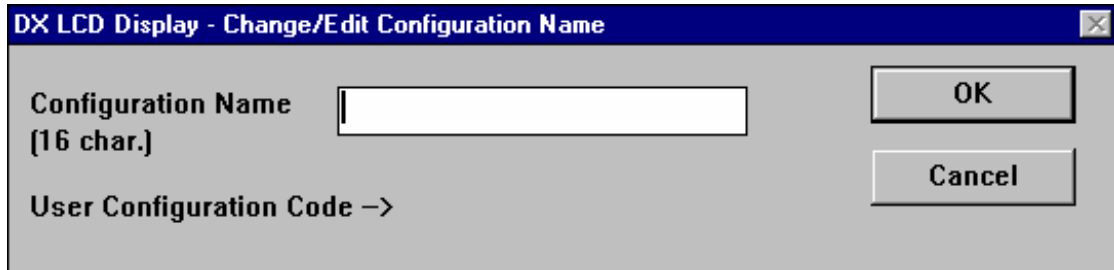
Figure 12-3: Configuration Name Dialog Box

2. Enter a configuration name, using up to 16 characters.

Note: If you have defined a Job Name, the first 16 characters appear as the default Configuration Name. In this case, you may edit or accept the name. The Job Name is unaffected by any changes to the Configuration Name.

3. Click OK.

Defining the Default Configuration

To define the default configuration:

1. On the DX LCD Display menu. click Define Default Configuration. The Define Default Configuration dialog box appears (Figure 12-4).
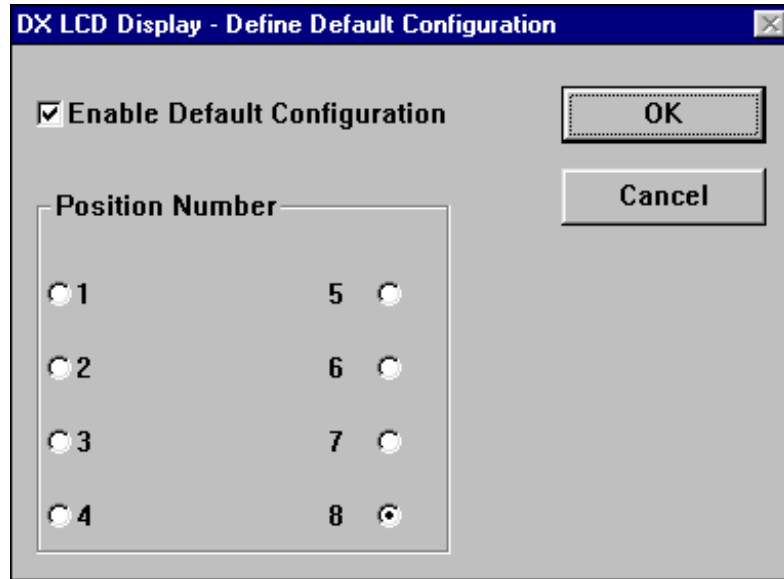
Figure 12-4: Define Default Configuration Dialog Box

2. Select Enable Default Configuration.

3. Select a Position Number to indicate the number configuration you want to set as the default.

4. Click OK.

Customizing the DX LCD Display Main Menu

Note: This will remove features from the main menu (for example, to remove functions for Original Equipment Manufacturer [OEM] customers).

To customize the DX LCD Display main menu:

1. Open the GX language file (dxmisc.lng) with an ASCII text editor.

2. Copy the line you want to remove and place it below the original.

Note: Only lines 16068 to 16078 represent menu text.

3. Type an asterisk in front of the original line to disable it.

4. Delete the menu text appearing between the quotation marks in the copied line (e.g., Figure 12-5 shows Optimal Start/Stop removed from the DX LCD Display Main Menu).

5. Save and close the file.

```
4.      .
.
.
* Max Allowed length 28
16068 0 0 0 0 "Home Page"
16069 0 0 0 0 "Point Data"
16070 0 0 0 0 "Alarm Summary"
16071 0 0 0 0 "Alarm Log"
16072 0 0 0 0 "Trend Data"
16073 0 0 0 0 "Time Schedules"
16074 0 0 0 0 "Holidays"
* 16075 0 0 0 0 "Optimal Start/Stop"
16075 0 0 0 0 ""
16076 0 0 0 0 "Time/Date"
16077 0 0 0 0 "Password"
16078 0 0 0 0 "Choose Controller
```

Figure 12-5: Editing the DX LCD Display Main Menu

Chapter 13

Defining the Point Database of the DX LCD Display

Introduction

The Point Database determines which points appear on the DX LCD Display. The Point Database contains 8 tables with 12 rows per table. Each table represents one Point Data screen of the display.

This chapter describes how to:

- add a new point to the DX LCD Display

- edit a point in the DX LCD Display Point Database

- delete a point from the DX LCD Display Point Database

- copy a point in the DX LCD Display Point Database

- move a point in the DX LCD Display Point Database

- save the Point Database

Key Concepts

Point Types

You can add the following types of points to the DX LCD Display Point Database:

- analog input

- analog output

- digital input

- digital output

DX LCD Display Data Points

Table 13-1 through Table 13-5 list the DX controller items you can include in the DX LCD Display Point Database. You can adjust or override a commandable point at the DX LCD Display.

Table 13-1: DX-9100/DX-912x/DX-9200 Hardware Points

Tag Name	Command	Description
AI1-8	No	Analog Input 1-8
DI1-8	No	Digital Input 1-8
OUT1-2	Yes	Analog Output 1-2
DO3-8	Yes	Digital Output 3-8
OUT3-8	Yes	Value of Analog Source DO 3-8
OUT9-14	Yes	Analog Outputs 9-14

Table 13-2: XT-9100 Hardware Points

Tag Name	Command	Description
XT*n*AI1-8	No	XT*n* Analog Input 1-8
XT*n*DI1-8	No	XT*n* Digital Input 1-8
XT*n*AO1-8	Yes	XT*n* Analog Output 1-8
XT*n*DO1-8	Yes	XT*n* Digital Output 1-8

Note: n = 1-8

Table 13-3: DX-912x/DX-9200 Network Inputs/Outputs

Tag Name	Command	Description
NAI1-16	Yes*	Network Analog Input 1-16
NDI*m-n*	Yes*	Network Digital Inputs
NAO1-16	No	Network Analog Output 1-16
NDO*m-n*	No	Network Digital Outputs

Notes: m = 1-8 (module)
   n = 1-16 (input/output)

* Use the Command option for testing and commissioning purposes only. During normal operation, the input is set by a network output of another controller on the network.

Table 13-4: DX-9100/DX-912x/DX-9200 Internal Points

Tag Name	Command	Description
SOFF	Yes	Shut Off
STUP	Yes	Start Up
DIAL	Yes	Dial-up Flag
CNT1-8	Yes	Counter Value 1-8
XT*n*CNT1-8	Yes	Counter Value XT*n* Digital Input 1-8
HIA1-8	Yes	Value of High Limit Analog Input 1-8
LOA1-8	Yes	Value of Low Limit Analog Input 1-8
XT*n*HIA1-8	Yes	Value of High Limit XT*n* Analog Input 1-8
XT*n*LOA1-8	Yes	Value of Low Limit XT*n* Analog Input 1-8
ADF1-8	Yes	Value of Alarm Differential Analog Input 1-8
AIH1-8	No	High Alarm Flag Analog Input 1-8
AIL1-8	No	Low Alarm Flag Analog Input 1-8
XT*n*AIH1-8	No	High Alarm Flag XT*n* Analog Input 1-8
XT*n*AIL1-8	No	Low Alarm Flag XT*n* Analog Input 1-8
DCO1-32	Yes	Digital Constant 1-32
ACO1-8	Yes	Analog Constant 1-8
LRS1-64	No	Logic Result Status 1-64

Note: n = 1-8

Table 13-5: Programmable Module Items

Tag Name	Command	Description
PM*m*K1-34	Yes	Module Constant 1-34
PM*m*OU1-8	Yes	Module Output 1-8
PM*m*AX1-2	Yes	Auxiliary Output 1-2
PM*m*CT1-8	Yes	Hold Control 1-8
PM*m*DO1-8	Yes	Module Logic Output 1-8
PM*m*S1-16	No	Module Status 1-16
PM*m*AC1-8	Yes	Accumulator 1-8

Note: m = 1-12

Detailed Procedures

Adding a New Point to the DX LCD Display

To add a new point to the DX LCD Display:

1. On the DX LCD Display menu, click Point Database. The DX LCD Display Point Database appears (Figure 13-1).
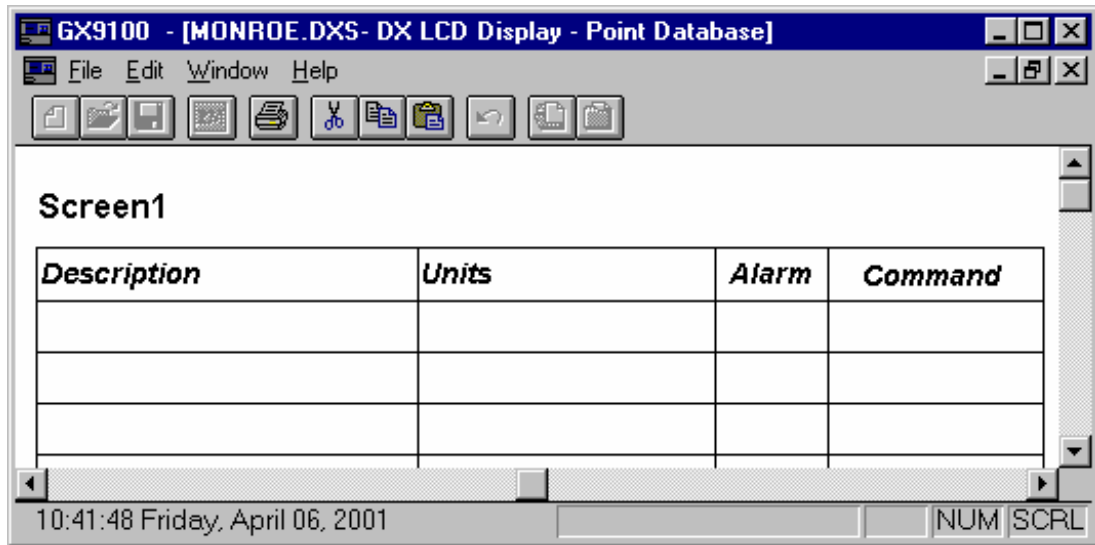
Figure 13-1: DX LCD Display Point Database Window

2. Right-click on a row and select Data from the pop-up menu that appears. The Data dialog box appears (Figure 13-2).

Figure 13-2: Data Dialog Box

3. Type a Tag Name or an asterisk (*) to select a Tag Name from a list. Click OK and a Select point category dialog box appears (Figure 13-3).

Note: If you entered a specific Tag name, the next dialog box is the appropriate Data dialog box. Proceed to Step 8.
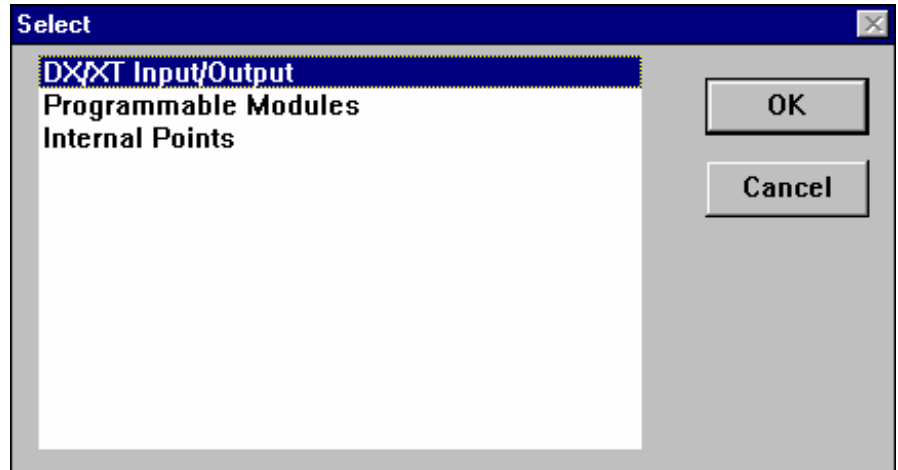
Figure 13-3: Select Point Category Dialog Box

4. Highlight a category and click OK. A Select subcategory dialog box appears (Figure 13-4).
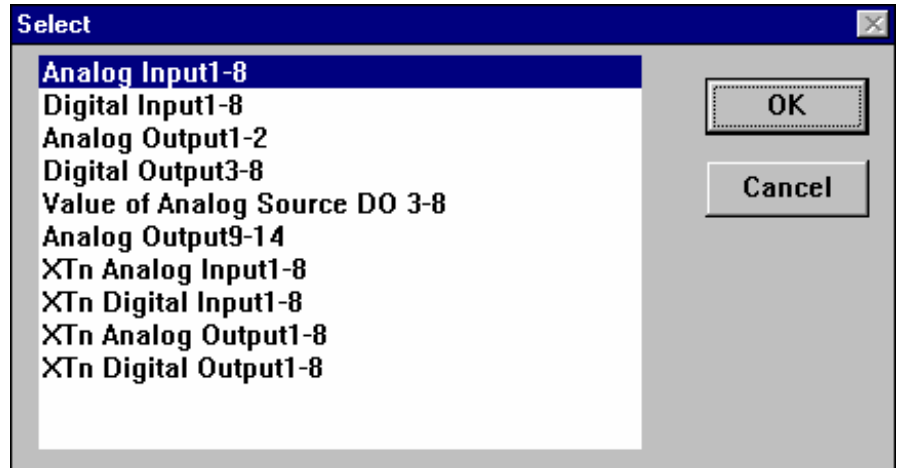
Figure 13-4: Select Subcategory Dialog Box Example

5. Highlight a subcategory and click OK. A Select point dialog box appears (Figure 13-5).

Note: Several subcategory dialog boxes may appear before you reach the Select point dialog box.

Figure 13-5: Select Point Dialog Box Example

6. Highlight the individual point and click OK. A Data dialog box appears (Figure 13-6).

Figure 13-6: Data Dialog Box Example

7. Complete the Data fields using Table 13-6.

8. Click OK.

Table 13-6: Fields in Point Data Dialog Boxes

Field	Description
Tag	Shows the Tag (Item) name of the point you selected.
Description	Enter a freely definable plain text description for the point, using up to 16 characters. The default text in the Description field is taken from the main configuration database, using the following criteria: 1. The first 16 characters of the point description is the default description field text. 2. If no description is defined for the point, but a user name is defined, then the user name is the default text. 3. If neither a description nor user name is defined for the point, then the Tag name is the default text. You can accept or edit the default description. This does not effect the text defined in the main database from which the default was taken.
Display Units	Enter the engineering units (up to six characters) that are to be displayed for the point on the DX LCD Display. Digital points have two unit fields: one for the State 0 units and one for the State 1 units. A point may have a default value in the Display Units field if you have already defined the point's Measurement Units in the main database. You can accept or edit the units. This does not effect the Measurement Units defined in the main database.
Alarm	Select this box to define that the alarm limits of the point be monitored by the DX LCD Display and that an alarm is generated on the unit when the point value goes outside the limits. This option is only available for physical input points that have alarm limits. For digital points, select None, State 0, or State 1 to define which state generates the alarm.
Command*	Select this box to define the point commandable from the DX LCD Display. If this box is not selected, Minimum Commandable Value and Maximum Commandable Value are unavailable. If this box is unavailable, the point cannot be commanded from the DX LCD Display.
Minimum Commandable Value	Enter the minimum value the user can command from the DX LCD Display. The allowable range is shown in parentheses.
Maximum Commandable Value	Enter the maximum value the user can command from the DX LCD Display. The allowable range is shown in parentheses.

Notes: Not all points contain all fields. If the field is not shown or is unavailable, it is unavailable for that point type.

Only points defined as On/Off, Stop/Start, or Pulse should be added as a digital output type (i.e., included in the database via the DO3-DO8 items). Include the value of the analog source in the database for D.A.T. and P.A.T. outputs.

* Network Input points should be configured for Command for testing and commissioning purposes only. During normal operation, the input is set by a network output of another controller on the network.

Editing a Point in the DX LCD Display Point Database

To edit a point in the DX LCD Display Point Database:

1. On the DX LCD Display menu, click Point database. A window named DX LCD Display Point Database appears (Figure 13-1).

2. Click on a point.

3. Right-click on the selected row and select Data from the pop-up menu that appears. The Data dialog box appears (Figure 13-7).
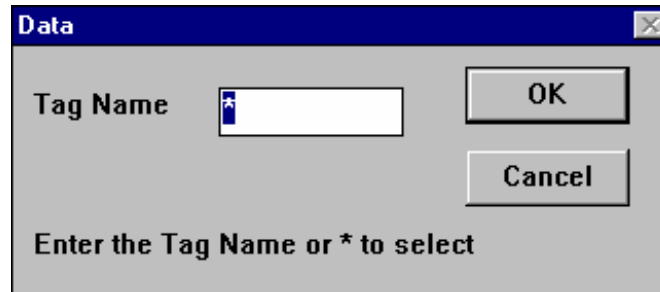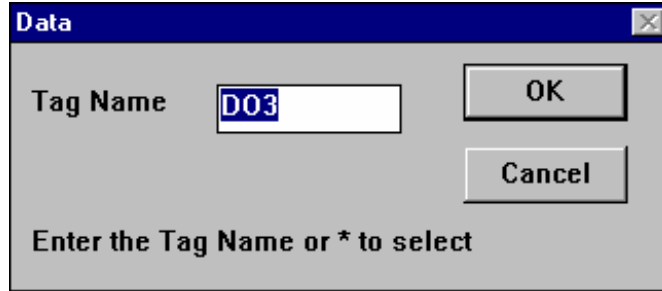

Figure 13-7: Data Dialog Box

Note: The originally defined Tag Name appears as the default in the Tag Name field.

4. To display a different point at the selected position, enter a new Tag name, or type an asterisk (*) to select the new item from a list. If you do not want to change the point, click OK without editing the Tag Name field.

5. Highlight a subcategory and click OK. A Select point dialog box appears (Figure 13-5).

Note: Several subcategory dialog boxes may appear before you reach the Select point dialog box.
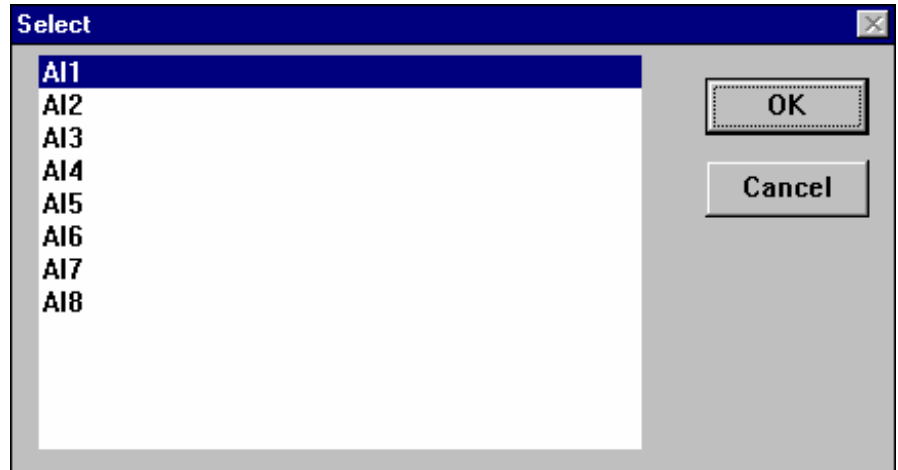
6. Highlight the individual point and click OK. A Data dialog box appears (Figure 13-6).

7. Complete the Data fields using Table 13-6.
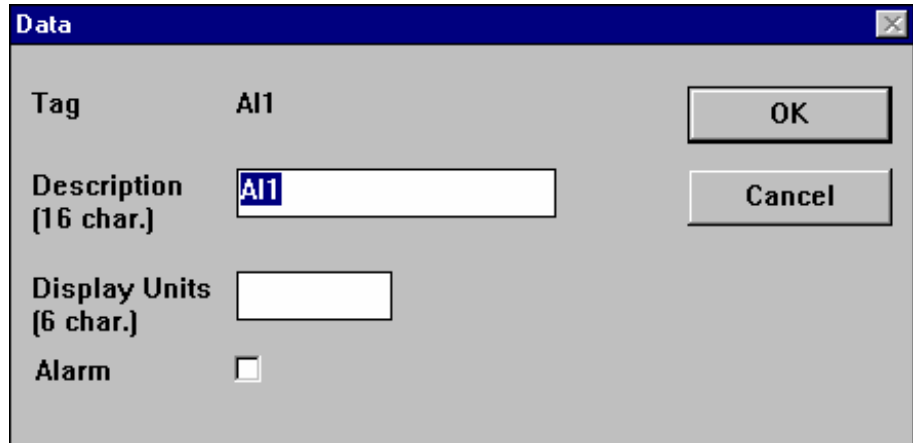
8. Click OK.

Deleting a Point from the DX LCD Display Point Database

To delete a point from the DX LCD Display Point Database:

1. Right-click on a point. To select multiple points, hold down Ctrl and click.

2. Select Delete from the pop-up menu that appears. A GX9100 dialog box appears (Figure 13-8) to confirm deletion.
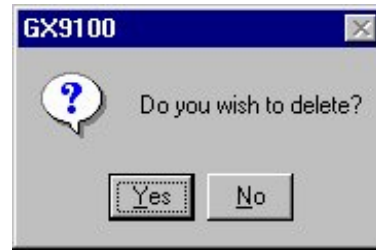
Figure 13-8: GX9100 Confirm Deletion Dialog Box

3.   Click Yes.

Copying a Point in the DX LCD Display Point Database

To copy a point in the DX LCD Display Point database:

1.   Right-click point. To select multiple points, hold down Ctrl and click points.

2.   Select Copy from the pop-up menu that appears.

3.   Click to highlight the destination row. If you are copying multiple points, the row you select marks the starting position to insert all rows.

4.   Right-click on the highlighted row, and select Paste from the pop-up menu that appears.

Notes: A deletion confirmation warning message appears before overwriting an existing point.

A confirmation warning message also appears if there are too few rows available in the database. Points extending beyond Screen 8 are not pasted, but remain on the clipboard.

5.   Edit the pasted point data, as required.

Moving a Point in the DX LCD Display Point Database

To move a point in the DX LCD Display Point Database:

1.   Click to highlight the point you want to move.

2.   Right-click on the point and select cut from the pop-up menu. The point is removed from the table.

3.   Click to highlight the destination row. If you are copying multiple points, the row you select marks the starting position to insert all rows.

4. Right-click on the highlighted row, and select Paste from the pop-up menu that appears.

Notes: A deletion confirmation warning message appears before overwriting an existing point.

A confirmation warning message also appears if there are too few rows available in the database. Points extending beyond Screen 8 are not pasted, but remain on the clipboard.

5. Edit the pasted point data, as required.

Saving the Point Database

To save the Point Database, on the File menu, click Save.

Note: Saving the Point Database only saves within the current configuration; it *does not* save the configuration to the disk.

Chapter 14

Defining Time Schedule and Optimal Start/Stop Module Descriptions in the DX LCD Display

Introduction

Time Schedule (TSn, where n=1-8) and Optimal Start/Stop (OSn, where n=1-2) module descriptions are displayed on the DX LCD Display.

This chapter describes how to:

- edit a TSn/OSn module description
- delete a TSn/OSn module description
- save the TSn/OSn module descriptions

Key Concepts

TSn/OSn Description Text Window

The TSn/OSn Description Text window (Figure 14-1) contains one table for the Time Schedule modules and another for the Optimal Start/Stop modules. Default descriptions appear in the Description field for each module, taken from the main configuration database using the following criteria:

- If a description is defined for the module in the main database, the first 16 characters are shown as the default.

- If no description is defined for the module, but a user name is defined, the user name is shown as the default.

- If neither a description nor a user name is defined for the module, then the Tag Name is shown as the default.

Changes to the TSn/OSn description text do not affect the main database.
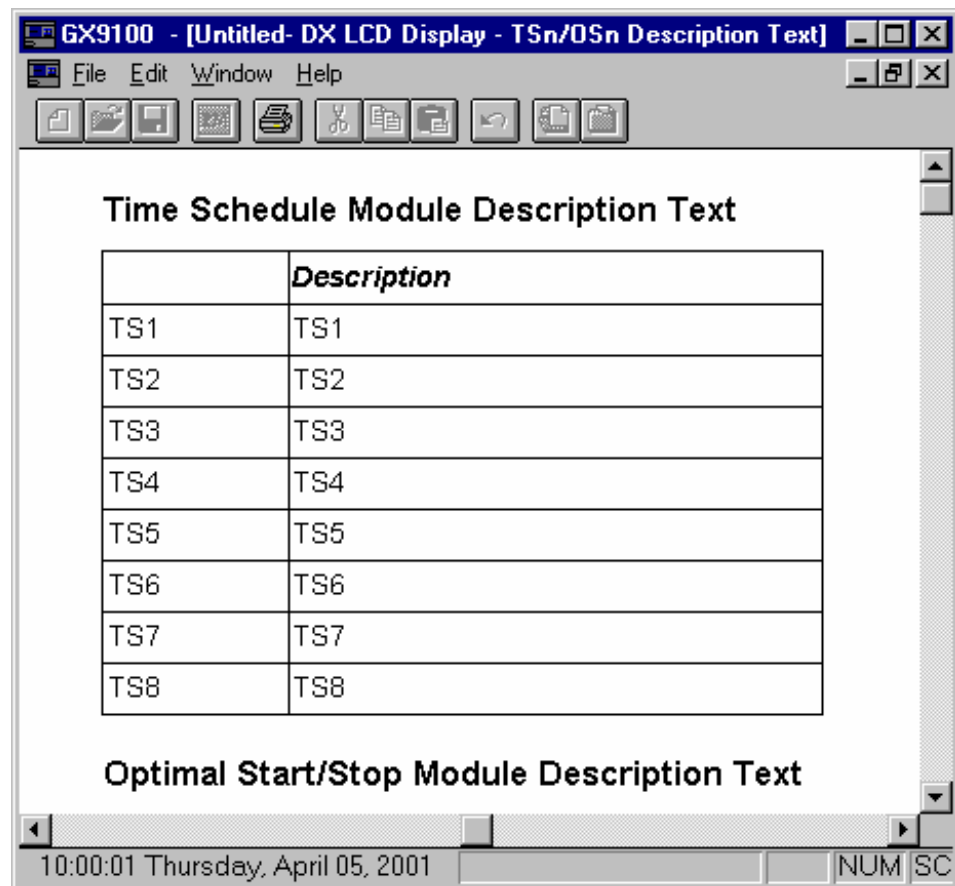
Figure 14-1: TSn/OSn Description Text Window

Detailed Procedures

Editing a TSn/OSn Module Description

To edit a TSn/OSn module description:

1. On the DX LCD Display menu, click TSn/OSn Descriptive Text. The DX LCD Display TSn/OSn Description Text window appears (Figure 14-1).

2. Click to highlight the module row you want to edit.

3. Right-click the selected row and select Data from the pop-up menu that appears. A Time Schedule Module Description TS1 dialog box appears (Figure 14-2).
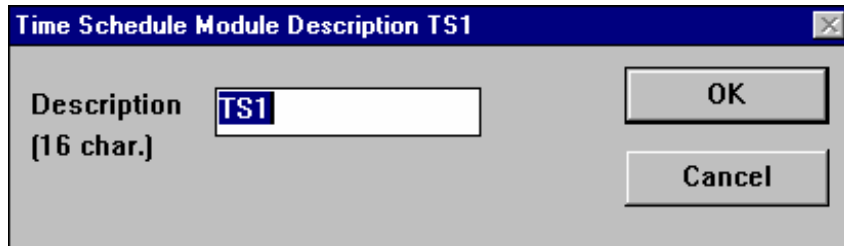
Figure 14-2: Time Schedule Description Dialog Box

4. Type the module description, using up to 16 characters, in the Description field, or accept the default description.

5. Click OK.

Deleting a TSn/OSn Module Description

To delete a TSn/OSn module description:

1. On the DX LCD Display menu, click TSn/OSn Descriptive Text. The DX LCD Display TSn/OSn Description text window appears (Figure 14-1).

2. Right-click selected modules, to select multiple points, hold down Ctrl and click points. Select Delete from the pop-up menu that appears. A GX9100 dialog box appears to confirm deletion (Figure 14-3).
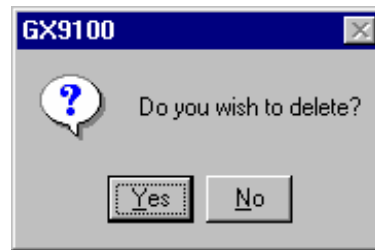
Figure 14-3: Confirm Deletion Dialog Box

3. Click Yes.

Saving the TSn/OSn Module Descriptions

To save the TSn/OSn module descriptions, on the File menu, click Save.

Note: Saving the TSn/OSn Module descriptions only saves within the current configuration; it *does not* save the configuration to the disk.

Chapter 15

Defining Trend Data Descriptions in the DX LCD Display

Introduction

The Trend Log module provides Metasys Point History data for remotely connected DX controllers or for a local DX LCD Display. The module provides 12 trend log channels, each records data from either 1 analog item or from a set of 8 logical variables (logic variable byte).

This chapter describes how to:

- edit a group description in the Trend Data window
- save the Trend Data definitions

Key Concepts

Trend Data Window

The DX LCD Display Trend Data window contains a table showing the points from the Trend Log module in the controller configuration (Figure 15-1). The item (Tag) names shown are the Items for which the DX is configured to store trend data.

Note: Saving the Trend Data definitions only saves within the current configuration; it *does not* save the configuration to the hard disk.
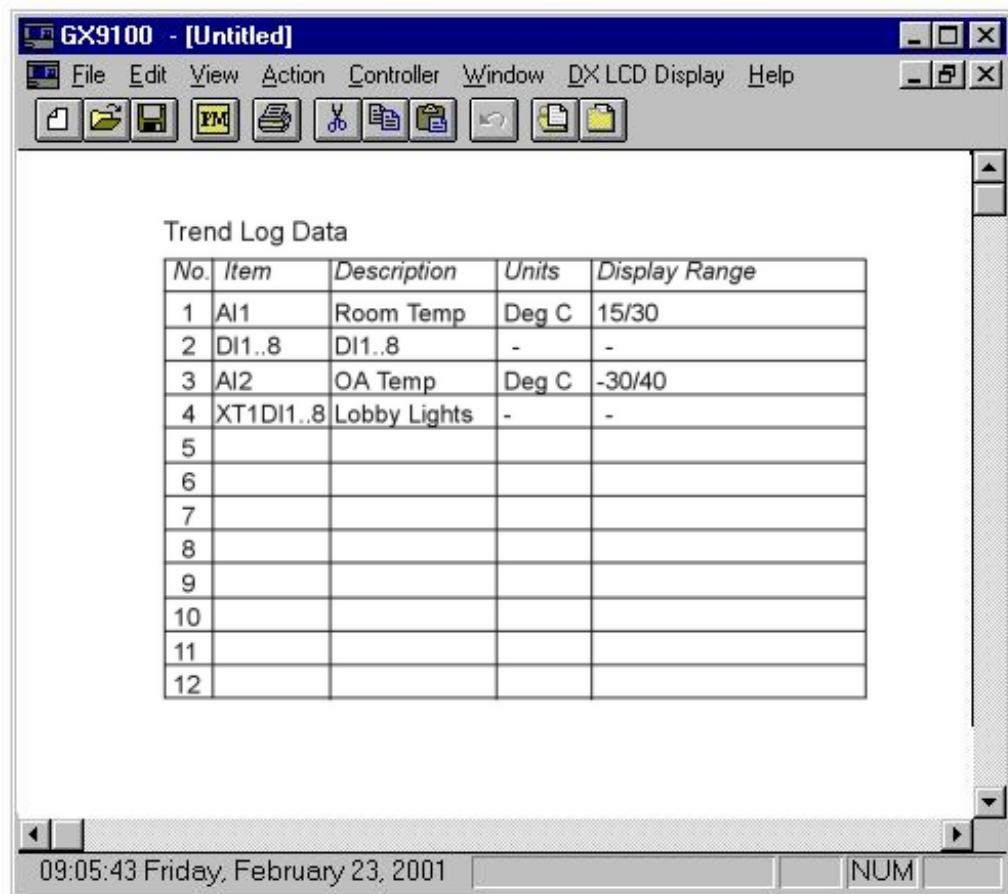
Figure 15-1: DX LCD Display Trend Data Window Example

Digital Trend Data

Digital items (i.e., a logic variable byte) appear as a group reference (e.g., DI1..8).

The DX LCD Display Digital Trend Data dialog box shows the DX trend number, Tag names, description, and the eight individual digital items of the group (Figure 15-2). For each item, the description and units (State 0 and State 1 names) are taken from the DX LCD Display Point Database. The bit number is description of an undefined point and 1 and 0 for the units. You can define a 16-character description in the Description field.

For groups of digital items, the default description is the group reference (e.g., DI1..8) and units do not apply. You can edit the description of the group in the Trend Data window.

Figure 15-2: Digital Trend Data Dialog Box

Analog Trend Data

Analog descriptions and units are taken from the DX LCD Display Point Database. If the point is undefined, the Tag name is used for the description and there are no units. If you add the point to the Point Database later and then reopen the Trend Data window, the point's description and units synchronize to the Point Database.

The DX LCD Display Analog Trend Data dialog box shows the DX Trend number, Tag name, Description, and Units as static text (Figure 15-3). You cannot change these values using the dialog box. The Data Range is –32768 to +32768.
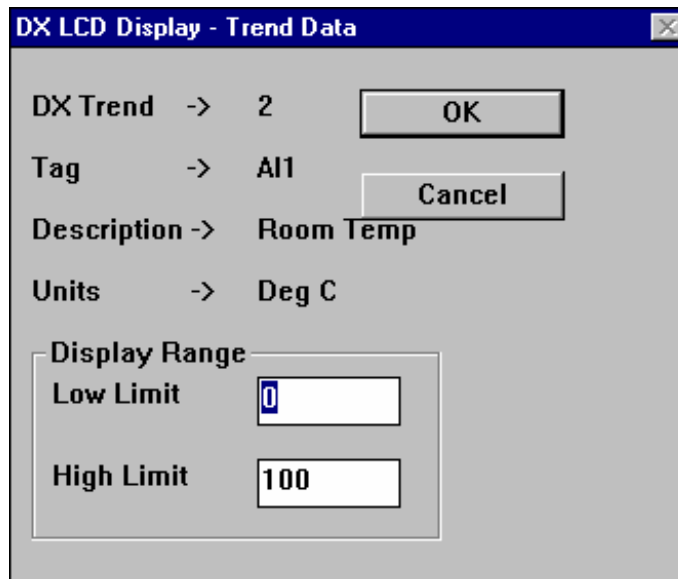
Figure 15-3: Analog Trend Data Dialog Box

Detailed Procedures

Editing a Group Description in the Trend Data Window

To edit a group description in the Trend Data window:

1. On the DX LCD Display menu, click Trend Data. The DX LCD Display – Trend Data window appears (Figure 15-1).

2. Right-click on the row that contains the point that you want to edit and select Data from the pop-up menu that appears. A DX LCD Display Digital Trend Data dialog box or an Analog Trend Data dialog box appears depending on the point you selected (Figure 15-2 or Figure 15-3).

3. For an analog point, enter a Display Range between –32768 to +32768.

   For a digital point, type the group description into the Description field, using up to 16 characters, or accept the default description.

4. Click OK to save the description.

Saving the Trend Data Definitions

To save the Trend Data definitions, on the File menu, click Save.

Note: Saving the Trend Data definitions only saves within the current configuration, it *does not* save the configuration to the hard disk.

Chapter 16

Downloading and Uploading the DX LCD Display

Introduction

The DX LCD Display stores up to eight configurations and Home Pages. The PC running GX Tool downloads and uploads configurations and Home Pages through the serial port to the DX LCD Display.

This chapter describes how to:

- download a configuration/Home Page to the DX LCD Display

- display the configuration codes in the display unit

- upload a configuration/Home Page from the DX LCD Display

Key Concepts

Display Configurations and Home Pages

Up to eight separate display configurations can be stored in the DX LCD Display. Storing a configuration is accomplished by downloading the configuration from the GX Tool to the display through the serial port to which it is connected.

You can also download up to eight different Home Pages to the display. The Home Pages are customizable (see *Appendix B: Custom Home Page*) and can display live point data from the DX controller. Home Page definitions are stored in separate files that have a file name extension of .hpg. When you open a configuration file in the GX Tool, it automatically looks for a Home Page file with the same name as the configuration file but with the .hpg extension. For example, if you open a configuration file named config1.dxs, the tool automatically opens the Home Page file named config1.hpg.

Note: The GX Tool downloads a default Home Page (named default.hpg) to the DX LCD Display if it cannot find a custom Home Page with the same name as the open configuration file.

Detailed Procedures

Downloading a Configuration/Home Page to the DX LCD Display

To download a configuration/Home Page to the DX LCD Display:

1. On the File menu, click Open. The File Open dialog box appears (Figure 16-1).
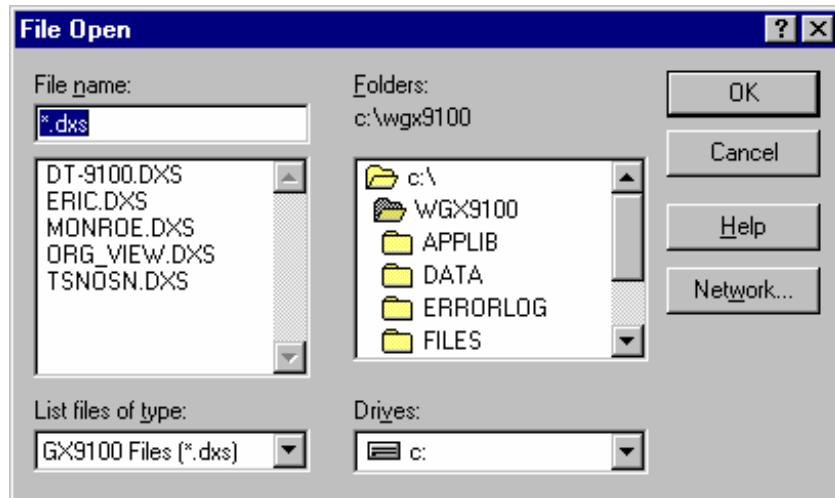
Figure 16-1: File Open Dialog Box

2. Select the configuration file to open and click OK.

3. On the DX LCD Display menu, click Download Display. The DX LCD Display-Download dialog box appears (Figure 16-2).

Notes: An error message appears if you have not specified the PC port to which the display unit is connected in the DX LCD Display Global Data dialog box.

An error message appears if you have specified the PC port, but the configuration tool cannot detect a display panel connected to the port. Check that the panel is properly connected to the correct port as described in the *Software Details and Hardware Connections* chapter.

gx91t_34

Figure 16-2: DX LCD Display Download Dialog Box

4.   Select the download options using Table 16-1.

Table 16-1: Download Options

Option	Description
Point Database	Downloads the configuration data to the DX LCD Display.
Home Page	Downloads the Home Page data to the DX LCD Display.
Download in Position	Selects the DX LCD Display storage location to download the configuration and/or Home Page.

Note: The default selection is the next available, free position in the display unit.

5.   Click OK to begin the download operation.

Note: If you are downloading a Home Page file, the GX Tool performs a Home Page Definition File syntax check. If the check fails, the Home Page Definition File Syntax Check dialog box appears (Figure 16-3). Click OK to ignore the errors or click View Error Listing button to open a window listing errors and warnings.

gx91t_35
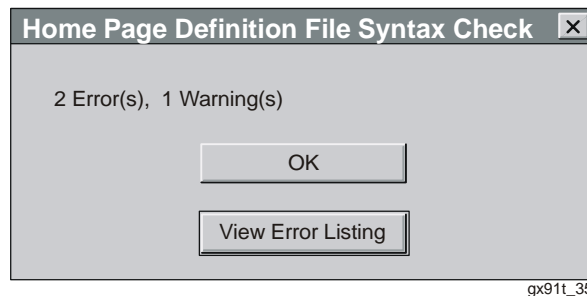
Figure 16-3: Syntax Check Results Dialog Box

When the download operation is complete, a GX9100 dialog box appears indicating successful download (Figure 16-4).

GX9100

ⓘ   Download Complete

OK

gx91t_36
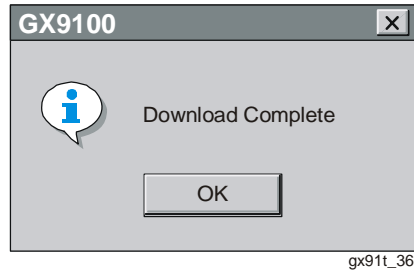
Figure 16-4: Download Complete Dialog Box

Displaying the Configuration Codes in the Display Unit

To display the configuration codes in the display unit:

1. On the DX LCD Display menu, click Read Configuration Codes. The DX LCD Display - User Configuration Codes dialog box appears (Figure 16-5).

Note: An error message appears if you have not specified the PC port as part of the Global Data or if the GX Tool cannot detect a display panel attached to the port.

DX LCD Display - User Configuration Codes

POSITION	CODE	CONFIGURATION NAME	HOME PAGE	TREND
1	1	Chiller Plant	Custom	Defined
2	2	Boiler Plant	Default	Defined
3				
4				
5				
6				
7				
8	65535	System (Default)	Default	Not Defined

OK

gx91t_38
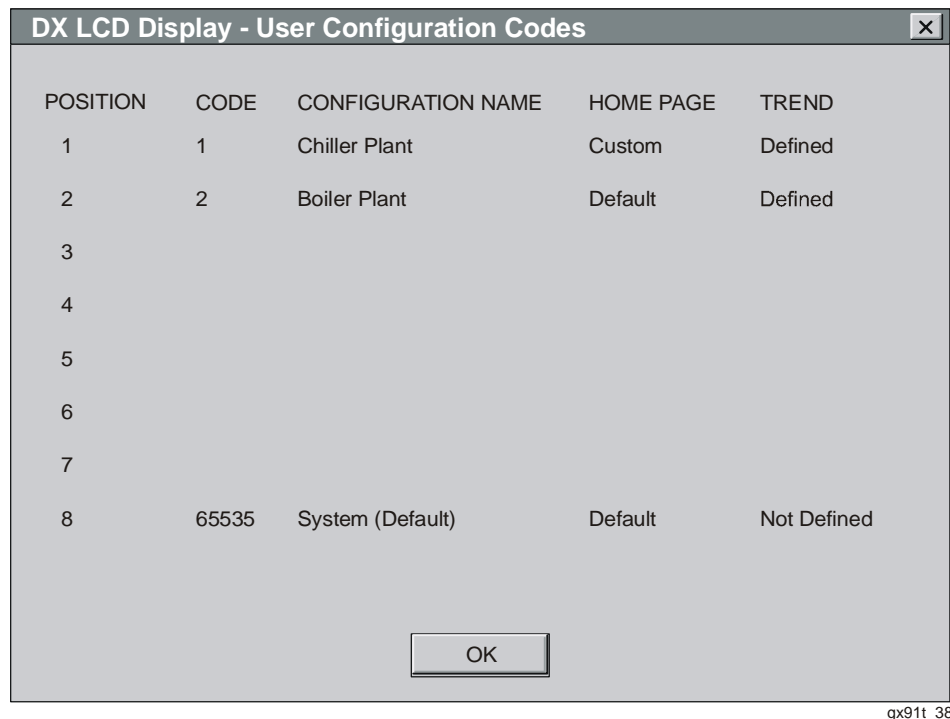
Figure 16-5: User Configuration Codes Dialog Box

2. Click OK.

Uploading a Configuration/Home Page from the DX LCD Display

To upload a configuration/Home Page from the DX LCD Display:

1. On the File menu, click New to create a new DX controller configuration file.

2. On the DX LCD Display menu, click Upload Display. The DX LCD Display Upload dialog box appears (Figure 16-6).

Notes: An error message appears if you have not specified the PC port to which the display unit is connected in the DX LCD Display Global Data dialog box.

An error message appears if you have specified the PC Port, but the configuration tool cannot detect a display panel connected to the port. Check that the panel is properly connected to the correct port as described in the *Software Details and Hardware Connections* chapter.
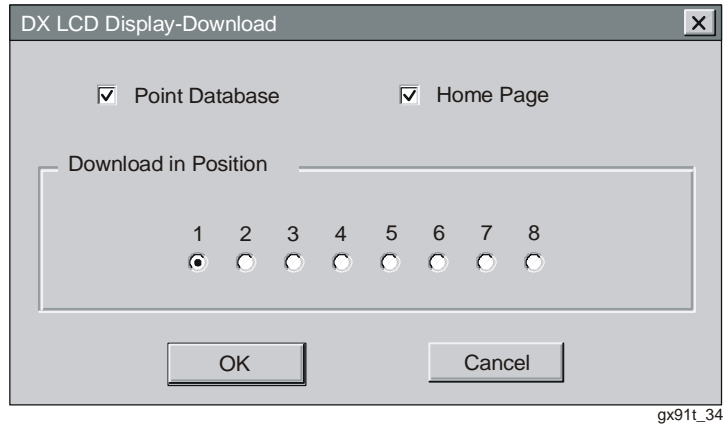

ctgxmen5
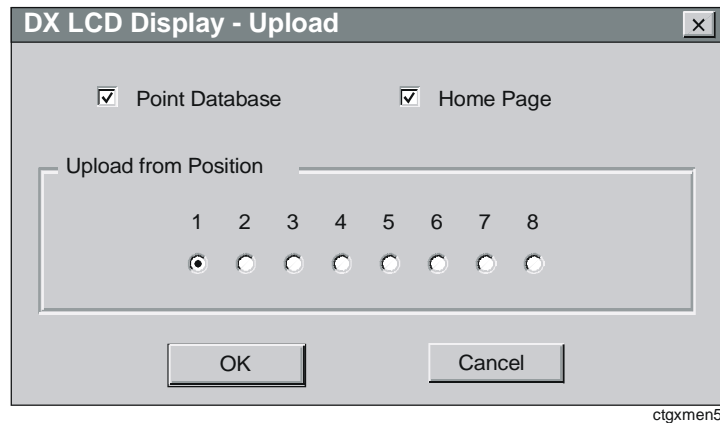
Figure 16-6: DX LCD Display Upload Dialog Box

3. Select the upload options using Table 16-2.

Table 16-2: Upload Options

Option	Description
Point Database	Uploads the configuration data to the DX LCD Display.
Home Page	Uploads the Home Page data to the DX LCD Display.
Download in Position	Selects the DX LCD Display storage location from which to upload the configuration and/or Home Page.

4. Click OK. A GX9100 dialog box appears warning of configuration overwrite.

5. Click OK. When the upload operation is complete, a GX9100 dialog box appears (Figure 16-7).

ctgxmen6
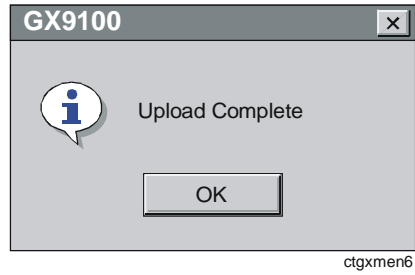
Figure 16-7: Upload Complete Dialog Box

6.   On the File menu, click Save.

Appendix A

Source and Destination Points

Introduction

Module inputs and outputs are shown in the GX Tool as abbreviations (for example: ALD@ is *disable alarm*). This appendix lists abbreviations and descriptions for:

- source points
- destination points

Key Concepts

Note: The variable n is the module number and m is the Item number in a module.

Source Points

ACOn	The current value of an *analog constant* set by a BAS, the GX Tool, SX Tool, or on the DX front panel.
AFB	A 1 when the DO P.A.T. *associated feedback* value is not responding to changes in the DO P.A.T. command value.
AIn	The current value of the *analog input.*
AI%n	The current value of the *analog input* in *percent* (%) of range.
AIHn	A 1 if the *analog input* is above its *high* limit and not below the high limit - limit differential.
AILn	A 1 if the *analog input* is below the *low* limit and not above the low limit + limit differential.
AOFn	A 1 when an *analog output* is being externally *forced.*
AOHn	A 1 when the *analog output* is equal to or above its *high* range.
AOLn	A 1 when the *analog output* is equal to or below its *low* range.
BATLOW	A 1 when the DX lithium battery needs to be replaced.
DCOn	The current value of a *digital constant* set by a BAS, the GX Tool, SX Tool, or on the DX front panel.
DIn	The current status of the *digital input*.
DIAL	When set to 1 by a set statement in the PLC, this causes the N2 *Dial*er to connect the N2 Bus to a BAS via telephone lines. The DIAL bit will be reset to 0 by the BAS when the telephone line connection is successful.
DICn	Toggles from 0 to 1 or 1 to 0 when the number of *digital input* transitions *(counts)* equals the prescaler.
DOn	The status of the *digital output*.
DOnC	A 1 when the BAS has commanded the *digital output* to be On.
DOnE	A 1 when the BAS has taken control of the *digital output*.

DOFn   A 1 when the *digital output* P.A.T. or D.A.T. is being externally *forced*.

DOHn   A 1 when the *digital output* P.A.T. or D.A.T. is at its defined *high* limit.

DOLn   A 1 when the *digital output* P.A.T. or D.A.T. is at its defined *low* limit.

HTRR   *Historical Trend Read Request*. A 1 when any trend log buffer has reached its Read Request limit.

LRSn   The *logic result status* of an OUT, OUTNOT, SET, or RST statement in a PLC. (Refer to the PLC code to determine which number to use.)

NAIn   The analog numeric value that is received over the LONWORKS N2 Network.

NDIn-m   The digital value that is received over the LONWORKS N2 Network.

NAIUn   A 1 when the network analog shared value is no longer receiving data from the LONWORKS N2 Network.

NDIUn   A 1 when the network digital shared value is no longer receiving data from the LONWORKS N2 Network.

OSnHEAT   A 1 when *Optimal Start* module is in the *Heating* mode.

OSnOUT   A 1 when the *Optimal Start* module requires equipment to be On. It is the controlling *output* of an *Optimal Start* module to START/STOP heating or cooling equipment.

OSnPRE   A 1 while the *Optimal Start* module is in the *Pre-conditioning* mode (will turn Off at occupancy).

OSnSTO   A 1 when the *Optimal Start* module is in the *Optimal Stop* mode (will turn Off at vacancy - unoccupancy).

OUHn   A 1 when an analog or digital *output* is in *Hold* mode from either the DX front panel or BAS.

OULn   A 1 when the INC and DEC connections are both On in an analog output module (including P.A.T. or D.A.T.) and the *output* is *locked.*

OUTn   The value of the analog *output* (including P.A.T. or D.A.T.).

OVRn   A 1 when the value of the analog *input* is more than 5% above its normal range (overrange condition).

PMnCMH	A 1 when a control module's output is equal to its output *high* limit.
PMnCML	A 1 when a control module's output is equal to its output *low* limit.
PMnCMP	A 1 when the control module's Working Setpoint (WSP) is being overridden by a BAS (*Computer* mode).
PMnDISm	A 1 when the output stage is *disabled* in a sequencer module.
PMnEF	A 1 when this control module is being *externally forced.*
PMnFSSm	A 1 when the totalized value of a totalization module is equal to the *full scale* limit of the channel.
PMnHDA	A 1 when the difference Process Variable (PV) - WSP is larger than the *high deviation alarm* value.
PMnHEAT	A 1 when, in a symmetric control module, the PV is below the center of the symmetry band and a 0 when above center; or a 1 when, in a dual control module, Loop 1 is active.
PMnHHDA	A 1 when the difference PV - WSP is larger than the *high high deviation alarm* value.
PMnHLD	A 1 when the program module is in the *Hold* mode, being overridden by the SX Tool or a BAS.
PMnHLDm	A 1 when the channel of the program module has been overridden (in *hold*) from an SX service module or a BAS.
PMnLDA	A 1 when the difference WSP - PV is larger than the *low deviation alarm* value.
PMnLLDA	A 1 when the difference WSP - PV is larger than the *low low deviation alarm* value.
PMnLSm	A 1 when the comparator module channel is at its comparison true *logic state*.
PMnLSP	The value of the *local setpoint.* (This value is changed when adjusting the WSP from the DX front panel.)
PMnLSP1	The value of the *local setpoint* of Loop 1 of a dual control module. (This value is directly changed when adjusting the WSP1 from the DX front panel.)
PMnLSP2	The value of the *local setpoint* of Loop 2 of a dual control module. (This value is changed when adjusting the WSP2 from the DX front panel.)

PMnMCSm A 1 as long as the *maximum cycles status* timer for an output stage is active.

PMnMNWS The value of the *minimum working setpoint* allowed for a control module.

PMnMXWS The value of the *maximum working setpoint* allowed for a control module.

PMnNCM The calculation result of a *numeric module.*

PMnNCMm The calculation result of a channel of a *numeric module*.

PMnNMH A 1 when the calculated output is equal to or greater than the *numeric module high* limit.

PMnNMHm A 1 when the psychrometric *numeric module* output is equal to or greater than the *high* limit of the channel.

PMnNML A 1 when the calculated output is less than or equal to the *numeric module low* limit.

PMnNMLm A 1 when the psychrometric *numeric module* output is less than or equal to the *low* limit of the channel.

PMnOCM The value of the PID *control module output* in percent; either a 1 or 0 for an On/Off control module.

PMnOUT The analog value of the requested *output* load % (percent) of a sequencer.

PMnOUTD The *output difference* between the required load minus the sum of the loads of stages that are On in a Sequencer mode. This can be used for Vernier control.

PMnOUTS The analog value of the *output sum* of the loads of stages that are On in an sequencer module.

PMnSOF A 1 when this control module is in the *Shutoff* mode, which occurs when enable shutoff = 1 and the BAS has commanded it On.

PMnSTA A 1 when this control module is in the *Startup* mode, which occurs when enable startup = 1 and the BAS has commanded it On.

PMnSTOm A 1 when the *staged output* of a sequencer module is requested to be On.

PMnTDOm A 1 when the numeric *timer* channel output is On.

PMnTIMm The numeric *timer* module timer value of each channel. It is 0 when the channel is not triggered or the timer has expired; or it is the number of seconds (or minutes, or hours) left as the timer decrements.

PMnTOTm   The *totalized* value of a totalization module channel; the number of events, runtime, or integration value.

PMnWSP   The value of a control module *working setpoint*.

PMnWSP1   The value of the *working setpoint* of Loop 1 of a dual control module.

PMnWSP2   The value of the *working setpoint* of Loop 2 of a dual control module.

SLF   A 0 when BAS is active and returns to a 1 sixty seconds after receiving the last command from the BAS.

SOFF   A 1 when the BAS has commanded the *Shutoff* mode.

SSA   A 1 when the BAS is *active* and returns to 0 two hours after the last command from the BAS.

STUP   A 1 when the BAS has commanded the *Startup* mode.

TSnEXS   A 1 when a *time schedule* module has its *extension* enabled by a BAS or a DX front panel command.

TSnOUT   A 1 when the real time is currently between the start and stop times of an event of the *time schedule* module and the current day is specified for that event.

UNRn   A 1 when the value of the analog input is more than 5% below its normal range (underrange condition).

XTnAIm   The current value of the *analog input* from the XT.

XTnAIHm   A 1 if the *analog input* is above its *high* limit and not below the high limit - limit differential.

XTnAILm   A 1 if the *analog input* is below the *low* limit and not above the low limit + limit differential.

XTnAOm   The value of the analog *output* to the XT.

XTnCOM   A 1 when the extension module is not communicating (wrong address, bus line broken, or bus line overload).

XTnDIm   The current status of the *digital input* from the XT.

XTnDOn   The status of the *digital output* to the XT.

XTnERR   A 1 when the XT database in the DX does not match the XT database in the *expansion* module, when XTnCOM is a 1, or when XTnHARD is a 1 (Versions 1.4, 2.3, 3.3 or later). (Combination of errors for XT/XTM module, i.e., configuring an XP-9102 and connecting an XP-9103 yields an *error*).

XTnHARD   A 1 when the expansion module is not connected or not responding (hardware fault).

XTnOUHm   A 1 when an analog or digital *output* is in *Hold* mode from either the DX front panel or BAS.

XTnPWR   A 1 when the *extension* module detects a loss of *power* or loss of communication. The DX will reset this after a few seconds.

Destination Points

ALD@   The connection to *disable* alarm processing on *analog inputs* AI1-AI8.

AO@   The numeric connection to control an *analog output*.

AOF@   The connection to *force* an *analog output* to a specified value.

DEC@   The connection to decrement an analog type output or sequencer module. While connection is a logic 1, the output will *decrease* at a rate dependent on the type of module.

DISn@   A connection in a sequencer to *disable* the corresponding stage or set number.

DO@   The connection to control a *digital output*.

DOF@   The connection for *forcing* a *digital output* to a specified value.

EF@   The connection to the *external forcing* point of control modules.

ENL@   The connection to *enable* output *limits* of an analog type output (P.A.T. and D.A.T. included).

FB@   The connection to the *feedback* of a P.A.T.. Usually a signal from a potentiometer on the controlled device.

FST@   The connection to set the sequencer module into *fast step* down mode.

In@   *Analog input* connections to a programmable module.

INC@   The connection to increment an analog type output or sequencer module. While connection is a logic 1, the output will *increase* at a rate dependent on the type of module.

MNWS@   The connection to the *minimum working setpoint* of a control module. The WSP cannot be adjusted below this value.

MXWS@   The connection to the *maximum working setpoint* of a control module. The WSP cannot be adjusted above this value.

NAOn@   The numeric source of a Network Analog Output that is shared over the LONWORKS N2 Network.

NDOn-m@   The digital source of a Network Digital Output that is shared over the LONWORKS N2 Network.

OB@   The connection of an *output bias* value of a PID module.

OB1@   The connection for Loop 1 of a dual PID *output bias*.

OB2@   The connection for the Loop 2 of a dual PID *output bias.*

OF@   The connection to the *Off mode* source point of a control module.

OSnDA@   The connection to *disable* the *adaptive* action of an *Optimal Start/Stop* module.

OSnDI@   The connection to *disable* the *Optimal Start/Stop* module.

OSnOB@   The connection to the *Off Setpoint Bias*, which replaces the entered value when connected in an *Optimal Start/Stop* module.

OSnOT@   The connection for the *Outdoor Air Temperature* sensor of an *Optimal Start/Stop* module.

OSnSP@   The connection for the *Optimal Start* Zone Temperature *setpoint*. If connected, it replaces the entered setpoint.

OSnTS@   The connection in an *Optimal Start/Stop* module for the *time schedule* that determines when the building is occupied.

OSnZT@   The connection for the *Zone Temperature* sensor in an *Optimal Start/Stop* module.

PB@   The connection to *proportional band*, which replaces the value PB if there is a connection.

PV@   The connection to the *process variable* of a PID or an On/Off.

RA@   The connection to the *reverse action* point of a control module.

RHn@   The *relative humidity* sensor connections for psychrometric calculations.

RS@   The connection to a *remote setpoint*, which is used in the calculation for the working setpoint.

RSn@   The connection to the *reset* function of a totalization module channel (to reset to 0 and re-start) or timer module channel (to reset the output).

RS1@   The connection for Loop 1 of a dual PID or On/Off *remote setpoint*.

RS2@   The connection for Loop 2 of a dual PID or On/Off *remote setpoint*.

RV@   The connection to *reference variable,* which is a multiplier in the calculation for the working setpoint.

RV1@   The connection for Loop 1 of a dual PID or On/Off *reference variable*.

RV2@   The connection for Loop 2 of a dual PID or On/Off *reference variable*.

SB@   The connection to the *stand by* source point of a control module.

SPn@   A *setpoint* connection for a comparator channel if a remote setpoint is desired; otherwise the entered value for the setpoint will be used.

TMn@   The *temperature* sensor connections for psychrometric calculations.

TSnOF@   A connection to externally force the output of a *time schedule* to Off.

TSnON@   A connection to externally force the output of a *time schedule* to On.

TSnEX@   A connection to the external extension *override* of a *time schedule*.

Appendix B

Custom Home Page

Introduction

The Home Page is a graphic display of important parameters. The GX Tool reads the Home Page definition file (*.hpg) and downloads the required bitmaps (*.bmp).

This chapter describes:

- default Home Page
- Home Page definition file
- Home Page content
- tokens
- statements
- example Home Page
- Home Page errors

Key Concepts

Default Home Page

When you open a configuration file in the GX Tool, it automatically looks for a Home Page file with the same name as the configuration file. For example, if you open a configuration file named config1.dxs, the tool automatically opens the Home Page file named config1.hpg.

The GX Tool downloads a default Home Page (Figure B-1), named default.hpg, to the DX LCD Display if it cannot find a custom Home Page with the same name as the configuration file.

Figure B-1: Default Home Page

Home Page Definition File

The Home Page is defined as an ASCII file format with references to bitmap files. The DX LCD Display can store up to eight different Home Pages.

Use any standard ASCII text editor to create the Home Page definition file. Give the file the same name as the associated DX configuration file but use a .hpg file name extension. Use any standard paint program to create monochromic Windows bitmap files.

When you load the Home Page file, the GX Tool performs a syntax check and lists any errors or warnings found in the file. Refer to Figure B-2 for an example of a Home Page definition file. Refer to Table B-4 for a list of syntax errors.

Home Page Content

You have complete control over the contents of the Home Page. Apart from referencing user-created bitmaps, the Home Page can also reference standard bar graph symbols available in the DX LCD Display. You can associate analog and digital items with the graphs.

Text

Home Pages can contain dynamic text for numeric items. For example, use dynamic text with analog items such as AI1, clock time, etc. Table B-1 lists Home Page text sizes.

Table B-1: Home Page Text Sizes

Size	Width (pixels)	Height (pixels)
Small	6	8
Medium	12	16
Large	24	32

Note: When you load a Home Page file, the GX Tool verifies the text does not exceed the limits of the LCD (240 pixels wide by 128 pixels high).

Static Bitmaps

Static bitmaps are typically used as the background of the Home Page. Labels, units, and any other static text can be a part of the static bitmap. The file is referenced in the Home Page definition file. Refer to the *Statements* section for information on referencing bitmaps.

Dynamic Bitmaps

Dynamic bitmaps are associated with digital items. Different bitmaps are associated with State 0 and State 1. Use this feature to display changing images that represent the states of the digital item. You create the State 0 and State 1 bitmaps, so you have complete control over their appearance.

Bar Graph

A bar graph can be linked to an analog item. Specify the values of the analog source for 0% and 100%. The bar size changes, as the input changes from 0% to 100%.

Alarm Line

The alarm line displays the most recent alarm and the total number of alarms in the *small* font size on any line of the Home Page.

Clock

The clock displays the current time in 12-hour (hh:mm a/p) or
24-hour (hh:mm) format in the small, medium, or large font size on
the Home Page.

Tokens

Tokens, shown in angle brackets (<>), are placeholders in the
statement rules. Replace tokens with values. Table B-2 lists tokens.
Table B-3 lists the special characters that can be used in the definition
file.

Table B-2: Tokens

Token	Values	Description
\<row\>	1 to 128	Pixel row of display
\<col\>	1 to 240	Pixel column of display
\<bmp top l row/col\>	1 to 65535	Top left row/column offset of image in bitmap file
\<bmp bot r row/col\>	1 to 65535	Bottom right row/column offset of image in bitmap file
\<height\>	1 to 128	Height in pixels
\<width\>	1 to 240	Width in pixels
\<font_size\>	small medium large	6 x 8 pixel font 12 x 16 pixel font 24 x 32 pixel font
\<orientation\>	horizontal vertical	Bar graph orientation
\<show status\>	status no_status	Specifies whether to display the analog item status.
\<12_24_format\>	12 to 24	12- to 24-hour time format
\<name\>		String enclosed in double quotes Example: "MASP"

Table B-3: Special Characters

Character	Description
carriage return	Delimiter for each line
****	Used for continuation of any line.
*****	Placed at beginning of line for single line comment (multiple line comments are not allowed).

Statements

Statements place elements on the Home Page. For static backgrounds and digital items, where you specify a bitmap file name, you must also specify the offset of the image within the bitmap file. Use this to store all of the Home Page images in one bitmap file and refer to different images in the file by specifying their coordinates.

The following examples show Home Page syntax.

Begin Home Page Definition

```
BEGIN_HOMEPAGE   <name>
```

The `<name>` serves only as an identifier for the Home Page definition and is not downloaded to the DX LCD Display.

End Home Page Definition

```
END_HOMEPAGE
```

Static Bitmap

```
<row> <col> STATIC \
<bmp top l row> <bmp top l col> \
<bmp bot r row> <bmp bot r col> <bitmap file>
```

The bitmap must be monochromic.

Analog Item

```
<row><col>ANALOG<font size> \
<no of digits after decimal point>\
<show status><item tag>
```

Digital Item

```
<row> <col> DIGITAL \
<bmp top l row> <bmp top l col> \
<bmp bot r row> <bmp bot r col> <bitmap file for off> \
<bmp top l row> <bmp top l col> \
<bmp bot r row> <bmp bot r col> <bitmap file for on> \
<bmp top l row> <bmp top l col> \
<bmp bot r row> <bmp bot r col> \
<bitmap file for override off> \
<bmp top l row> <bmp top l col> \
<bmp bot r row> <bmp bot r col> \
<bitmap file for override on> <item tag>\
```

The OFF (State 0) and ON (State 1) bitmaps must be the same size. Similarly, the override OFF and override ON bitmaps must be the same size. If an override OFF bitmap is specified, an override ON bitmap is also required.

For digital input type items, you do not have to specify bitmap files for override OFF and override ON (i.e., you can omit them from the DIGITAL statement).

For digital output type items, you must specify override OFF and override ON bitmap files. They can, however, be the same bitmaps as the normal OFF and ON bitmaps. The override bitmaps display at the same position as the OFF and ON bitmaps (i.e., they replace them on the display).

Alarm Line

```
<row> ALARM_LINE
```

The ALARM_LINE begins at the first column and is eight pixels high. Only one alarm line is allowed on a Home Page. The row for the alarm line must be a multiple of eight.

Bar Graph

```
<row> <col> BARGRAPH <width> <height> \ <orientation>
<src val for 0%> \
<src val for 100%> <item tag>
```

A rectangle is drawn around the bar graph by leaving a one pixel gap on each side to indicate the bar graph's boundary.

Clock

```
<row> <col> CLOCK <font_size> <12_24_format>
```

For 12-hour format, the clock occupies six characters (hh:mm a/p) and for 24-hour format, it occupies five characters (hh:mm) of the size defined by <font_size>.

Example Home Page

The Home Page definition file (Figure B-2) defines the custom Home Page (Figure B-3).

```
** put all rectangles, units, and fixed text in the static bitmap
*
BEGIN_HOMEPAGE "plant1"
0 0 STATIC 2 2 129 241 "plant1.bmp"
10 10 ANALOG LARGE 0 NO_STATUS AI1
10 130 ANALOG LARGE 0 NO_STATUS AI2
72 170 DIGITAL 140 2 147 13 "plant1.bmp" 150 2 157 13 "plant1.bmp" DI1
80 170 DIGITAL 140 2 147 13 "plant1.bmp" 150 2 157 13 "plant1.bmp" DI2
88 170 DIGITAL 140 2 147 13 "plant1.bmp" 150 2 157 13 "plant1.bmp" DI3
96 170 DIGITAL 140 2 147 13 "plant1.bmp" 150 2 157 13 "plant1.bmp" DI4
104 170 DIGITAL 140 2 147 13 "plant1.bmp" 150 2 157 13 "plant1.bmp" DI5
END_HOMEPAGE
```
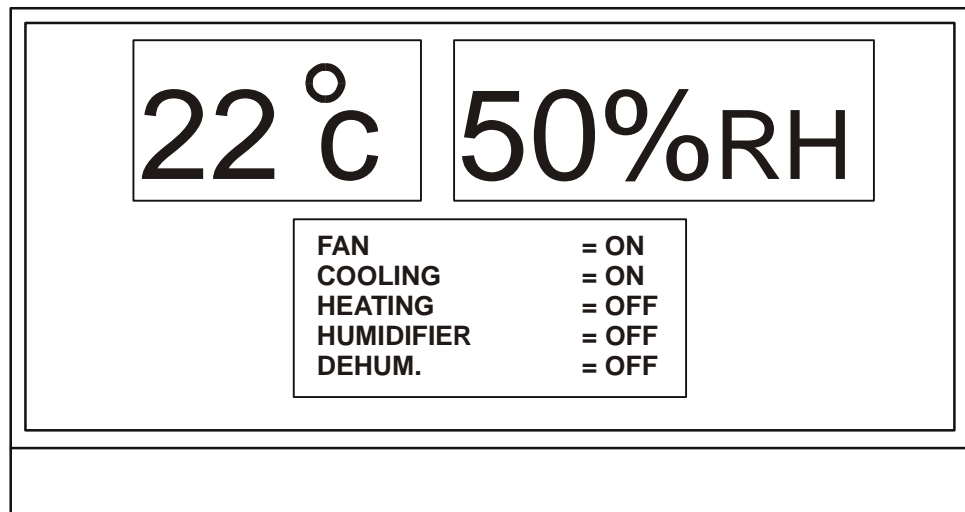
Figure B-2: Home Page Definition File

$$22\,^{\circ}C \quad 50\%RH$$

FAN	= ON
COOLING	= ON
HEATING	= OFF
HUMIDIFIER	= OFF
DEHUM.	= OFF

Figure B-3: Home Page Example

Home Page Errors

Table B-4: Home Page Definition Errors

Error Message	Syntax Check Message	Solution
`Bitmap File Type`	Error Line :6 Bitmap Error, only monochromic bitmaps are supported.	Reopen the bitmap file in Paint. Change Save As type to monochromic bitmap and resave.
`Bitmap file not found`	Error Line :6 Bitmap file not found.	The Home Page file (*.hpg) references a bitmap file (*.bmp) that is not located in the same directory. Locate bitmap file in the same directory as the Home Page file.
`Bitmap dimension mismatch, Bitmap is smaller than that specified`	Error Line :6 Bitmap is smaller than that specified.	Increase the bitmap file size to match the Home Page definition. The bitmap file can be larger than what is defined without producing an error. The DX LCD Display unit displays only what appears in the area up to 240 pixels wide by 128 pixels high.
`Multiple alarm lines`	Error Line :42 Multiple alarm lines not allowed.	Delete all but one alarm line.
`Overlapping area`	Error Line :42 Overlap error, at least two areas overlap, dynamic data items, Digital, Analog	The overlapping items could be analog or digital. To determine overlapping areas, open the static bitmap file, and locate the dynamic item referenced in the error line. Locate other dynamic items near the referenced item. Check the coordinates from the definition of the items in the Home Page file (coordinate refers to location of the upper left corner of the dynamic item and its font size). Relocate the referenced item, so it does not contact another item.
`Statement type not recognized`	Error Line :33 Statement type not recognized. DO, DI, Digital	Digital items typically use backslash (\ ) as part of the definition. Verify backslash used for line continuation includes space before special character. Example: 90 160 DIGITAL \ 141 22 151 63 "DX-22.BMP" \ 129 22 139 63 "DX-22.BMP" \ DO3
`Not enough space to show ANALOG item`	Warning Line :11 Not enough space to show ANALOG item	Dynamic Analog item is overlapping an area of the static bitmap that contains an image. Relocate the Analog item. To determine the overlapping area, open the static bitmap file, and locate the analog item referenced in the Error line. Locate the static image (i.e., labels units, text, etc.) near the analog item. Check the coordinates from the definition of the analog item in the Home Page file (coordinate refers to location of the upper left corner of the dynamic item and its font size).
`Number of Parameters not correct for type DIGITAL`	Error Line :30 Number of Parameters not correct for type DIGITAL	Digital items typically use backslash (\ ) as part of the definition. Verify backslash used for line continuation includes space before special character. Example: 90 160 DIGITAL \ 141 22 151 63 "DX-22.BMP" \ 129 22 139 63 "DX-22.BMP" \ DO3

Appendix C

Updating the DX LCD Display Firmware

Introduction

You can update a DT-9100 with firmware Version 3.00.00 via the DX LCD Display Update Firmware menu. This feature needs to be enabled in the GX Tool initialization file.

This chapter describes how to update DX LCD Display firmware.

Detailed Procedures

Updating DX LCD Display Firmware

> ⚠ CAUTION: **Possible Data Loss.** Updating the firmware overwrites all configuration data in the DX LCD Display. To avoid data loss, upload and save all configurations and Home Pages from the display before updating the firmware.

To update DX LCD Display firmware:

1. On the DX LCD Display menu, click Update Firmware. The DX LCD Display Update Firmware dialog box appears (Figure C-1).
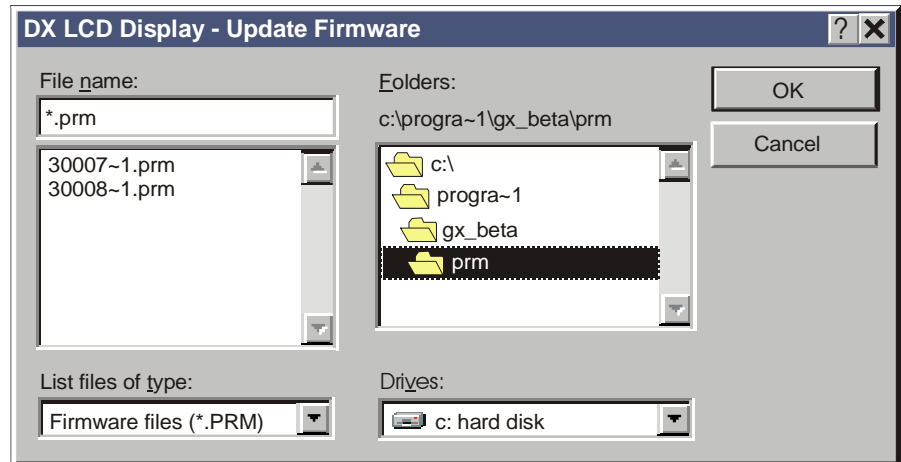

Figure C-1: Update Firmware Dialog Box

2. Choose the file name and click OK to continue. The dxd_dldr DOS window appears (Figure C-2).
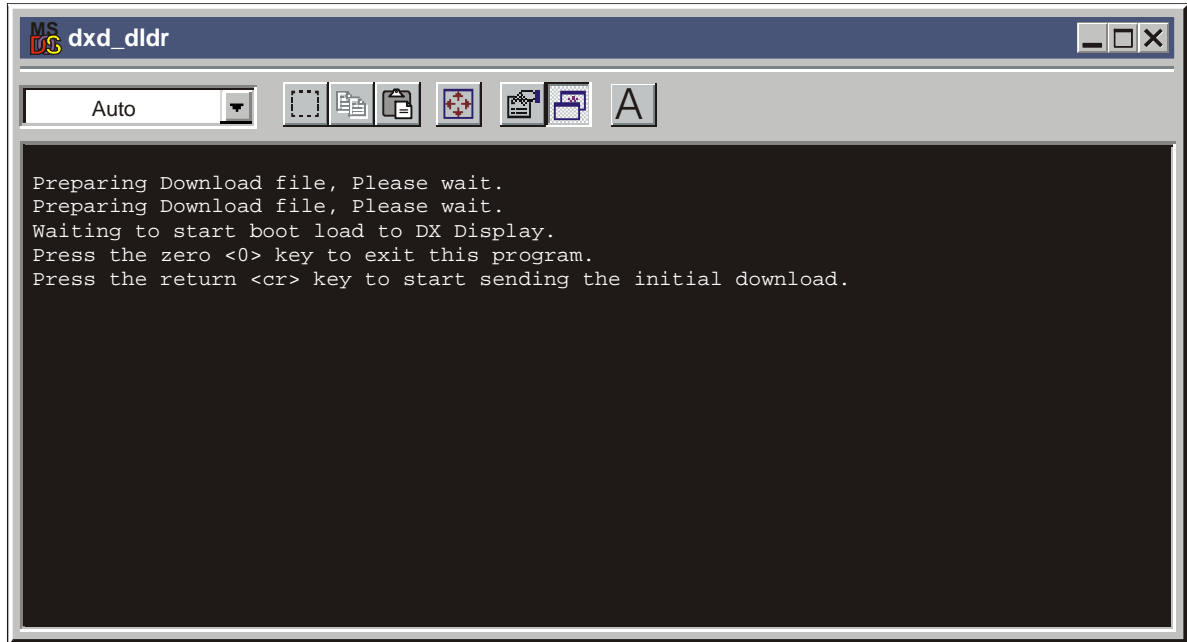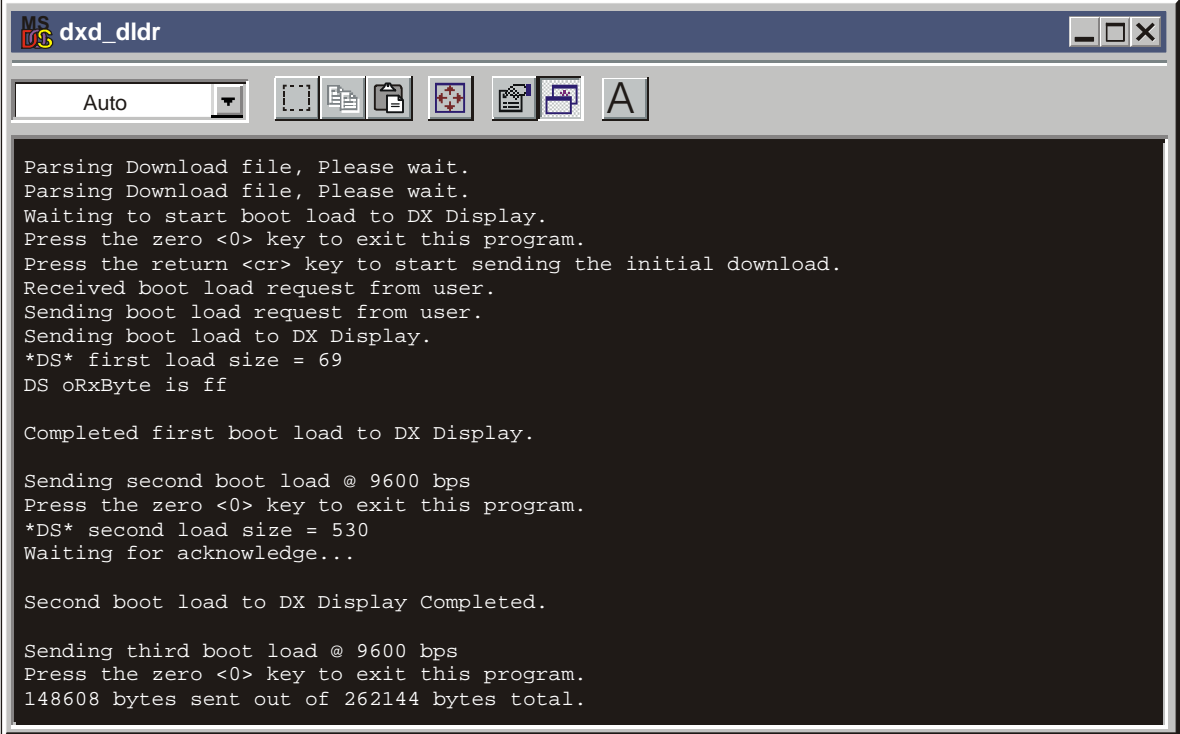
Figure C-2: DOS Window

3. Press Zero key to abort the download procedure and return to the GX Tool, or press the Enter key to start the download procedure. If you press Enter, the DT-9100 is reset with a blank screen and the download begins (Figure C-3).

    When the download is complete, the Finished - dxd_dldr window appears and the DT-9100 is reset (Figure C-4).

4. Close the download window to return to the GX Tool.
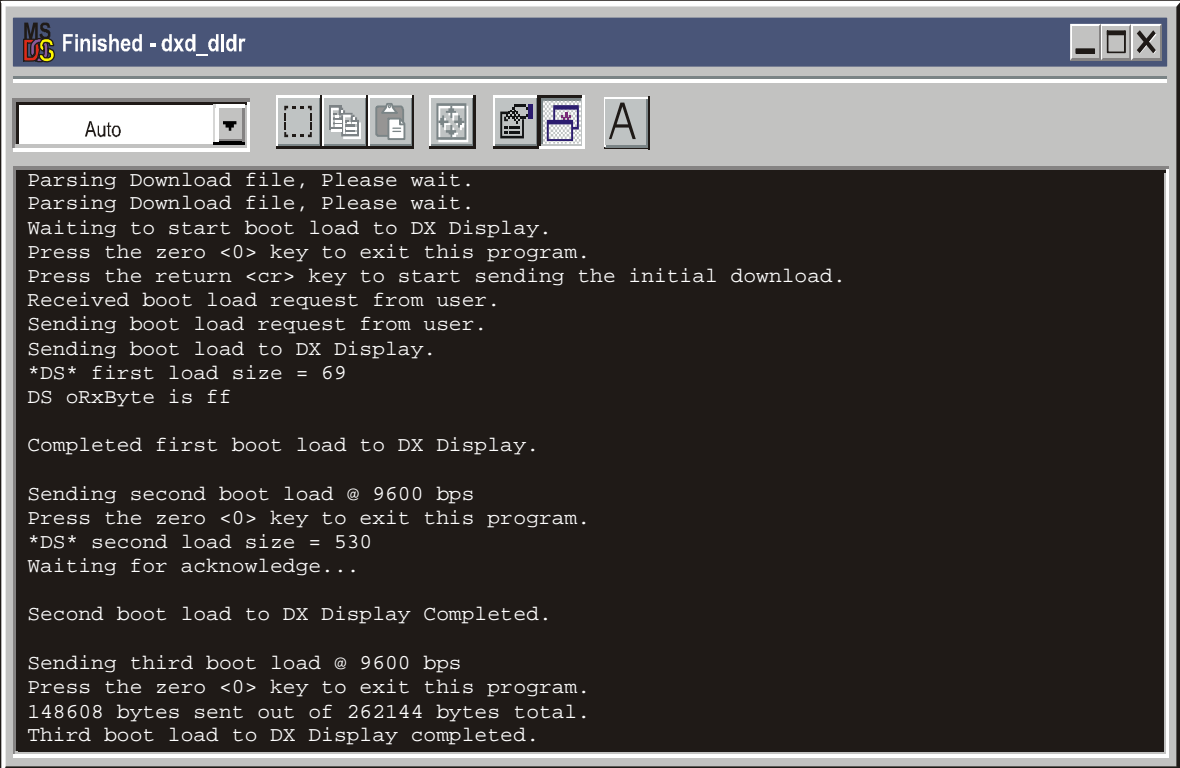
dxd_dldr

Auto

```
Parsing Download file, Please wait.
Parsing Download file, Please wait.
Waiting to start boot load to DX Display.
Press the zero <0> key to exit this program.
Press the return <cr> key to start sending the initial download.
Received boot load request from user.
Sending boot load request from user.
Sending boot load to DX Display.
*DS* first load size = 69
DS oRxByte is ff

Completed first boot load to DX Display.

Sending second boot load @ 9600 bps
Press the zero <0> key to exit this program.
*DS* second load size = 530
Waiting for acknowledge...

Second boot load to DX Display Completed.

Sending third boot load @ 9600 bps
Press the zero <0> key to exit this program.
148608 bytes sent out of 262144 bytes total.
```

Figure C-3: Download Starting

Finished - dxd_dldr

Auto

```
Parsing Download file, Please wait.
Parsing Download file, Please wait.
Waiting to start boot load to DX Display.
Press the zero <0> key to exit this program.
Press the return <cr> key to start sending the initial download.
Received boot load request from user.
Sending boot load request from user.
Sending boot load to DX Display.
*DS* first load size = 69
DS oRxByte is ff

Completed first boot load to DX Display.

Sending second boot load @ 9600 bps
Press the zero <0> key to exit this program.
*DS* second load size = 530
Waiting for acknowledge...

Second boot load to DX Display Completed.

Sending third boot load @ 9600 bps
Press the zero <0> key to exit this program.
148608 bytes sent out of 262144 bytes total.
Third boot load to DX Display completed.
```

Figure C-4: Download Complete

Appendix D

Printing Configurations

Introduction

The GX Tool allows you to print DX controller and DX LCD Display configurations.

This chapter describes how to:

- define the header and footer
- preview the printed configuration
- print a configuration

Detailed Procedures

Defining the Header and Footer

To define the header and footer:

1. On the File menu, click Header/Footer. The Header/Footer Dialog box appears (Figure D-1).

Figure D-1: Header/Footer Dialog Box

2. Enter company name up to 78 characters.

3. Choose header position and select Field Information from drop-down list. Refer to Table D-1 for Field Information options.

4. Select Page Options to display the header and footer on every page or only the first page.

5. Choose footer position and select Field Information from drop-down list. Refer to Table D-1 for Field Information options.

Note: The footer does not include descriptors (e.g., **JOB NAME:**)
when printed.

Table D-1: Header/Footer Field Information

Option	Description
None	Leaves blank space.
Job Name*	Prints job name.
Controller*	Prints the controller version.
Engineer*	Prints name of engineer.
Branch*	Prints branch name.
Created On*	Prints creation date.
Page	Prints page number.
Filename	Prints the name of the file.
Printed On	Prints the current date.

* Job Name, Controller Name, Engineer, Branch, and Created On information is
entered in Job Information.

6.   Select OK to save settings or Cancel to revert to the default
settings. Figure D-2 is an example of a header and footer.

Header Example:

Johnson Controls

JOB NAME: Test Job   **Controller Name:**DX123987   **Page:**1
Branch: JC Toronto   **Engineer:** H.W.Schillack   **Creation Date:** 00/03/21

Footer Example:

Tuesday, March 21, 2000   DX123987.DXS   JC Toronto

HD&FT_EX

Figure D-2: Header and Footer Example

Previewing the Printed Configuration

To preview the printed configuration:

1. On the File menu, click Print Preview. The Print Preview dialog box appears (Figure D-3).
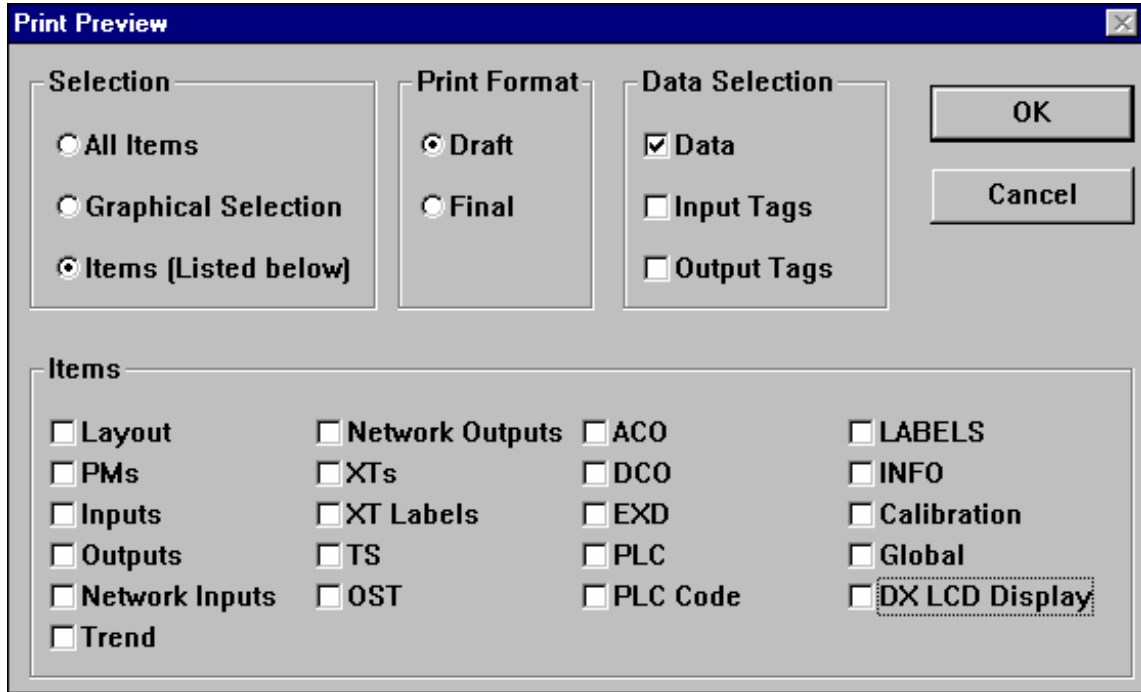

Figure D-3: Print Preview Dialog Box

2. Select options according to Table D-2.

Table D-2: Print Options

Option	Description
Selection	
All Items	Prints items listed in the Items box, including module data, job information, calibration information, and global data.
Graphic Selection	Prints all items selected in the configuration layout.
Items (listed below)	Prints all items with checked boxes in the Items box.
Print Format	
Draft	Prints the configuration as it would be printed in Draft mode (without page headers and footers).
Final	Prints the configuration as it would be printed in Final mode (with page headers and footers).
Data Selection	
Data	Includes data for every module with the configuration printout.
Input Tags	Includes a list of defined input-tags for every module with the configuration printout.
Output Tags	Includes a list of defined output-tags for every module with the configuration printout.

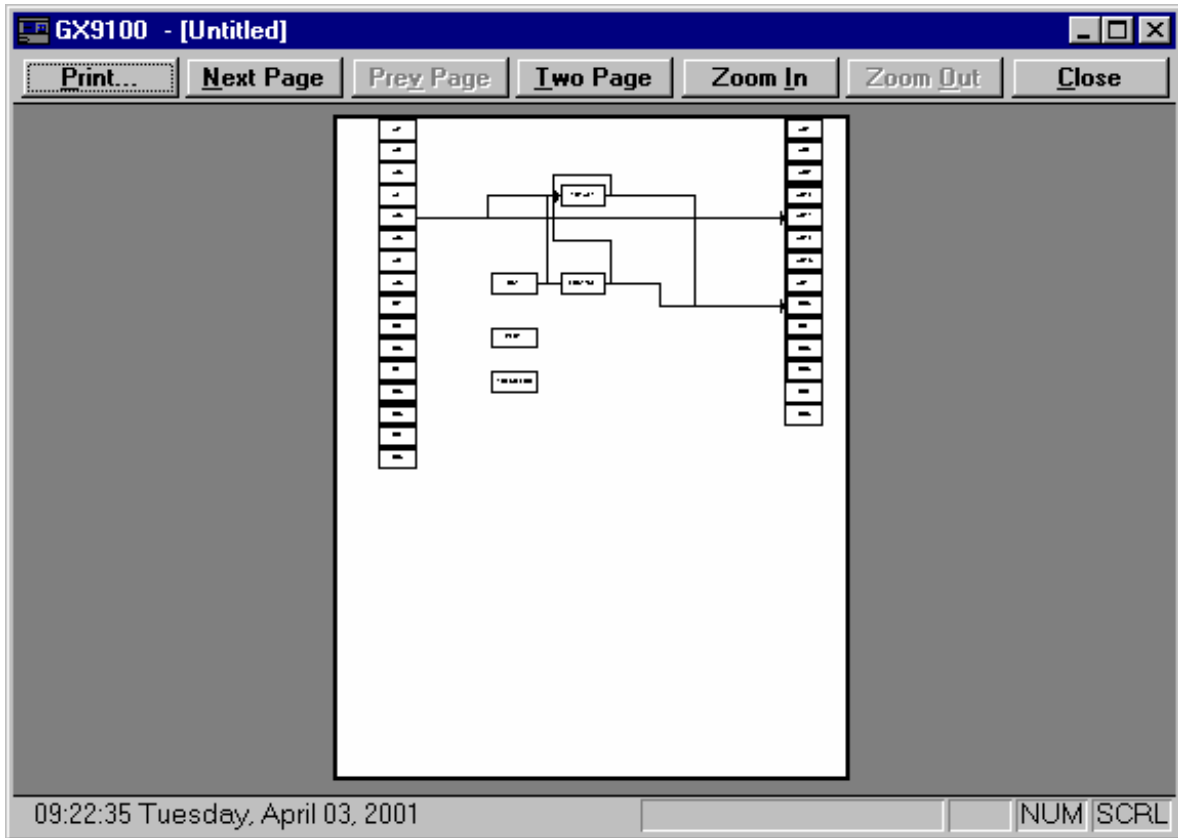3.   Click OK. A print preview screen appears (Figure D-4).

Figure D-4: Print Preview Example

4.   Click Print to print or Close to exit.

Printing a Configuration

To print a configuration:

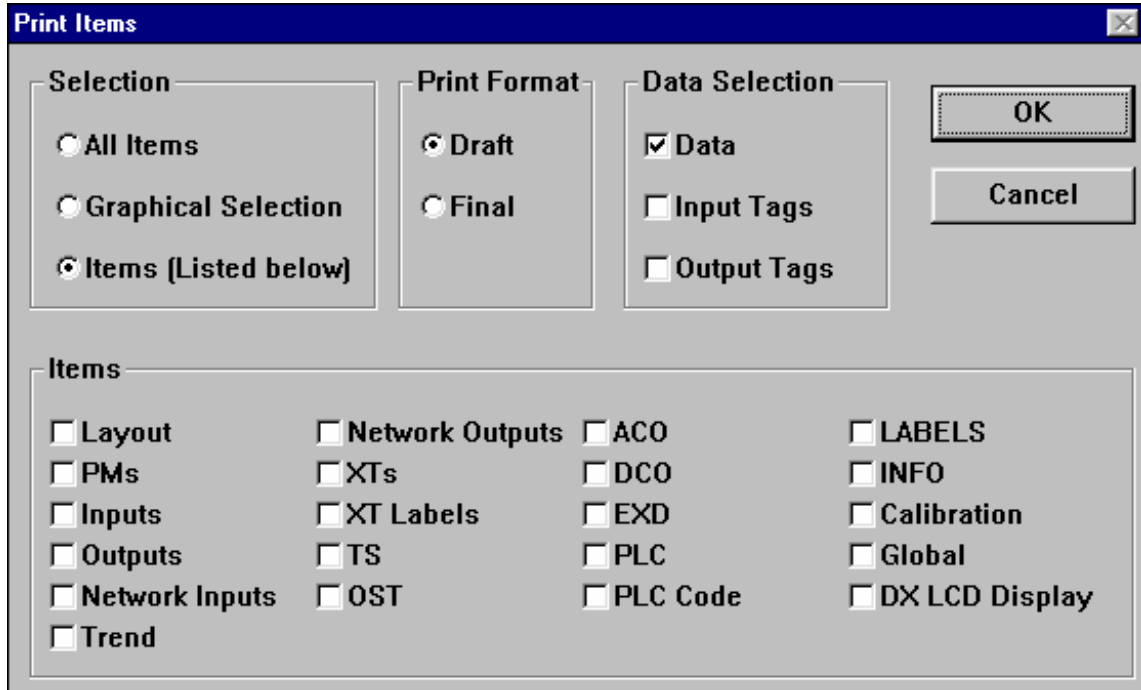1. On the File menu, click Print. The Print Items dialog box appears (Figure D-5).

Figure D-5: Print Items Dialog Box

2. Select options according to Table D-2.

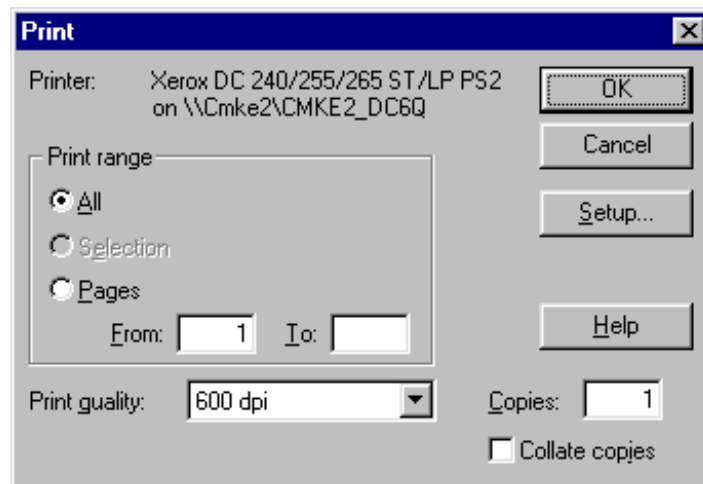3. Click OK. The Print dialog box appears (Figure D-6).

Figure D-6: Print Dialog Box

4. Click Setup… to change the selected printer and printer options.

5. Select the print range.

6. Select the print quality from the drop-down list.

7. Enter the number of copies to print.

Note: If you are printing multiple copies, select Collate Copies to print each set in order.

8. Click OK.