

MDS USER'S GUIDE

Form 691-990421 – April, 1999

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MDS User's Guide
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INTRODUCTION

THANK YOU

Congratulations and thank you for choosing the Mystic Data Server (MDS)! Your new MDS software package is part of Opto 22's continuing effort to deliver the industry's most advanced PC-based automation products. You'll find out how easy MDS is to use and how it provides the sophisticated communication link you need to solve your multi-vendor software data exchange requirements.

WHERE DO I START?

If you're new to client/server programs, please read Chapter 1 to understand the basics about MDS. Then continue with the "Quick Start" in Chapter 2 to get your system up and running.

If you're familiar with client/server programs, just want to get started, and your client is the Mystic MMI, turn to the "Quick Start" in Chapter 2. If your client isn't the Mystic MMI, please read about the installation process in Chapter 2 and then turn to "MDS and DDE-aware Clients" in Chapter 5.

This book is divided into six chapters:

- | | |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Chapter 1 | Introduction
Describes what MDS is and how to use this manual. |
| Chapter 2 | Quick Start
Explains hardware and software requirements as well as step-by-step configuration and setup for MDS and the Mystic MMI. |
| Chapter 3 | The MDS Administrator Menu
Presents details about menu options and dialogs for the "MDS Administrator" program. |
| Chapter 4 | The MDS Menu
Presents details about menu options and dialogs for the "MDS" program. |
| Chapter 5 | MDS and DDE-aware Clients
Provides instructions and examples to setup MDS with Microsoft Word, Excel, Access, and Visual Basic. |

Chapter 6

Advanced Topics

Discusses how to optimize MDS. Learn how to add a backup server to a Mystic MMI application or how to find optimum controller scan times for your data.

Appendices

Troubleshooting, Messages, Technical Support, Glossary

Contains a glossary and information to troubleshoot your system

This book assumes you are familiar with Opto 22's Mystic MMI and Cyrano, Microsoft Windows for Workgroups, and have a basic knowledge of networking. For more information about the Mystic MMI, consult the *MMI User's Guide*, Form 626. For more about Cyrano, refer to the *Cyrano User's Guide*, Form 704. Consult the Microsoft Windows for Workgroups documentation and your particular network's manuals for more information about these products.

MDS OVERVIEW

MDS (Mistic Data Server) is a software package that allows multiple Mistic MMIs and other DDE aware applications to easily access data from Mistic controllers. Two software programs make up the MDS package: the MDS Administrator, and MDS.

The MDS Administrator is used to:

- Configure the physical ports MDS uses to communicate with Mistic controllers
- Set scan times for "non-Mistic MMI" clients
- Set time-outs between MDS and Mistic controllers

MDS is a stand-alone PC application used to:

- Collect data from attached Mistic controllers
- Send data to all registered clients
- Display client/server conversation messages

WHY USE MDS?

Use MDS to provide real-time information to multiple PC workstations needing data from the same Mystic controller(s), without slowing down the controller's throughput. Typically, a system with several computer terminals, each running Mystic MMI and/or DDE-aware clients (such as Microsoft Excel or Microsoft Word), are networked to a PC running MDS (Figure 1-1). The PC running MDS has a direct physical connection to Mystic controllers via a MysticNET protocol (ARCnet, RS-485, or any other Mystic controller supported communication option). MDS scans controllers at a preset rate and informs clients of any changes in data.

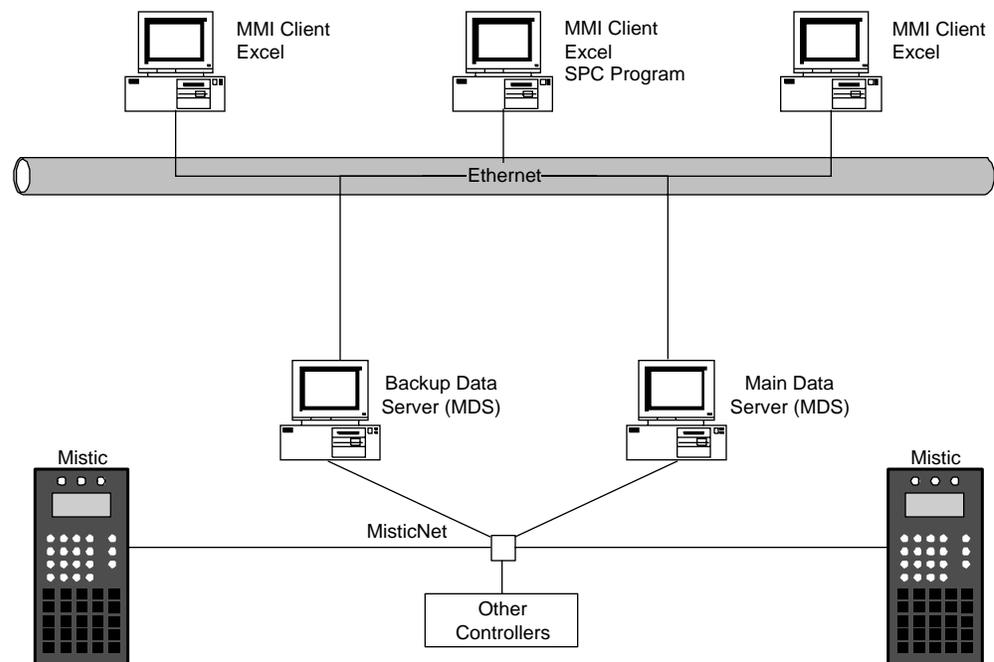


Figure 1-1: Mystic System and MDS

Without MDS, each client would need to scan Mystic controllers for data updates. This would result in slower throughput rates from the controllers. Each time a controller is scanned, its resources are used to read I/O instead of processing the control strategy.

Client/Server Basics and MDS

Mistic MMI strategies and DDE-aware applications running under Microsoft Windows for Workgroups can exchange data on a real-time basis by engaging in a DDE conversation. A conversation is a series of exchanged messages between applications in order to request and supply data. The application initiating the conversation and requesting data is the client. The application supplying the data is the server. MDS is an example of a server, while Mistic MMI, Microsoft Word, and Microsoft Excel are clients. Clients and servers are typically connected together over a local area network such as Ethernet or ARCnet. Clients must be registered with the server to receive information.

The MDS server scans Mistic controllers at a preset rate and sends information to its clients. Scan rates for Mistic MMI clients are setup in the Mistic MMI and scan rates for DDE-aware clients are setup in the MDS Administrator program. DDE-aware clients are sent information on a report-by-exception basis. This means they are only sent data that is newer or different from the last time MDS sent out information to its clients. Because of a special data format used to communicate to Mistic MMI clients, MDS sends all data (changed and unchanged) to those clients.

CONVENTIONS USED IN THIS MANUAL

Before getting started with MDS, review the following conventions used in this manual.

General Conventions

The names of menus, commands, dialog boxes, fields, and buttons are set in quotes.

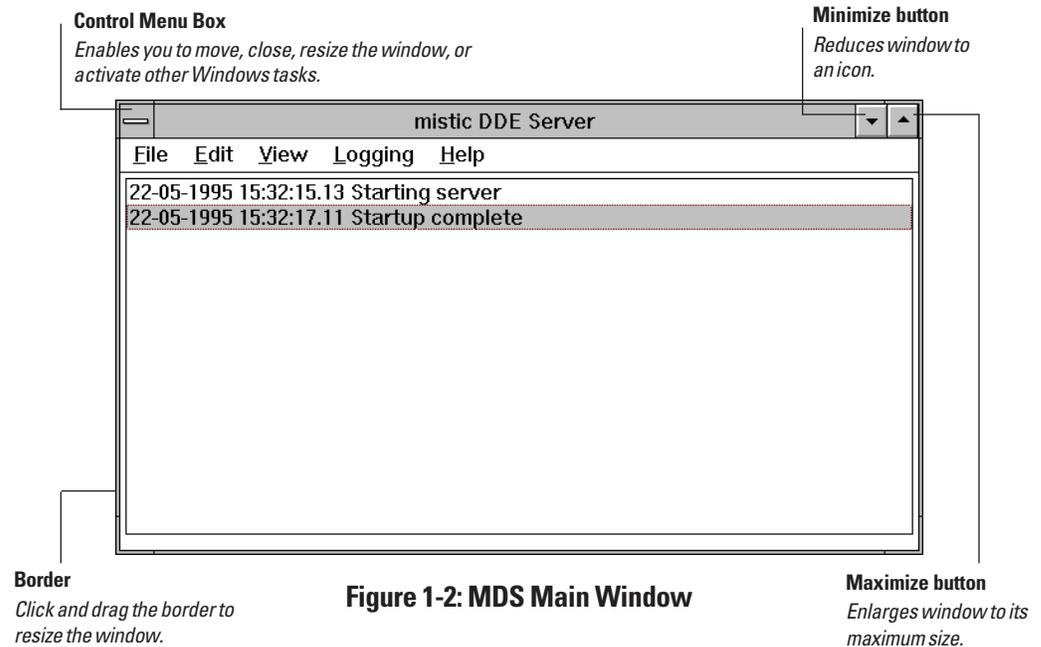
The names of files are set in capital letters (for example, MDSLOG.LOG for the file containing the log messages).

The names of keyboard keys are set in small capital letters (for example, CTRL, ALT, DELETE).

Window Screen Conventions

A dialog box is displayed in response to menu options and enables you to enter specifications. Pressing the TAB key highlights the next control; pressing SHIFT+TAB highlights the previous control. The following illustrations are typical dialog boxes.

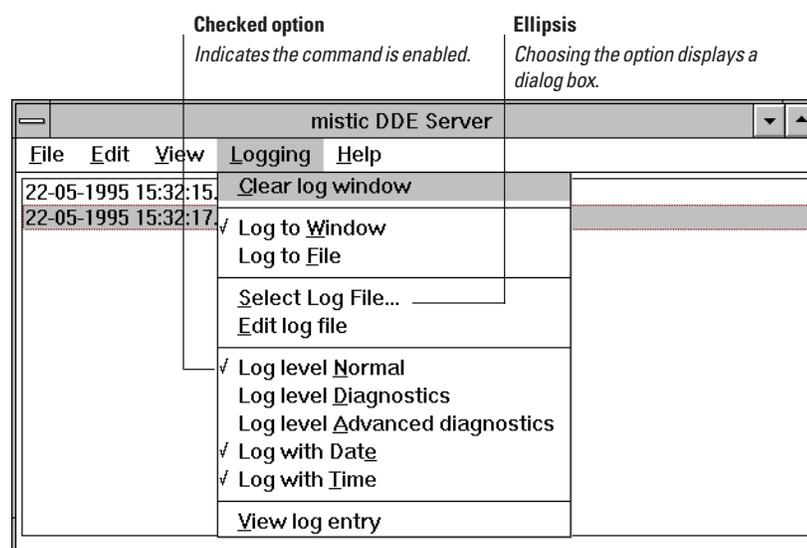
The MDS Administrator main window is used to access and setup menu options, while the MDS main window is used as a display for log messages. The following illustration shows the elements of these main windows.



Menus

To display a menu, click on its title in the menu bar (or press **ALT** and the underlined letter in the menu name).

A menu displays a list of options or displays a dialog box. If a menu is displayed, choose an option by clicking on it using the arrow keys, followed by **ENTER**, or by pressing the underlined letter in the option name.



Dialog Boxes

A dialog box is displayed in response to menu options and enables you to enter specifications. Pressing the **TAB** key highlights the next control; pressing **SHIFT+TAB** highlights the previous control. The following illustrations are typical dialog boxes.

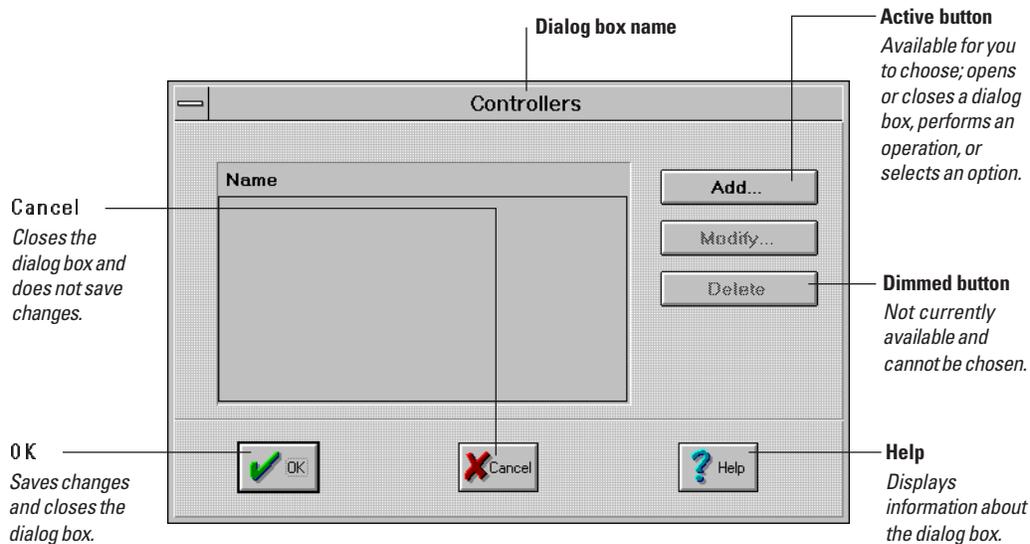


Figure 1-4: Dialog Box Buttons

Some dialog boxes have drop-down lists and require you to enter specifications in field boxes.

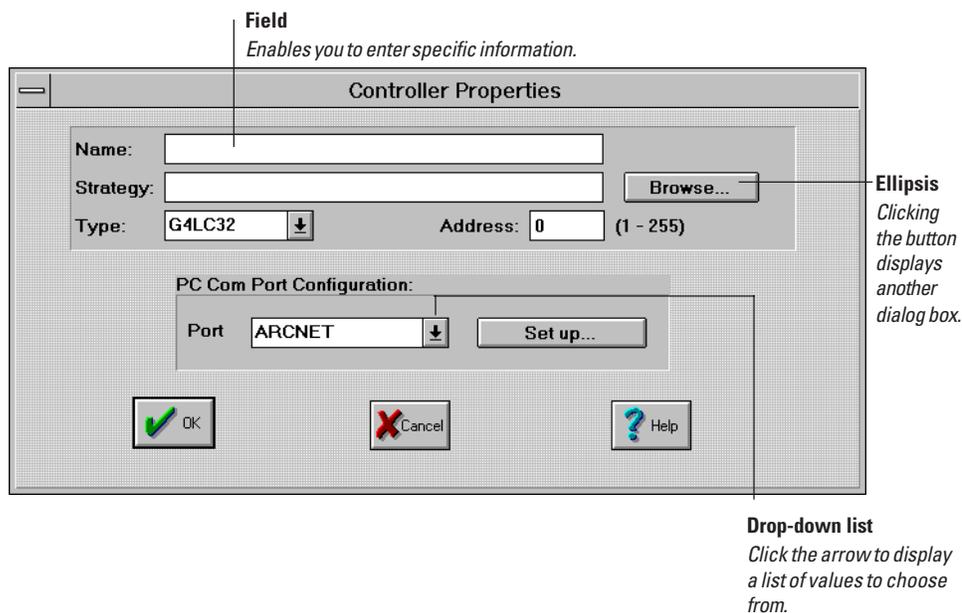


Figure 1-5: Dialog Box Field Entries

QUICK START

OVERVIEW

This chapter explains how to quickly get MDS up and running on a PC in an application using the Mystic MMI and a Mystic system with a controller in a networked environment.

If you are using other programs to query MDS for data, refer to Chapter 5, “MDS and DDE-aware Clients” for detailed instructions.

The quick start process consists of the following steps:

1. Install MDS
2. Verify Mystic equipment and Cyrano work together
3. Configure Mystic MMI
4. Configure MDS
5. Run MDS
6. Run Mystic MMI

SYSTEM REQUIREMENTS

The minimum requirements you need to run MDS are:

PC Hardware

- IBM-compatible 386 personal computer (486 or better recommended)
- Hard disk with 10 MB of free space
- 8 MB of RAM
- Microsoft Mouse or other compatible pointing device
- VGA or compatible display

Software

- MS-DOS version 5.0 or later
- Microsoft Windows for Workgroups version 3.11 or later

Mistic Products

- Any Mistic controller
- Mistic controller kernel EPROM, version 1.43 or later
- Cyrano software, version 1.5 or later
- Mistic MMI version 3.0 or above

The MDS “About” box in MDS and Mistic MMI Runtime also displays the requirements for MDS.

Network

Make sure the Windows for Workgroups NetBIOS or NetBEUI networking protocol option is enabled. Without them, Mistic MMI clients will not work with MDS. If the Mistic MMI is connected to MDS and NetBIOS or NetBEUI is not available, a runtime error is displayed to indicate networking is not enabled.

Important: Make sure you do not install a Windows network driver on the ARCnet card in your PC at the time you install a Windows programming environment. Operating systems such as Windows 95 and Windows NT automatically try to install a network driver on an ARCnet card. Allowing the driver to be installed can produce unpredictable results from MDS.

Also make sure Network DDE is enabled by doing the following:

1. From the Windows Main Program Group, choose the Control Panel icon.
2. Choose the Network icon. The Microsoft Windows Network dialog box appears.
3. Click the “Startup” button to display the “Startup Options”.
4. Make sure the “Enable Network DDE” check box has an ‘X’ in it.

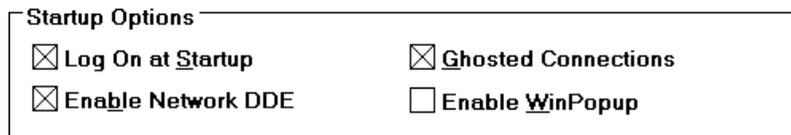


Figure 2-1: Network Dialog

5. Click OK and close all dialog boxes.

TO INSTALL MDS

At least 10 MB of free space must be available on your hard drive to install MDS.

1. Run Windows for Workgroups on your PC.
2. Insert the Mystic Data Server disk, P/N 8876, into a removable floppy drive (e.g.: b:).
3. Choose the "File\Run..." command from Program Manager.
4. Type **b:setup** in the Command Line box and click OK.
5. Enter the desired location for MDS when prompted by the MDS setup and press ENTER.

The default location is: C:\OPTOMDS.

6. When installation is complete, the program group "Opto 22" is displayed and contains two icons as shown in Figure 2-2.

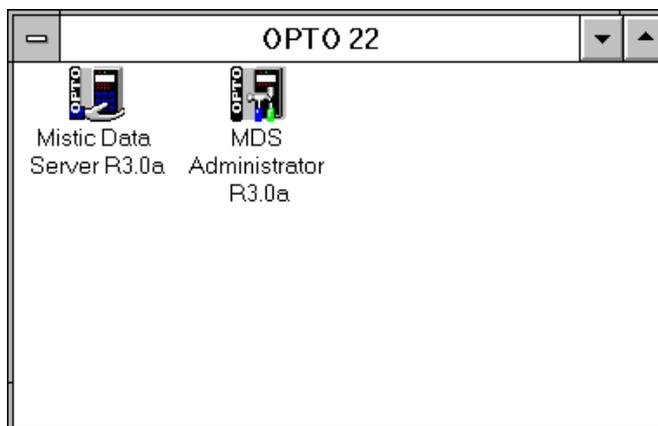


Figure 2-2: Opto 22 Program Group

TO VERIFY MISTIC EQUIPMENT AND CYRANO WORK TOGETHER

Before going on, you'll want to verify the Mystic controller and Cyrano strategy are working properly. If the Cyrano strategy is already downloaded to a Mystic controller and is properly operating, you're done with this section.

If your Cyrano strategy is new or you need to check to see if its controller configuration matches your target controller, proceed with the following steps.

Verification Process

1. Start Cyrano and go into the Configurator by selecting "System\Configurator" from the Cyrano environment.
2. Choose the "File\Load" command and select a Cyrano strategy.
3. Select the "Configure\Mistic" command to review the controller's configuration.

The "Configure Mystic Communications" dialog box appears. It displays the controller's address, communication mode, and its PC COM port configuration. Make any necessary changes so it matches the controller's settings.

4. Choose "Accept" to close the dialog box.
5. Save the file by selecting "File\Save".
6. Download the strategy to the controller by choosing "System\Debugger".
Choose "Yes" when asked "Are you sure?".
7. Once the strategy is downloaded and you're in the Debugger, choose the "Run\Stop" option.
8. Verify the Mystic system is operating.

Run the Cyrano strategy in Autostep mode to verify the controller is communication with the PC. A properly running system displays two messages in the lower left corner of the Cyrano Debugger screen indicating the charts and program are running. You can also visually inspect your Mystic system's communication LEDs for communication transactions.

If you suspect your system is not operating properly, consult the controller manual's or Cyrano manual's appropriate troubleshooting section.

9. Verification is complete. Exit the Debugger by choosing "File\Quit".
10. Exit the Cyrano environment by choosing "Cyrano\Quit".

TO CONFIGURE MISTIC MMI

The Mystic MMI must be configured to use MDS for its data updates. This requires changing the Mystic MMI's PC communication port from its direct Mystic hardware connection, to the networked PC running MDS.

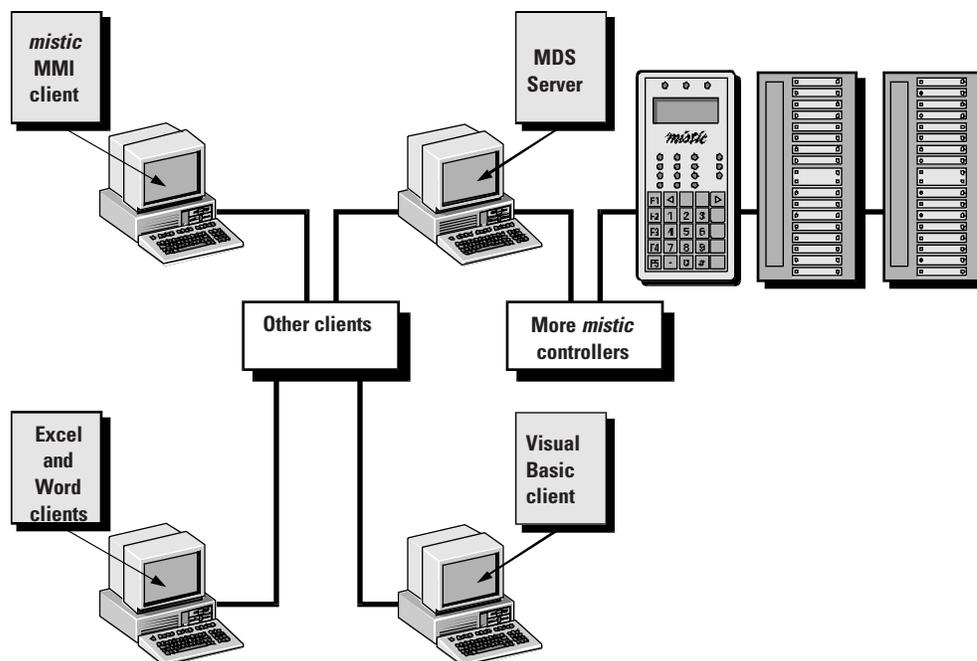


Figure 2-3: Mystic MMI PC Connected to the MDS Server Instead of the Controller

IMPORTANT: Make a backup of your Mystic MMI project before working with it in a new MMI release. A Mystic MMI project saved under a newer release will not work under an older version of the Mystic MMI.

1. Start the Mystic MMI Configurator from the Windows Program Manager.

The Mystic MMI Configurator main window appears.

If a previously loaded MMI project is opened under a newer Mystic MMI release, a warning first appears indicating the "Project is being marked as Modified". Click OK.

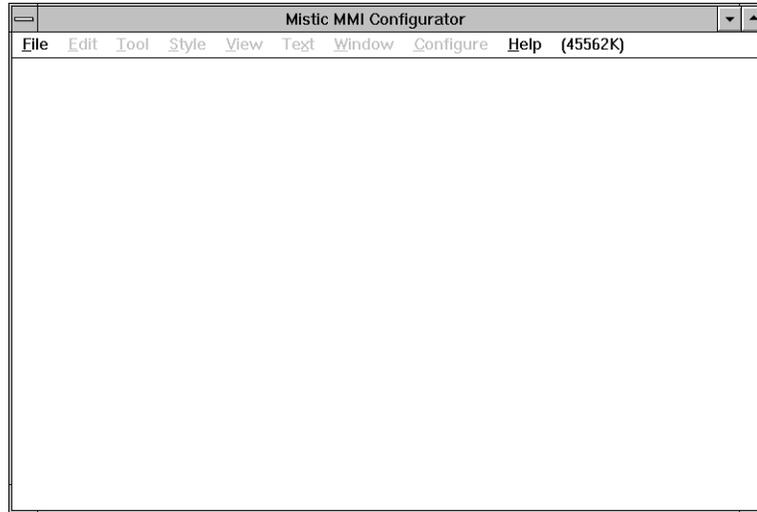


Figure 2-4: Mistic MMI Configurator Main Window

2. Select the "File\Open project..." command.

The "Open Project" dialog box appears .

If the project was "..marked as Modified" (from step 1), you are first asked if you want to save any changes. Saving the project saves it under the newer Mistic MMI release and makes it incompatible with older releases. Click "Yes" if you made a backup copy; click "No" if you do not have a backup copy. Backup all projects before proceeding and start the Mistic MMI configuration process again.

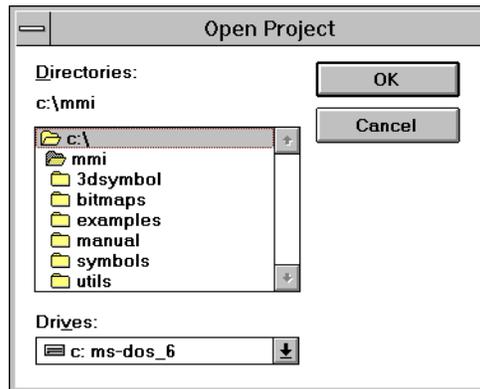


Figure 2-5: Open Project Dialog Box (Mistic MMI)

3. Select a Mistic MMI project and click OK.

Use the directory list box to locate the project directory. The Mistic MMI project loads and its graphics appear in the main draw window.

4. Choose the “Configure\Mistic Controller(s)...” command.

The “Controllers” dialog box appears.

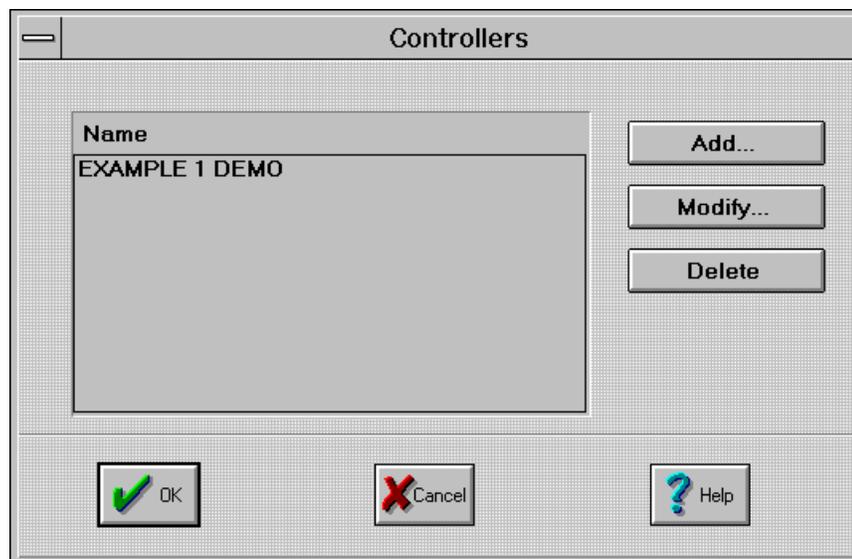


Figure 2-6: Controllers Dialog Box (Mistic MMI)

5. Choose a controller from the “Name” list box.

- If controller names appear in the “Name” list box, click on a name and click “Modify”.

The “Controller Properties” dialog box appears with information about the controller in the boxes.

- If controller names do not appear in the “Name” list box, click “Add...”.

The “Strategy File Name Selection” dialog box appears. Use the file and directory listing to find the Cyrano strategy you want to use and click OK. Cyrano strategies have a .GML extension. The “Controller Properties” dialog box appears with information about the controller in the boxes.

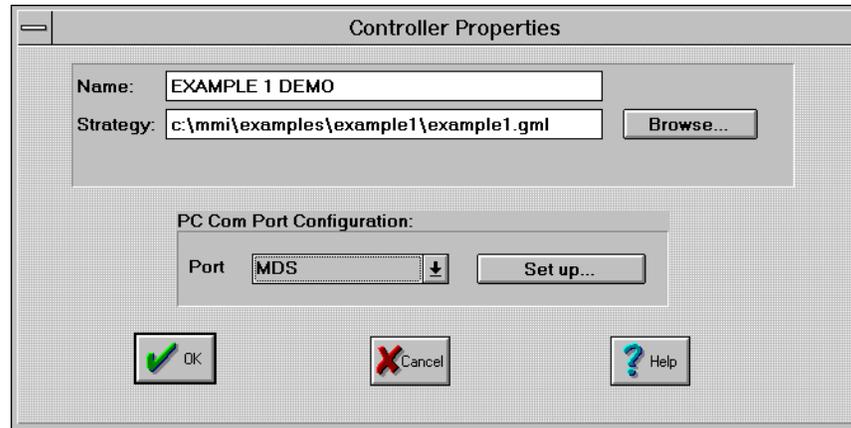


Figure 2-7: Controller Properties Dialog Box (Mistic MMI)

6. Choose "MDS" from the "Port" drop-down list.
7. Click the "Set up..." button to configure the port.

The "MDS Network Server" dialog box appears. Type in the settings for each box. The options are described in Table 2-1.

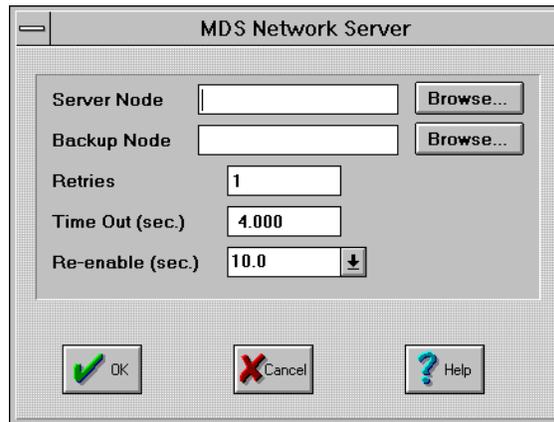


Figure 2-8: MDS Network Server Dialog Box (Mistic MMI)

Table 2-1: MDS Network Server Dialog Box Options

Option	Description
Server Node	Enter the main MDS server's node name. Use the "Browse" button to quickly locate and enter the node name. If the PC is not connected to a network (<i>mistic</i> MMI and MDS are running on the same computer), enter the PC's name.
Backup Node	Leave this option blank. This parameter is used to configure a backup MDS server. Refer to the "Backup Servers" section in Chapter 6 for more information about backups.
Retries:	The number of times a message is retransmitted by the <i>mistic</i> MMI Runtime to MDS before an error condition is declared. The default value is 1 retry.
Time Out (sec.):	The <i>mistic</i> MMI waits for this length of time for a response from MDS on the main server and backup nodes before an error condition is declared. The default value is 4 seconds.
Re-enable (sec.):	The <i>mistic</i> MMI waits this length of time before trying to re-establish communications with a failed server. The default value is 10 seconds.

8. Click OK to accept the new settings and click OK again from the "Controller Properties" dialog box.
9. Repeat steps 5 through 8 to configure additional controllers.

Important: All controllers in your *Mistic* MMI application must be configured to use the MDS port in order for MDS to work properly.

10. After configuring all controllers, click OK from the "Controllers" dialog box.
11. Choose "File\Save project" to save any changes.
12. Exit the *Mistic* MMI Configurator by choosing the "File\Exit MMI Configurator" command.

TO CONFIGURE THE MDS ADMINISTRATOR

Use the MDS Administrator to identify the Mystic MMI client(s) and to define the Mystic controllers MDS will service. The communication ports to the controllers are also defined in this process.

1. Start the MDS Administrator from the Windows Program Manager.
The Mystic Data Server Administrator main window appears.

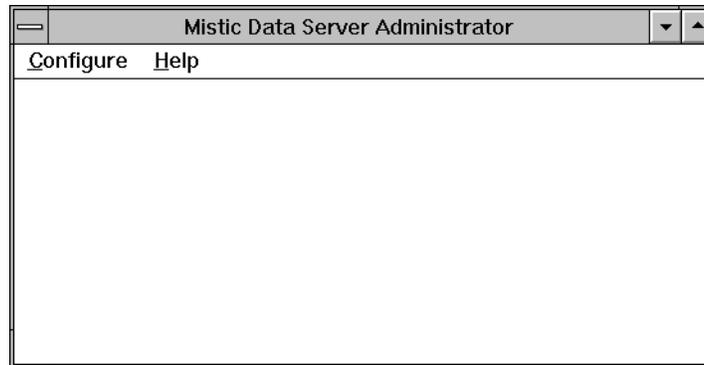


Figure 2-9: Mistic Data Server Administrator Main Window

2. Select the "Configure\Controllers..." menu option.
The "Controllers" dialog box appears.

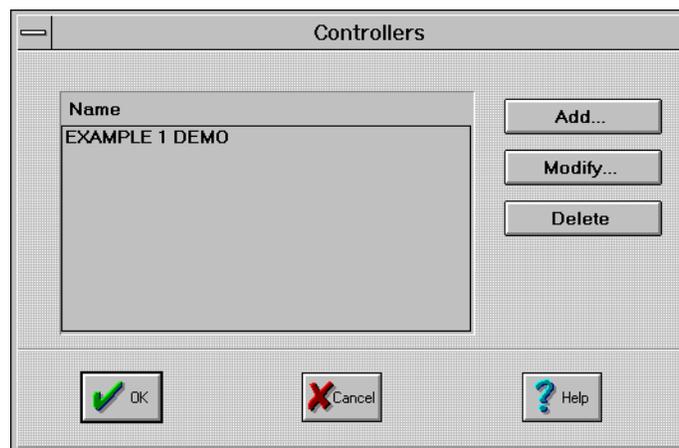


Figure 2-10: Controllers Dialog Box (MDS Administrator)

3. Choose a controller and set up its properties.

- If controller names appear in the “Name” list box, click on a name and then click “Modify”. The “Controller Properties” dialog box appears with information about the controller in the boxes.
- If controller names do not appear in the “Name” list box, click “Add”. The “Controller Properties” dialog box appears. Use the “Browse” button to find the Cyrano strategy you want to use and click OK. Cyrano strategies have a .GML extension. The “Controller Properties” dialog box appears with information about the controller in the boxes.

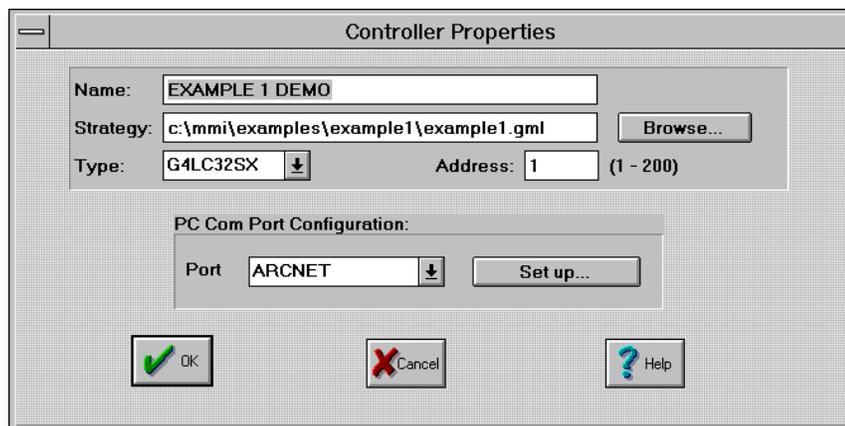


Figure 2-11: Controller Properties Dialog Box (MDS Administrator)

4. Click OK to accept the displayed controller properties.
Typically all options displayed are the correct properties describing the controller. The information is derived from the Cyrano strategy.
5. Repeat steps 3-4 for all controllers listed in the Mystic MMI project.
6. Click OK in the “Controller” dialog when the controller list is complete.
7. Close the MDS Administrator by double-clicking on the control menu box.

TO RUN MDS

Typically, once MDS is started and its message logging features are selected, it can be iconified and run in the background.

1. Start MDS from the Windows Program Manager.

The Mystic Data Server main window appears.

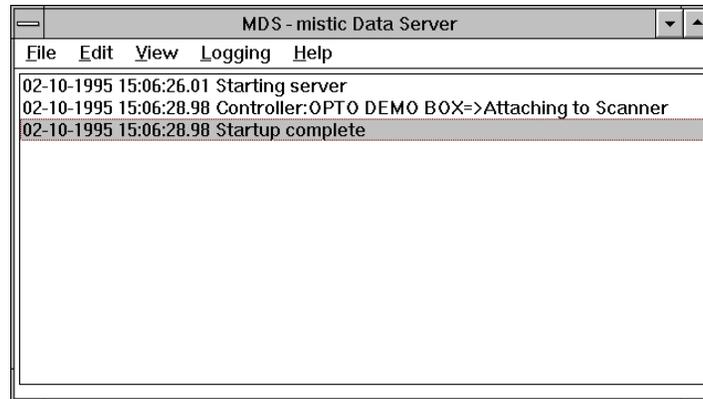


Figure 2-12: MDS Main Window

2. Choose the "Logging" menu item and verify the following default logging options are checked:
 - ✓ "Log to Window" (the main window displays the messages)
 - ✓ "Log Level Normal" (only significant MDS communication events are recorded)
 - ✓ "Log with Time" (messages are saved with a timestamp).
3. Click the minimize button to reduce the Mystic Data Server window to an icon.

TO RUN MISTIC MMI

1. Start the Mystic MMI Runtime from the Windows Program Manager.

The Mystic MMI Runtime main window and the "Event Log Viewer" window are both started.

2. Examine the MDS main window to verify the Mystic MMI is connected to MDS.

Read the messages it displays. Figure 2-13 shows messages of a successful Mystic MMI to MDS connection.

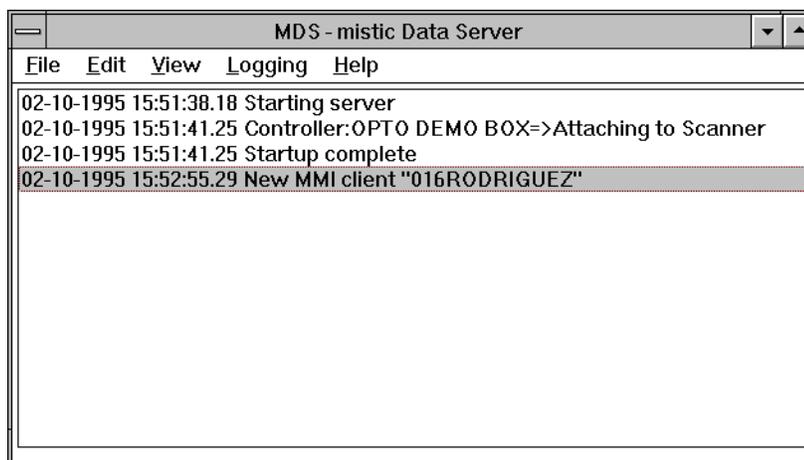


Figure 2-13: Successful Mystic MMI to MDS Connection (MDS)

3. The Mystic MMI to MDS connection is complete.

SUMMARY

In this brief quick start, you have learned how to run your MDS software package with a Mystic MMI client. See Chapter 5, "MDS and DDE-Aware Clients" if you have a client other than the Mystic MMI that you'd like to run with MDS. Refer to the appropriate sections in this manual for additional details about MDS.

MDS ADMINISTRATOR MENU

OVERVIEW

The MDS Administrator enables you to configure the physical ports MDS uses to communicate to Mystic controllers, set scan rates for DDE aware clients such as Microsoft Excel, and setup time-outs between MDS and Mystic controllers.

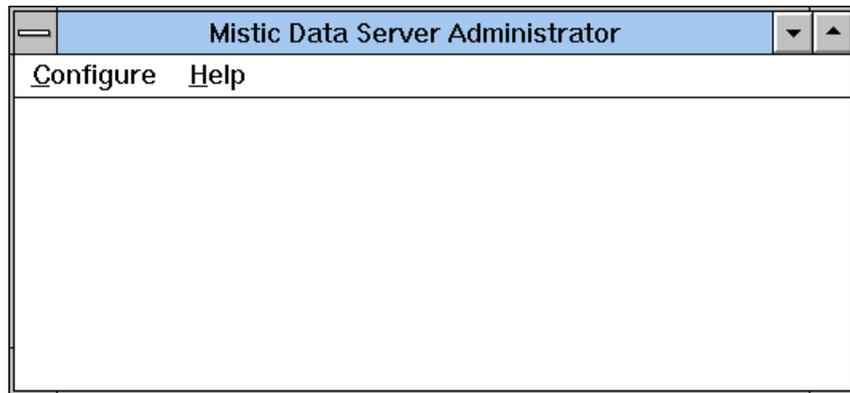


Figure 3-1: MDS Administrator Menu

CONFIGURE

The "Configure" menu contains commands to configure Mystic controllers, setup refresh times, and general options to modify MDS transactions.

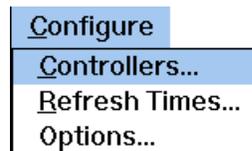


Figure 3-2: Configure Menu Commands

Controllers...

“Controllers...” enables you to add and configure Mistic controllers. Choosing “Controllers...” displays the “Controllers” dialog box.

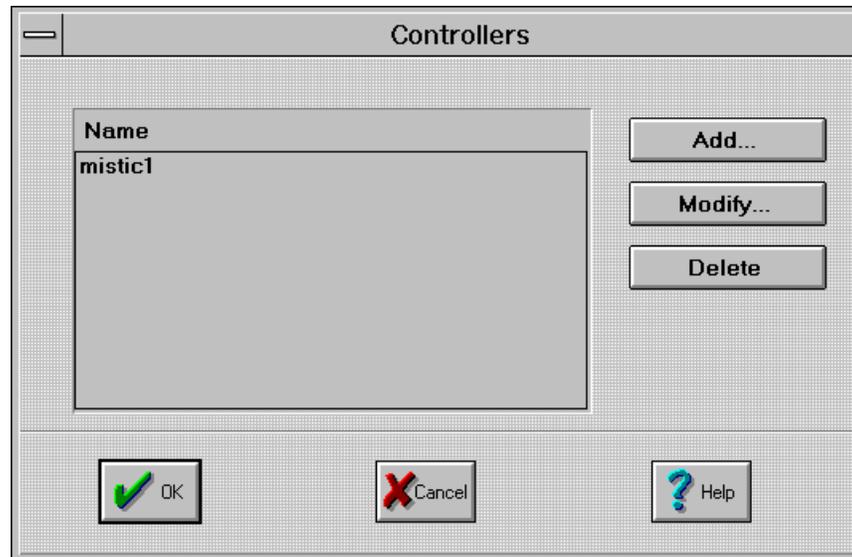
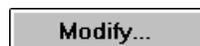


Figure 3-3: Controllers Dialog Box

The “Name” list box displays a list of controllers available for MDS data updates. The controller names are the same names used in your system’s Mistic MMI project and Cyrano strategy. The properties you enter for each controller are saved by clicking OK.



To add controllers to the “Name” list box, click the “Add...” button. The “Controller Properties” dialog box appears (Figure 3-4). The dialog box is described in the next section.



To modify properties for controllers shown in the “Name” list box, click the “Modify...” button or double-click on its name. The “Controller Properties” dialog box appears (Figure 3-4). The dialog box is described in the next section.



Deletes controllers from the “Name” list box. A “Delete Controller” dialog box appears and asks for confirmation about the controller you want to delete. Click “Yes” to delete the name from the list, or “No” to void the delete request.

Controller Properties Dialog Box

Clicking “Add...” or “Modify...” in the “Controllers” dialog box displays the “Controller Properties” dialog box (Figure 3-4). After setting all options, click OK to save the changes.

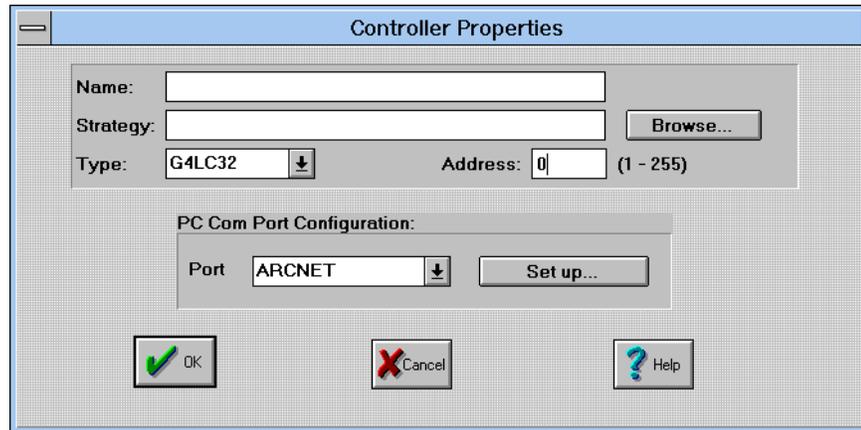


Figure 3-4: Controller Properties Dialog Box

Name	To add a controller, enter its name exactly as it appears in the Cyrano strategy. Use the “Browse...” button to easily find your Cyrano strategy and enter the controller’s name and other properties. If you selected the “Modify...” button from the “Controllers” dialog, the controller name automatically appears. Cyrano files end with a .GML extension.
Strategy	To specify the name of the Cyrano strategy running in your controller, enter the full pathname of the file. Use the “Browse...” button to easily enter the filename. Cyrano files end with a .GML extension. If you selected the “Modify...” button from the “Controllers” dialog, the controller strategy name automatically appears.
Type	To select the Mystic controller model you are configuring, choose an option from the “Type” drop-down list. The options are: G4LC32, G4LC32SX, G4LC32ISA, and M4RTU. If you selected the “Modify...” button from the “Controllers” dialog, the controller type automatically appears.
Address	To select the controller’s address, enter a value in the “Address” field. If you selected the “Modify...” button from the “Controllers” dialog, the address automatically appears.

Port

Choose an option from the “Port” drop-down list to select the communication port type used to connect to the Mystic controller. This port is located in the PC that’s running MDS. If you selected the

Table 3-1: Mystic Controller Address Ranges

Controller	Address Range
G4LC32	1—255
G4LC32SX	1—200
G4LC32ISA	1—255
M4RTU	1—255

“Modify...” button from the “Controllers” dialog, the port type automatically appears.

Table 3-2: Controller Port Types

Type	Description
ARCnet	Choose this option if you are using an ARCnet port
AC37/AC42	Choose this option if you are using an Opto 22 AC37 RS-485 port, or an AC42, fiber optic port
WIN COM PORT	Choose this option if you are using a RS-232 port
ISA DIRECT	Choose this option if you are using an Opto 22 G4LC32ISA controller



To configure the selected port, click the “Setup...” button. A dialog box named after the “Port” option you selected appears. The dialog boxes are described in the following sections.

ARCnet Port Dialog Box

Click “Setup...” in the “Controller Properties” dialog box to display the “ARCnet Port” dialog box. Use this dialog box to configure the ARCnet port used to connect the MDS computer to the Mystic controller. Click OK to save the options you entered.

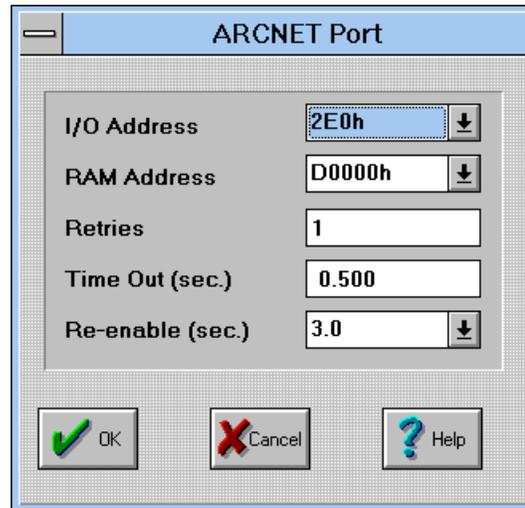


Figure 3-5: ARCnet Port Dialog Box

I/O Address	To specify an I/O address for the ARCnet port, choose an option from the “I/O Address” drop-down list. The address options are: 260h, 290h, 2E0h, 2F0h, 300h, 350h, 380h, and 3E0h. The address should match the address configured in your Cyrano strategy and the address setting of the ARCnet card.
RAM Address	To specify a RAM address for the ARCnet port, choose an option from the “RAM Address” drop-down list. The options are: C0000h, C4000h, C8000h, CC000h, D0000h, D4000h, D8000h, DC000h, and E0000h.
Retries	To specify the number of times MDS tries to communicate to a controller after the initial attempt before the controller is considered down, enter a value from 1 to 9. This parameter is optional and the default value is 1.
Time Out(sec.)	Enter a value from 0.2 to 600 to specify the time (in seconds) MDS waits for a response from the controller between each communication attempt (set by the “Retries” option). Failure by the controller to respond results in an error message sent to the MDS window and/or message log file about a downed controller. The default time-out value is 0.5 (seconds).
Re-enable	To specify the time interval to wait before checking for a Mystic controller response after it has failed to respond. This property frees up the computer’s CPU for other tasks during this waiting period. MDS options available are 1, 3, 10, and 30 seconds. The MDS default re-enable time is 3 seconds.

AC37/AC42 Port Dialog Box

Click "Setup..." in the "Controller Properties" dialog box to display the "AC37/AC42 Port" dialog box. Use this dialog box to enter settings for your AC37, RS-485 port or your AC42, fiber optic port. Click OK to save the options you entered.

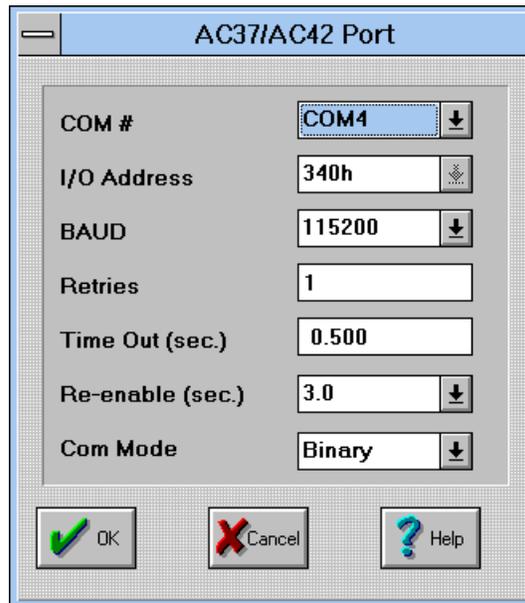


Figure 3-6: AC37/AC42 Port Dialog Box

COM #

To select a communication port, choose a port from the "COM #" drop-down list. The options available are: COM1, COM2, COM3, COM4, COM5, COM6, and Custom. The "Custom" port option allows you to enter an address in the "I/O Address" field. All other COM ports have dedicated I/O addresses and cannot be changed. The default COM # is COM3.

Choose “Custom” if your port’s address is configured differently from standard I/O Address settings. Refer to the “I/O Address” option description for the standard address settings.

Table 3-3: AC37/AC42 I/O Addresses

COM #	I/O Address
COM1	3F8h
COM2	2F8h
COM3 (Opto setting)	348h
COM3	3E8h
COM4 (Opto setting)	340h
COM4	2E8h
COM5	248h
COM6	240h
Custom	*

*See I/O Address discussion for available addresses.

I/O Address

This option displays the dedicated I/O address for the COM port selected in the “COM #” option. Table 3-3 shows the assigned I/O Address to each COM #. If the “Custom” port was chosen, assign an address from the drop-down list. The addresses available for the “Custom” option are 260h, 290h, 2E0h, 2F0h, 300h, and 350h. Make sure the address you choose is assigned to only one communication port. The default I/O address is 348h (the typical Opto address setting for the default COM3 port).

BAUD

To specify a baud rate, choose an option from the “BAUD” drop-down list. The options are: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 76800, 115200. The default baud rate is 115200 baud.

Retries	To specify the number of times MDS tries to communicate to a controller after the initial attempt before the controller is considered down, enter a value from 1 to 9. This parameter is optional and the default value is 1.
Time Out(sec.)	Enter a value from 0.2 to 600 to specify the time (in seconds) MDS waits for a response from the controller between each communication attempt (set by the "Retries" option). Failure by the controller to respond results in an error message sent to the MDS window and/or message log file about a downed controller. The default time-out value is 0.5 (seconds).
Re-enable	To specify the time interval to wait before checking for a Mystic controller response after it has failed to respond. This property frees up the computer's CPU for other tasks during this waiting period. MDS options available are 1, 3, 10, and 30 seconds. The MDS default re-enable time is 3 seconds.
Com Mode	<p>To select the communication mode used by the host computer to the controller, choose the Binary or ASCII option from the "Com Mode" drop-down list. The Com Mode chooses the type of information packets exchanged by the host computer and controller. The default communication mode is binary.</p> <p>Use ASCII mode if there is a modem between the MDS computer and Mystic controller. Make sure you configure the Mystic controller for ASCII mode as well. (Consult your controller's user's guide for this setting.) Most modems cannot understand the Opto 22 binary protocol.</p>

WIN COM PORT Dialog Box

Click "Setup..." in the "Controller Properties" dialog box with the WIN COM port option selected to display the "WIN COM Port" dialog box. Use this dialog box to enter settings for your RS-232 port. Click OK to save the settings you entered.

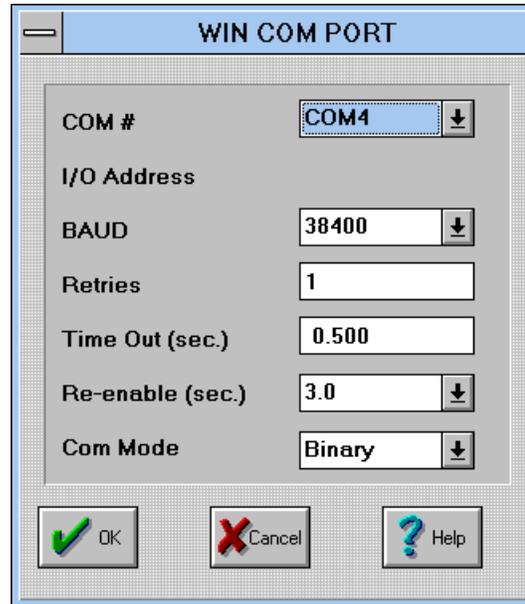


Figure 3-7: WIN COM Port Dialog Box

COM #	To select a communication port, choose a port from the “COM #” drop-down list. The options are: COM1, COM2, COM3, and COM4. The default COM # is COM3.
I/O Address	This field is not displayed. Communication port I/O addresses may be viewed and configured in the Ports program group from the Windows Control Panel. Make sure the address you choose is assigned to only one communication port.
BAUD	To specify a baud rate, choose an option from the “BAUD” drop-down list. The options are: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 76800, 115200. The default baud rate is 38400 baud.
Retries	To specify the number of times MDS tries to communicate to a controller after the initial attempt before the controller is considered down, enter a value from 1 to 9. This parameter is optional and the default value is 1.

Time Out(sec.)	Enter a value from 0.2 to 600 to specify the time (in seconds) MDS waits for a response from the controller between each communication attempt (set by the "Retries" option). Failure by the controller to respond results in an error message sent to the MDS window and/or message log file about a downed controller. The default time-out value is 0.5 (seconds).
Re-enable	To specify the time interval to wait before checking for a Mystic controller response after it has failed to respond. This property frees up the computer's CPU for other tasks during this waiting period. MDS options available are 1, 3, 10, and 30 seconds. The MDS default re-enable time is 3 seconds.
Com Mode	<p>To select the communication mode used by the host computer to the controller, choose the Binary or ASCII option from the "Com Mode" drop-down list. The Com Mode chooses the type of information packets exchanged by the host computer and controller. The default communication mode is binary.</p> <p>Use ASCII mode if there is a modem between the MDS computer and Mystic controller. Make sure you configure the Mystic controller for ASCII mode as well. (Consult your controller's user's guide for this setting.) Most modems cannot understand the Opto 22 binary protocol.</p>

ISA Direct Dialog Box

Click "Setup..." in the "Controller Properties" dialog box with the ISA DIRECT port option selected to display the "ISA DIRECT Port" dialog box. Enter settings for your G4LC32ISA's PC COM port connection. Click OK to save the settings you entered.

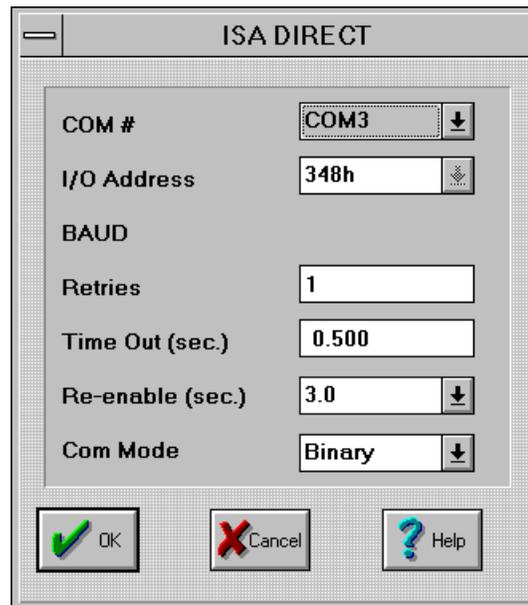


Figure 3-8: ISA DIRECT Port Dialog Box

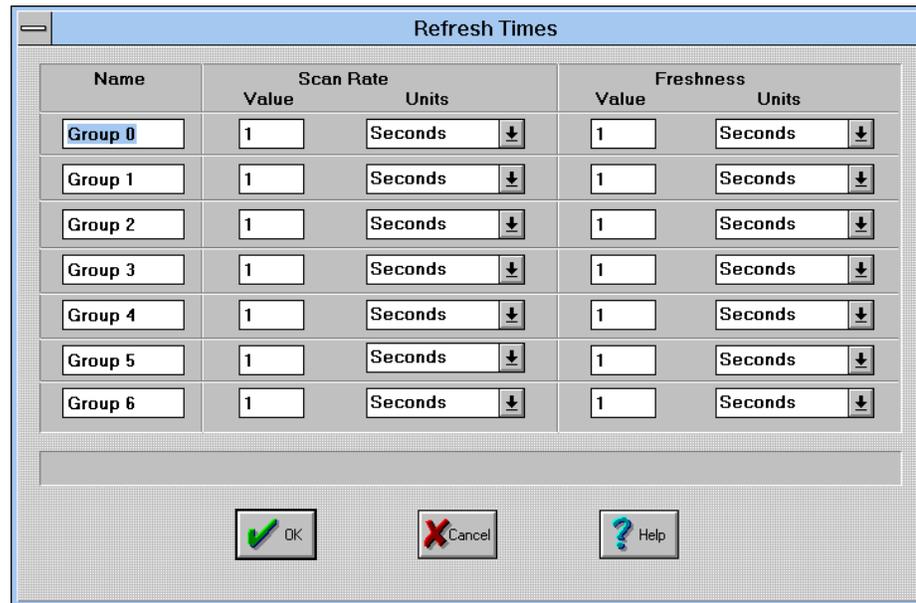
COM #	To select a communication port, choose a port from the "COM #" drop-down list. The options are: COM1, COM2, COM3, COM4, COM5, and COM6. The default COM # is COM3.
I/O Address	This field displays the communication I/O address for the G4LC32ISA controller. Communication port I/O addresses may be viewed and configured in the Ports program group from the Windows Control Panel. Make sure the I/O address matches the I/O address setting on the G4LC32ISA. Also verify the I/O address is unique from any other address assigned to a card in the computer.
BAUD	This field is not displayed. This parameter does not apply to the G4LC32ISA.
Retries	To specify the number of times MDS tries to communicate to a controller after the initial attempt before the controller is considered down, enter a value from 1 to 9. This parameter is optional and the default value is 1.
Time Out(sec.)	Enter a value from 0.2 to 600 to specify the time (in seconds) MDS waits for a response from the controller between each communication attempt (set by the "Retries" option). Failure by the controller to respond results in an error message sent to the MDS window and/or message log file about a downed controller. The default time-out value is 0.5 (seconds).
Re-enable	To specify the time interval to wait before checking for a Mystic controller response after it has failed to respond. This property frees up the computer's CPU for other tasks during this waiting period. MDS options available are 1, 3, 10, and 30 seconds. The MDS default re-enable time is 3 seconds.
Com Mode	To select the communication mode used by the host computer to the controller, choose the Binary or ASCII option from the "Com Mode" drop-down list. The Com Mode chooses the type of information packets exchanged by the host computer and controller. The default communication mode is binary. Binary mode is faster and is typically used. If you are configuring a G4LC32ISA controller, choose the binary communication mode.

Refresh Times...

"Refresh Times..." enables you to configure scan rate and freshness values for DDE aware clients such as Microsoft Excel and Word. Up to seven refresh names can be set up and a client can use more than

one refresh name. If your client program is the Mystic MMI, this option is configured in the Mystic MMI Configurator and not in the MDS Administrator.

Choosing “Refresh Times...” displays the “Refresh Times” dialog box. After setting all options, click OK to save the changes.



Name	Scan Rate		Freshness	
	Value	Units	Value	Units
Group 0	1	Seconds	1	Seconds
Group 1	1	Seconds	1	Seconds
Group 2	1	Seconds	1	Seconds
Group 3	1	Seconds	1	Seconds
Group 4	1	Seconds	1	Seconds
Group 5	1	Seconds	1	Seconds
Group 6	1	Seconds	1	Seconds

Figure 3-9: Refresh Times Dialog Box

Name

Specify a name for the DDE aware client refresh time you want to set up. The name is used in a client's request for a data item.



The name can be up to 15 characters long. Avoid using the “!” and “|” characters in the name. Spaces are also valid characters, but remember to include them when creating your client’s DDE message. Don’t omit them or substitute the “_” character.

The following is an example of a Microsoft Excel DDE formula using a refresh name:

```
MDS[OPTO_MDS_0!MyMistic[Group 0]:I.TEST_INT'
```

“Group 0” is used in this Excel request to specify the scan rate and freshness values. Notice there is a space between “Group” and “0”.

More than one refresh Name can be assigned to a client. This is useful when there are groups of I/Os with different scan rates. For example, you might have a group of analog I/O points to read the outdoor temperature while you have some digital I/Os sensing the on/off status of a security gate’s toggle button. Since outdoor temperatures are fairly stable, the scan rate for the analog I/O group would typically be longer than the scan rate for the digital I/O group which is trying to detect if the gate’s button was toggled.

Scan Rate

To specify how often MDS scans the controllers for data, enter a value from 0 to 9999 in the “Value” field and a unit of time from the the “Units” drop-down list. The unit options are: milliseconds, seconds, minutes, hours, days, and months. The scan rate must be greater than or equal to the value in the “Freshness” field. The greater the value, the more time between I/O readings and the fewer times the controller is scanned.

Freshness

To specify how current (fresh) the data from the controller must be, enter a value from 0 to 9999 in the “Value” field and a unit of time from the “Units” drop-down list. The unit options are: milliseconds, seconds, minutes, hours, days, and months. The freshness value must be less than or equal to the value in the “Scan Rate” field.

If the data available from the controller is older than the time specified in the freshness field, the controller scans the I/O units or bricks for new data. The higher the freshness value, the less the controller's throughput is affected. The lower the freshness value, the more likely the I/O units will need to be scanned.

Options...

Choosing the "Options..." command displays the Options dialog box. A list of options available to modify MDS transactions is displayed. Click OK to save the options you entered.

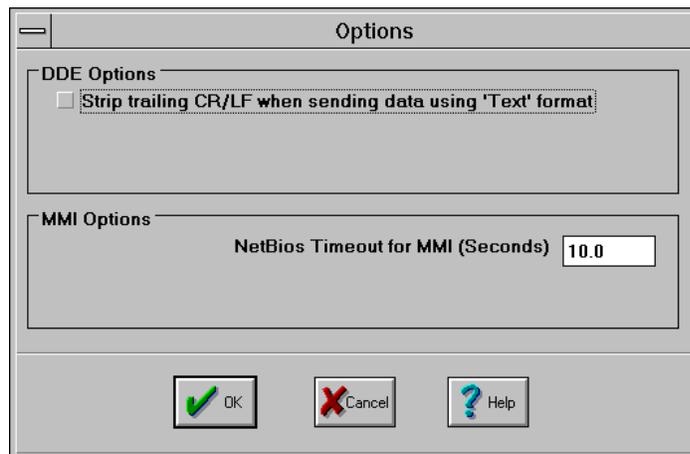
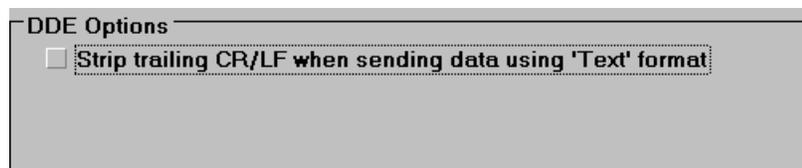
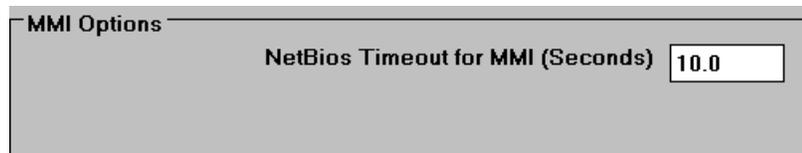


Figure 3-10: Options Dialog Box



Choose this DDE option to remove carriage return/linefeed (CR/LF) characters from text strings used in communication transactions to DDE aware clients. For example, Microsoft Excel does not expect messages from MDS to end with CR/LF characters.



Choose this Mistic MMI option to lengthen the timeout between MDS and Mistic MMI clients. The timeout is the time MDS waits for NetBIOS communication transactions to complete. Lengthen the timeout if you are experiencing NetBIOS errors which result in MDS disconnecting from your network. The default timeout is 10 seconds.

HELP

The “Help” menu contains commands to display this manual online, instructions for using it, and options to display information about MDS and the OPTOMDS.INI file.

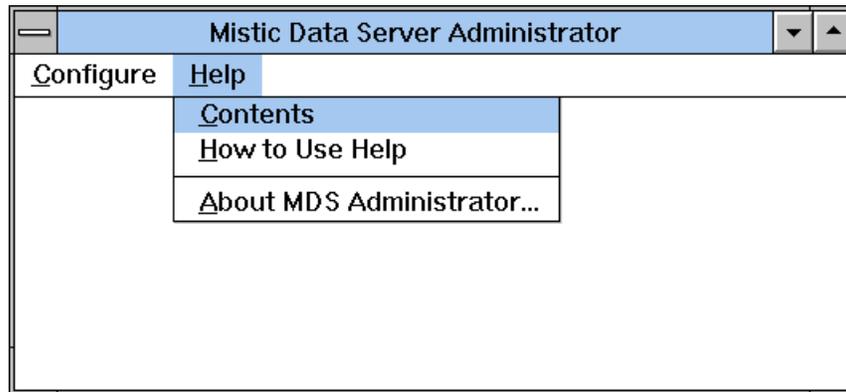


Figure 3-11: Help Menu Commands

Contents

“Contents” gives online help for the MDS Administrator. For assistance on using online help, refer to the “How to Use Help” command from the Help menu.

How to Use Help

“How to Use Help” assists you in navigating through the online help displayed by the “Contents” Help menu option.

About MDS Administrator...

“About MDS Administrator” displays information about your MDS software including the version number, date, timestamp, and directory location of the OPTOMDS.INI file.

Click OK to close this dialog box.

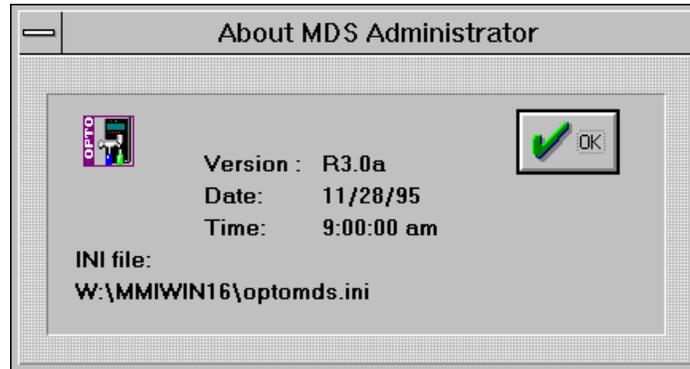


Figure 3-12: About MDS Administrator Dialog Box

MDS MENU

OVERVIEW

The MDS program is a stand-alone PC application that enables you to collect data from attached Mystic controllers, send data to all registered clients, and display client/server conversation messages. Setup message logging options and run the server application from the MDS program.

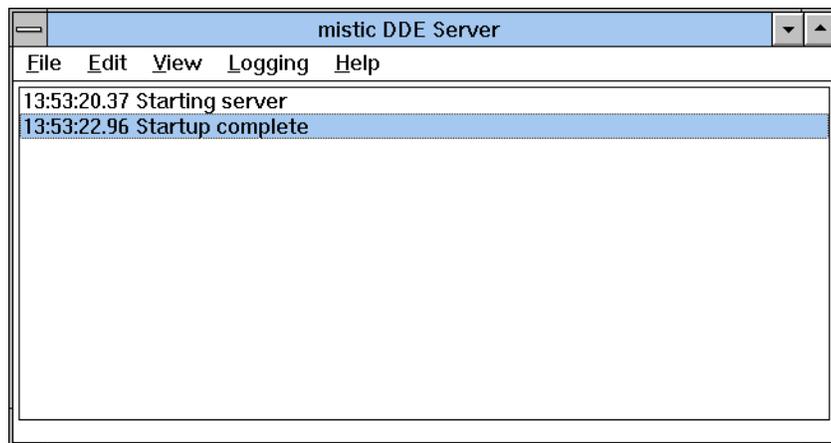


Figure 4-1: MDS Menu

FILE

The "File" menu contains commands to save Windows information about MDS to the OPTOMDS.INI file, or to exit MDS.

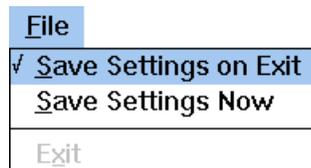


Figure 4-2: File Menu Options

Save Settings on Exit

“Save Settings on Exit” saves the message log settings and specifications about the MDS Window to the OPTOMDS.INI file when you exit MDS. The message log options are described in the “Logging” menu section. MDS Window information saved includes: Window size, position, and status (iconified, maximized, or normal).

Save Settings Now

This menu option immediately saves the message log settings and information about the MDS Window to the OPTOMDS.INI file. The message log options are described in the “Logging” menu section. Clicking this option displays the “Mistic Data Server” message box. Click OK to close the box.

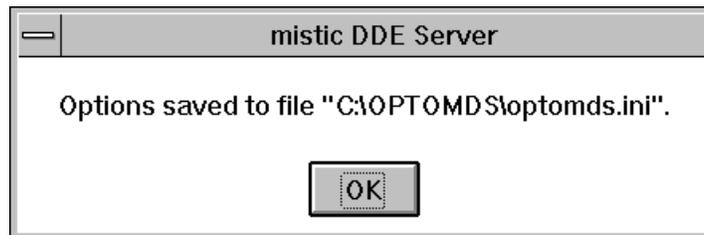


Figure 4-3: Message Displayed from “Save Settings Now” Command

Information saved to the OPTOMDS.INI file includes: Window size and position, Window status (iconified, maximized, normal), and message log settings.

Exit

“Exit” closes the MDS server. No special sequence is required to exit the server. The Mistic MMI Runtime client(s) detect the absence of the MDS server and an acknowledgment message is sent to the Mistic MMI Event Log. Other DDE aware applications such as Microsoft Excel do not automatically detect the server’s absence.

EDIT

The “Edit” menu allows you to copy information from the message log window to the Windows clipboard.

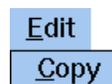


Figure 4-4: Edit Menu

Copy

“Copy” takes the highlighted log entry from the log window and copies it to the Windows clipboard. The clipboard contents can then be pasted into other Windows applications. Select the desired log entry before choosing the “Copy” command.

VIEW

The “View” menu provides a diagnostic aid to determine if a client is connected to MDS.

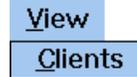


Figure 4-5: View Menu

Clients

The “Clients” command enables you to see which clients are connected to MDS. The number appearing next to the client matches the handle number assigned by DDE to a DDE-aware client. This number appears in the log file/log window to identify the attached client. Choosing “Clients” displays the “Client List” dialog box.

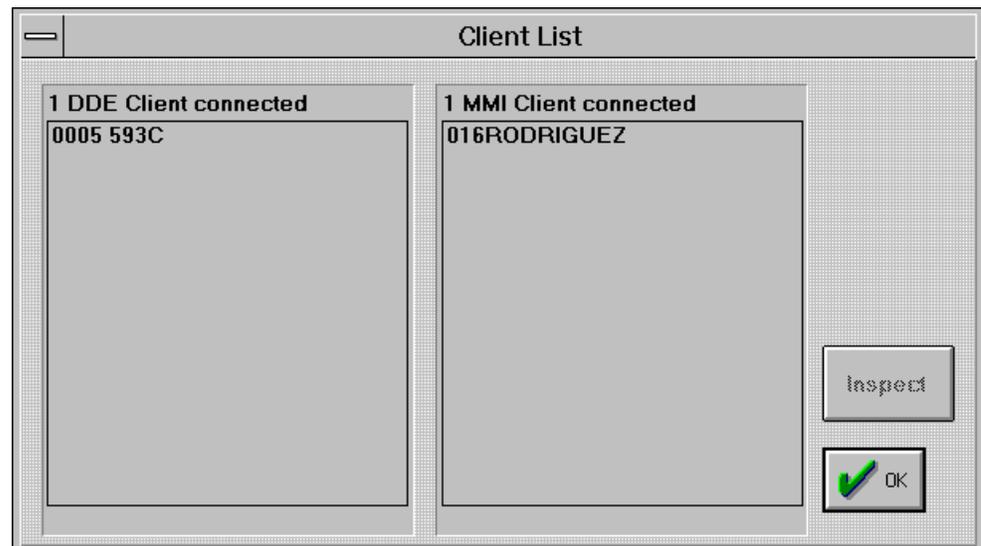


Figure 4-6: Client List Dialog Box

Client List Dialog Box

The “Client List” dialog displays two list box regions; one to show connected DDE aware clients and the other to show connected Mystic MMI clients. Connected DDE aware clients are listed by their DDE client handle number in the “DDE Client Info” box. The “MMI Client” box lists Mystic MMI clients by their computer network nodenames. In the previous example, a Mystic MMI client is connected at network

nodename "016RODRIGUEZ". The maximum number of clients is limited by the server's system resources. Click OK to close the dialog box.

To inspect information about a client, click on the client's name and then click the "Inspect" button. If you selected a Mystic MMI client, the "MMI Client Info" dialog box appears. If you selected a DDE aware client, the "DDE Client Info" dialog box appears. The dialog boxes are described in the two next sections.

DDE Client Info Dialog Box

Click a name in the DDE Client list box and click "Inspect" to display the "DDE Client Info" message box. Table 4-1 describes the entries listed in Figure 4-7. Click OK to close.

Table 4-1: DDE Client Info Entries

Entry	Definition
Client handle	A number assigned by DDE to identify a client.
Topic	The topic of the DDE conversation. Refer to Chapter 5, "MDS and DDE-Aware Clients" for topic explanations.



Figure 4-7: DDE Client Info Message Box

MMI Client Info Dialog Box

Click a name in the “MMI Client Info” box and click “Inspect” to display the “MMI Client Info” message box. Table 4-2 describes the entries listed in Figure 4-8. Click OK to close.

Table 4-2: MMI Client Info Entries

Entry	Definition
Client computer name	The <i>mistic</i> MMI client’s network nodename.
Time since active (ms)	The length of time (milliseconds) since a client’s last successful communication transaction.
Active	Status of attached <i>mistic</i> MMI client.

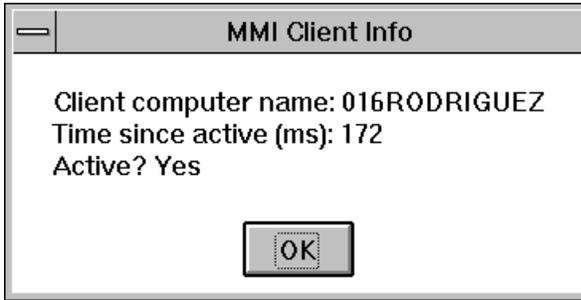


Figure 4-8: Mystic MMI Client Info Message Box

LOGGING

The “Logging” menu includes commands to choose the destination of the logging information as well as what information is recorded.

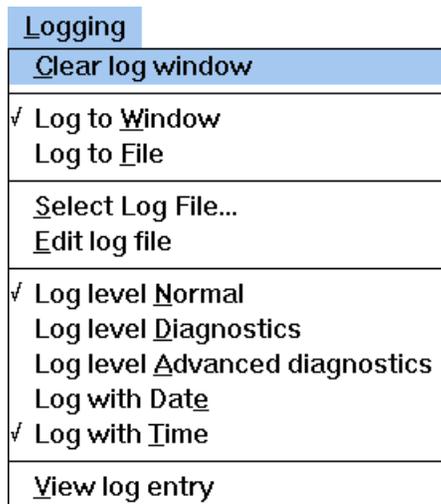


Figure 4-9: Logging Menu Options

Clear Log Window

Use the “Clear Log Window” command to clear the MDS main window of log messages. If you are logging to a file, this command does not clear the log file’s contents.

Log to Window

The “Log to Window” command enables or disables message logging to the MDS main window. If you are logging to a file, this command does not enable or disable message logging to a file.

Log to File

The “Log to File” command enables or disables message logging to a file. The default log filename is MDSLOG.LOG and is created in the directory MDS root directory (typically c:\OPTOMDS). If you want to change the filename, use the “Select Log File” command from the “Logging” menu. Enabling this option sends log messages to the MDS main window and to the log file.

Select Log File

“Select Log File” enables you to change the name of the message log file. Choosing “Select Log File” displays the “Open” dialog box.

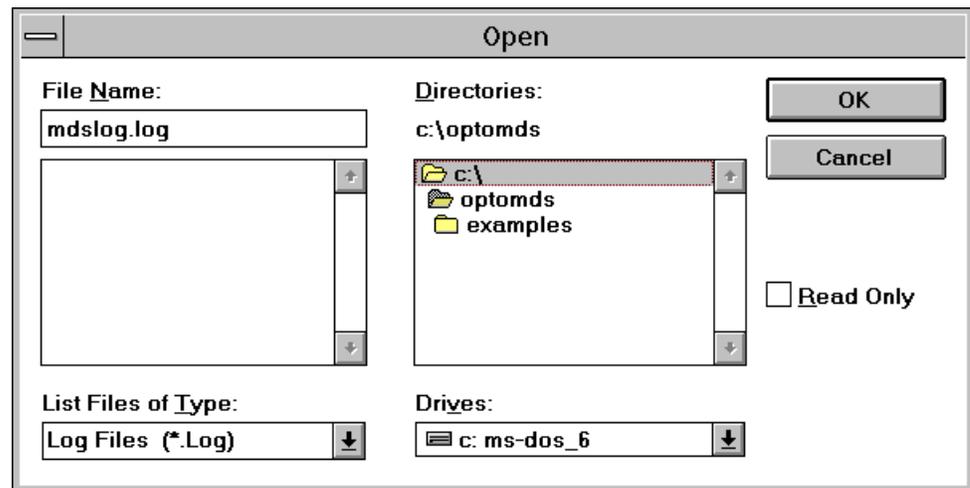


Figure 4-10: Open Dialog Box

Select the drive, directory, file type, and filename for the log file. The default log filename is MDSLOG.LOG and is created in the directory MDS root directory (typically c:\OPTOMDS). This command does not enable message logging to the file. If you want to enable or disable logging to a file, choose the “Log to File” command from the “Logging” menu.

Edit Log File

Choosing “Edit Log File” starts the Microsoft Windows Notepad editor and opens the message log file for editing. The default log filename is MDSLOG.LOG and is in the MDS root directory (typically c:\OPTOMDS).

Log Level Normal/Diagnostics/Advanced Diagnostics

Three levels of message logging are available for the main window and/or the message log file. “Normal” logging shows errors and client connections or terminations. The “Diagnostics” level displays “Normal” logging messages and all data sent from MDS to clients. “Advanced” level displays “Diagnostics” logging messages and lists all internal MDS events. Internal MDS events can be used by Opto 22 Technical Support staff to help troubleshoot problems.

Log with Date

“Log with Date” enables you to include the date in each log message entry. The date format is: DD-MM-YYYY, where DD is the day, MM is the month, and YYYY is the year. Ex: 12-07-1995 is July 12, 1995.

Log with Time

“Log with Time” enables you to include the time in each log message entry. The time format is: HH:MM:SS.TT, where HH is hours, MM is minutes, SS is seconds, and TT is hundredths of a second. Time is displayed based on a 24-hour representation. Ex: 22:34:49.79 is 10:34 p.m. with 49.79 seconds.

View Log Entry

“View Log Entry” displays the currently highlighted log entry from the main log window in a message box. Choosing “View Log Entry” displays the “Log Entry” message box.



Figure 4-11: Log Entry Message Box

Use this option to view long messages that aren’t fully displayed in the main log window. Double clicking on the log entry from the main log window also displays the “Log Entry” message box.

HELP

The “Help” menu includes commands to assist you with MDS.

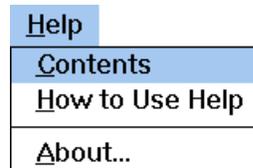


Figure 4-12: Help Menu

Contents

“Contents” gives online help for MDS. For assistance on using online help, refer to the “How to Use Help” command from the Help menu.

How to Use Help

“How to Use Help” assists you in navigating through the online help displayed by the “Contents” Help menu option.

About...

“About...” displays information about the MDS software, including the version number and timestamp, path to the MDS software and its OPTOMDS.INI file, and the minimum software and firmware version requirements. Click OK to close this text box.



Figure 4-13: About Mystic Data Server Dialog Box



MDS AND DDE-AWARE CLIENTS

OVERVIEW

DDE-aware applications are updated in real-time by using MDS to scan MDS controllers for information. For example, if you open a MDS registered Microsoft Excel spreadsheet, DDE linked cells are automatically updated as their corresponding MDS data values change. You can do this with Microsoft Word, Access, Visual Basic, or any other program that supports DDE.

Each DDE-aware application has its own set of syntactical rules to create DDE link messages that “connect” it to MDS. In the following discussion, the common elements of the DDE link messages are reviewed. General procedures to run selected DDE-aware applications with MDS are discussed later in this chapter. Consult your DDE-aware program manuals for details about DDE linking.

DDE MESSAGE BUILDING BLOCKS

A DDE-aware client sends a DDE message to initiate a conversation with MDS to request data. Although each application has its own unique syntax to develop messages, they all consist of three common character expressions:

<Application> <Topic> <Item>

The application is the name of the program supplying the data, the topic refers to a group of data within the application, and the item identifies the specific data value requested. DDE messages are also known as “DDE link formulas”. DDE messages are not case sensitive.

Application

The application is simply the name of the server supplying the data information, which in this case is MDS. Actual string expressions depend on your DDE-aware application’s syntax and what node MDS is running on relative to the DDE-aware application.

Topic

A topic expression identifies a category of data from the application. In MDS, it is a way to access data protected by security levels set up in the Cyrano strategy. There are four security levels in

Cyrano and they're numbered from 0 to 3, with 3 being the highest security level. Security level 3 accesses all security levels; security level 2 accesses security levels 0, 1, and 2; and so on for the other levels.

The topic is not case sensitive, but note the use of '_' in the topic names. Remember to include them in your topic expressions.

Table 5-1: Topic and Security Levels in MDS

Topic	Security Levels Accessed in Cyrano	Priority
OPTO_MDS_0	Level 0	Lowest security
OPTO_MDS_1	Levels 0 and 1	•
OPTO_MDS_2	Levels 0, 1, and 2	•
OPTO_MDS_3	Levels 0, 1, 2, and 3	Highest security

Item

The item expression identifies a data item from a Cyrano strategy. The format for a Cyrano DDE item has the following syntax in all applications:

**ControllerName[RefreshGroupName]:ItemType.ItemName
[start-end].Field.BITn**

Each parameter is described in Table 5-2. Supported ItemTypes and Fields are listed in Table 5-3.

Table 5-2: Item Parameter Descriptions

Parameter	Description
ControllerName	The name of the controller to scan for data. This parameter is configured in the MDS Administrator with the "Configure\Controllers..." command.
[RefreshGroupName]	The scan rate group for a data item. This parameter is required when a DDE-aware client requests data from MDS. It is not required when a value is written from the DDE-aware application to the controller (POKE function). This parameter is configured in the MDS Administrator with the "Configure\Refresh Times..." command.
ItemType	Defines the data type of the item requested. Valid ItemTypes are defined in Table 5-3. The mnemonic used in the message is listed in the "ItemType" column.
ItemName	The actual data item's name in the Cyrano strategy.
[start-end]	The range of elements for ItemNames of type float table or integer table. "Start" is the first element in the range and "end" is the last element in the range. Single table elements can be requested by specifying only a "start" parameter. Up to 50 elements may be specified in one request. This means you must limit the start-end range to request only 50 elements (0-49, 101-150, etc.). Only one element from a string table may be requested at a time.
Field	Applies only to data items with more than one value associated with it. For example, a PID loop item type has a setpoint, a gain, a derivative, and many other related fields. Refer to the "Field" column in Table 5-3 for an item type's applicable fields.
BIT	Applies to items of type integer and integer table elements. It is the literal character string "BIT" followed by n , a number between 0 and 31, inclusive.

Table 5-3: DDE Items Supported

Description	ItemType	Field	Actual Base Type	Access
Integer	I	None	integer ¹	R/W
Float	F	None	float	R/W
String	S	None	string	R/W
Timer	T	None	float	R/W
Integer Table	IT	[start-end] ²	integer table ¹	R/W
		[element]	integer ¹	R/W
Float Table	FT	[start-end] ²	float table	R/W
		[element]	float	R/W
String Table	ST	[element]	string	R/W
Digital Non-Multifunction I/O Unit	DIOS	Enable	discrete	R/W
Digital Multifunction I/O Unit	DIOM	Enable	discrete	R/W
Digital Remote Simple I/O Unit	DIOR	Enable	discrete	R/W
Analog Multifunction I/O Unit	AIO	Enable	discrete	R/W
Digital Remote Simple I/O Unit	DIORS	Enable	discrete	R/W

¹Access to 32 bits supported

²Table range is limited to 50 elements

³Cyrano chart 'state' values are as follows: (-3) waiting for I/O, (-1) Start, (0) Stop, (1) Suspend

Table 5-3: DDE Items Supported (continued)

Description	ItemType	Field	Actual Base Type	Access
Motion Control I/O Unit	not supported			
Analog Input Point	AI	Value	float	R
Analog Output Point	AO	Value	float	R/W
PID Loop	PID	Input	float	R
		Output	float	R/W
		Setpoint	float	R/W
		Gain	float	R/W
		Integral	float	R/W
		Derivative	float	R/W
		Process Variable	float	R/W
		Setpoint Max	discrete	R/W
		Setpoint Min	discrete	R/W
		Input Range	discrete	R/W
		Activate	discrete	R/W
		Auto	discrete	R/W
		Output Enable	discrete	R/W
		Output Track	discrete	R/W
Setpoint Track	discrete	R/W		
		Host for Process Variable	discrete	R/W
		I/O For Setpoint	discrete	R/W
		Average Input	discrete	R/W
Digital Non-Multifunction Input Point	DIS	State	discrete	R
Digital Multifunction Input Point	DIM	State	discrete	R
Digital Remote Simple Input Point	DIRS	State	discrete	R
Digital Motion Input Point	not supported			
Counter	CNT	State	discrete	R
		Counts	integer ¹	R
Quadrature Counter	QUAD	State	discrete	R
		Counts	integer ¹	R
On Time Totalizer	TOTON	State	discrete	R
		On Time Total	float	R
Off Time Totalizer	TOTOFF	State	discrete	R
		Off Time Total	float	R
On Latch	LATON	State	discrete	R
		Latch (ON)	integer ¹	R

¹Access to 32 bits supported

²Table range is limited to 50 elements

³Cyrano chart 'state' values are as follows: (-3) waiting for I/O, (-1) Start, (0) Stop, (1) Suspend

Table 5-3: DDE Items Supported (continued)

Description	ItemType	Field	Actual Base Type	Access
Off Latch	LATOFF	State	discrete	R
		Latch (OFF)	integer ¹	R
On Pulse Measurement	PULON	State	discrete	R
		On Pulse Measure	float	R
Off Pulse Measurement	PULOFF	State	discrete	R
		Off Pulse Measure	float	R
Frequency Measurement	FREQ	State	discrete	R
		Frequency	integer ¹	R
Period Measurement	PERIOD	State	discrete	R
		Period	float	R
Digital Non-Multifunction Output Point	DOS	State	discrete	R/W
Digital Multifunction Output Point	DOM	State	discrete	R/W
Digital Remote Simple Output Point	DORS	State	discrete	R/W
Digital Motion Input Point	not supported			
Digital TPO Output Point	TPO	State	discrete	R/W
		On Time Percent	float	R/W
Digital Event/Reaction	ERD	Period	float	R/W
		Scan Enable	discrete	R/W
Analog Event/Reaction	ERA	Has Occurred	discrete	R
		Is Occurring	discrete	R
Stepper Event/Reaction	not supported	Scan Enable	discrete	R/W
		Has Occurred	discrete	R
Chart	CHART	Is Occurring	discrete	R
		Run	discrete	R/W
Controller	CTRLR	Stop	discrete	R/W
		Suspend	discrete	R/W
Controller	CTRLR	Continue	discrete	W
		State ³	integer ¹	R/W
Controller	CTRLR	Free Memory	integer ¹	R
		Time Stamp	string	R
Controller	CTRLR	Date Stamp	string	R
		Time/Date	string	R
Controller	CTRLR	Filename	string	R
		# of Errors	integer ¹	R
Controller	CTRLR	Current Error	integer ¹	R

¹Access to 32 bits supported²Table range is limited to 50 elements³Cyano chart 'state' values are as follows: (-3) waiting for I/O, (-1) Start, (0) Stop, (1) Suspend

EXCEL AND MDS

With MDS, you can read values from a Mystic controller into an Excel spreadsheet or write values out to a controller with MDS. This section describes the basics of linking Excel and MDS. For more details about DDE linking and Excel, consult your Microsoft Excel manuals.

Linking Excel and MDS

1. Consult the "Quick Start" guide, Chapter 2 for instructions to verify your Mystic controller and Cyrano strategy are running properly.
2. Also consult Chapter 2 for instructions on configuring MDS with the MDS Administrator.

Before closing the MDS Administrator and running MDS, configure a Refresh Group name for use by the DDE-aware client. See Chapter 3, "MDS Administrator Menu" to explain the "Configure\Refresh Group" dialog box parameters.

3. Choose a method from the following discussions to create DDE links in Excel.

Two methods for creating DDE links in Excel are presented. The first method describes how to create a MDS hot link to a cell to read in a data value. The second method describes how a Visual Basic macro is used in Excel to read values from MDS or to write values from Excel to a controller. The examples use the Cyrano sample program "DDE_TEST" that's included with MDS and can be found in the MDS home directory, under the "...EXAMPLES\CYRANO" directory. The examples also use the Excel sample program "DDE_TST1.XLS", in the "...EXAMPLES\EXCEL" directory. These small test cases are intended to illustrate the DDE reading and writing process.

Method #1: Creating DDE Links to a Cell

DDE link formulas are made up of three character strings and are entered in the formula bar for a chosen cell. The following sections describe the syntax and what to type in the formula bar.

1. Start up Excel and open the "...EXAMPLES\EXCEL\DDE_TST1.XLS" spreadsheet.
2. Choose the A4 cell.

The DDE link formula appears in the formula bar.

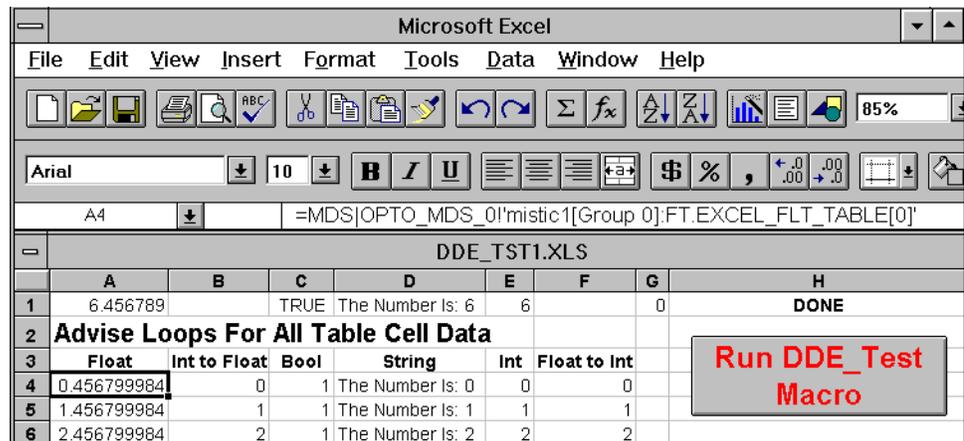


Figure 5-1: DDE Link Formula Example

3. The following is an explanation of the DDE link formula. (Notice you can place your cursor in the formula bar and modify the text.) The general syntax for the formula is:

= 'Application' | 'Topic' | 'Item'

Begin the DDE link formula with an "=" sign followed by the Application enclosed in apostrophes. The "|" and "!" characters are required to separate the Topic and Item strings.

Application

If Excel and MDS are on the same PC (the same network node), the application is simply:

'Mds'

If Excel and MDS are on different PCs (different network nodes), the application is:

'\\NodeName\NDDE\$'

where *NodeName* is the Windows for Workgroups node name as seen in any Workgroup node browser.

Topic

If Excel and MDS are on the same PC (the same network node), the topic expression is:

'Opto_Mds_n'

If Excel and MDS are on a different PC (different network nodes), the topic expression is:

'\$Opto_Mds_n.DDE'

n is 0, 1, 2, or 3 and designates one of the four topics supported by MDS. Topics correspond to security levels defined for data items in a Cyrano strategy. Refer to Table 5-1 for security level information.

Item

The syntax for the item is:

'ControllerName[RefreshGroup]:ItemType.ItemName[start-end].Field.BIT*n*'

Refer to Table 5-2 for parameter explanations and Table 5-3 for supported item and field types.

To Activate DDE Links

1. After creating the DDE links, select the "Edit/Links..." menu option from Excel.

The "Links" dialog box appears. All DDE links are listed.

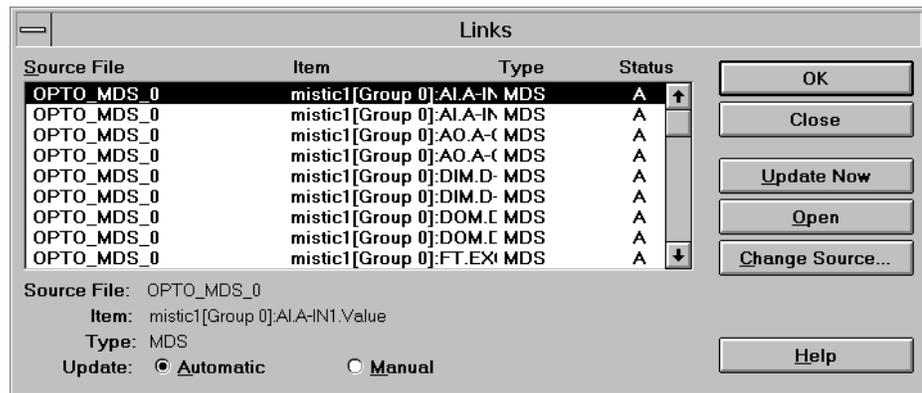


Figure 5-2: Links Dialog Box (Excel)

2. Choose a link from the list.

You can select more than one link by choosing a link and dragging the mouse pointer down the list of links until you reach the last desired link.

3. Choose the Automatic option button in the Update field and click OK.
4. If MDS is running and the links are established, you'll notice cell values change automatically.

Method #2: Using a Visual Basic Macro in Excel for MDS updates

1. Make sure MDS is running and you've configured it for this example by going through the steps outlined in a previous section, "Linking Excel and MDS".

2. Start up Excel and open the “..\EXAMPLES\EXCEL\DDE_TST1.XLS” spreadsheet.
Excel’s Sheet 1 is displayed.

	A	B	C	D	E	F	G	H
1	6.456789		TRUE	The Number Is: 6	6		0	DONE
2	Advise Loops For All Table Cell Data							
3	Float	Int to Float	Bool	String	Int	Float to Int		
4	0.456799984	0	1	The Number Is: 0	0	0		
5	1.456799984	1	1	The Number Is: 1	1	1		
6	2.456799984	2	1	The Number Is: 2	2	2		
7	3.456799984	3	1	The Number Is: 3	3	3		
8	4.456799984	4	1	The Number Is: 4	4	4		
9	5.456799984	5	1	The Number Is: 5	5	5		
10	Request Loops For All Table Cell Data							
11	0.456799984	0	1	The Number Is: 0	0	0		
12	1.456799984	1	1	The Number Is: 1	1	1		
13	2.456799984	2	1	The Number Is: 2	2	2		
14	3.456799984	3	1	The Number Is: 3	3	3		
15	4.456799984	4	1	The Number Is: 4	4	4		
16	5.456799984	5	1	The Number Is: 5	5	5		

Sheet Tab

Figure 5-3: DDE_TST1.XLS Worksheet Information (Excel)

Tip: Notice the “Run DDE_Test Macro” push button displayed in the worksheet. You can embed a WordArt object in the worksheet and assign a macro to it. (This makes for a snazzy push button!)

3. A macro module using Visual Basic was used to create the DDE links to MDS. Select the ‘Module 1’ sheet tab to view the macro. (You can switch back to Sheet 1 by selecting the ‘Sheet 1’ sheet tab).

Use the scroll bars and arrows to scroll throught the macro to view the code.

For additional information about creating Visual Basic macro modules in Excel, refer to your Microsoft Excel manuals.

```

DDE_TST1.XLS

Option Explicit

Sub DDE_Test()

    Dim iStartCell      As Integer
    Dim iEndCell        As Integer
    Dim iDelayMax       As Integer
    Dim iChannel        As Integer
    Dim iCnt            As Integer
    Dim iInc            As Integer
    Dim iRequestLoopStartRow As Integer
    Dim iRequestBlockStartRow As Integer
    Dim dArray         As Variant

    iInc = 1
    iStartCell = 0
    iEndCell = 5
    iDelayMax = 20
    iRequestLoopStartRow = 11
    iRequestBlockStartRow = 25

    '***** Shut down user input *****
    Application.Interactive = False

    iChannel = Application.DDEInitiate("MDS", "OPTO_MDS_0") ' open DDE Channel

```

Figure 5-4: Visual Basic Macro (Excel)

4. Click on the push button to run the macro. Excel is updated by MDS and writes out to a Mystic controller.

Summary

After going through this section, you should be familiar with some of the highlighted aspects of DDE linking to MDS using Excel with respect to the DDE_TST1.XLS sample program. For more specific details about DDE linking and Excel, please consult the Microsoft Excel manuals.

WORD AND MDS

With MDS, you can read values from a Mystic controller into a Microsoft Word document or write values out to a controller. This section describes the basics of linking Word and MDS. A sample program developed with Word version 6.0a is included with your MDS software disks. For more details about DDE linking and Word, consult your Microsoft Word manuals.

Linking Word and MDS

1. Consult the "Quick Start" guide, Chapter 2 for instructions to verify your Mystic controller and Cyrano strategy are running properly.

2. Also consult Chapter 2 for instructions on configuring MDS with the MDS Administrator.

Before closing the MDS Administrator and running MDS, configure a Refresh Group name for use by the DDE-aware client. See Chapter 3, "MDS Administrator Menu" to explain the "Configure\Refresh Group" dialog box parameters.

3. Choose a method from the following discussions to create DDE links in Word.

Two methods for creating DDE links in Word are presented. The first method describes how to insert a field code for a text item. The second method describes how Word Basic macros are used to read values from MDS or to write values from Word to a controller. The examples use the Cyrano sample program "DDE_TEST" included with MDS and can be found in the MDS home directory, under the "...EXAMPLES\CYRANO" directory. The examples also use the Word sample program "DDE_TST1.DOC", in the "...EXAMPLES\WORD" directory. These small test cases are intended to illustrate the DDE reading and writing process.

Method #1: Creating Field Codes to a Text Item

DDE links are made up of three character strings and are inserted into a Word document by using field codes. The following sections describe the syntax and what to type in the field codes.

1. Make sure MDS is running and you've configured it for this example by going through the steps outlined in the previous "Linking Word and MDS" section.
2. Start up Word and open the "...\EXAMPLES\WORD\DDE_TST1.DOC" example.

The Word document (which is actually a table) is displayed.

Double Click Here to Run ClearStuff Macro

Cyrano Tag	Value (DDE Advise Loop)	Value (DDE Requests)
EXCEL BOOL TABLE[0]	1	1
EXCEL BOOL TABLE[1]	1	1
EXCEL BOOL TABLE[2]	1	1
EXCEL BOOL TABLE[3]	1	1
EXCEL BOOL TABLE[4]	1	1
EXCEL BOOL TABLE[5]	1	1
EXCEL BOOL TABLE[0-5]	1, 1, 1, 1, 1, 1	1, 1, 1, 1, 1, 1

Figure 5-5: DDE_TST1.DOC Example (Word)

3. To view the field codes which are the DDE links to MDS, you need to toggle an option in Word to display them.
 - a. Choose the "Tools\Options..." command and select the "View" tab.

The following Options dialog appears.

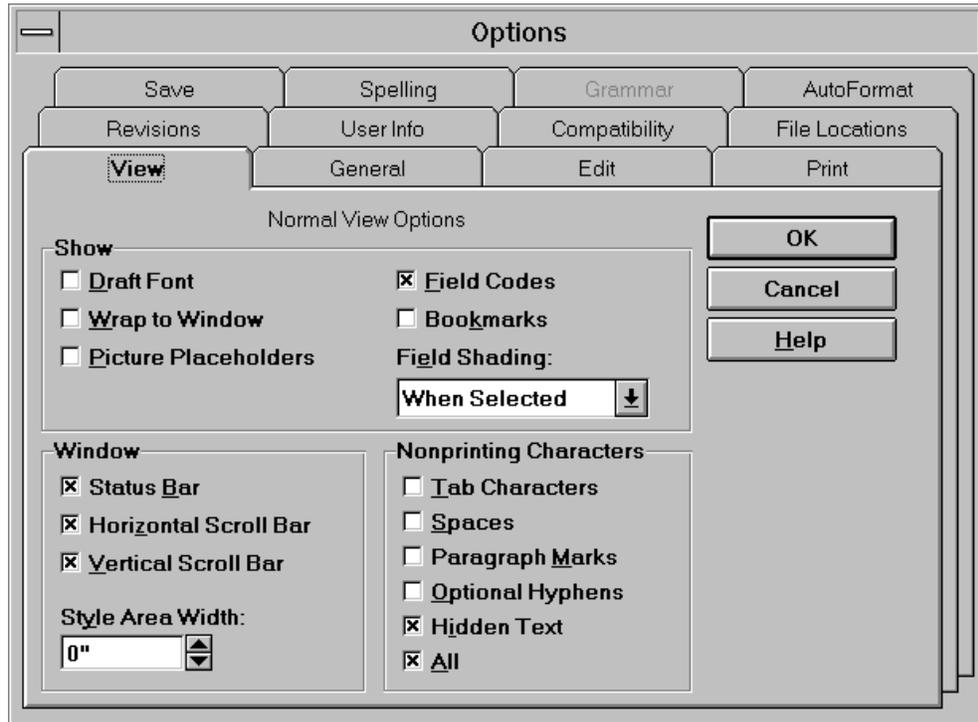


Figure 5-6: View Tab Dialog to Toggle Field Codes (Word)

- b. Click the Field Codes option to place an 'X' in the check box. Click OK to close the dialog.
- c. The Word document now displays field codes instead of their actual values.

**{ MACROBUTTON ClearStuff Double Click
Here to Run ClearStuff Macro }**

Cyrano Tag	Value (DDE Advise Loop)	Value (DDE Requests)
EXCEL_BOOL_TABLE[0]	{DDEAUTO MDS OPTO_MDS_0 "mistic1[Group 0]:IT.EXCEL_BOOL_TABLE[0]" * mergeformat \t}	1
EXCEL_BOOL_TABLE[1]	{DDEAUTO MDS OPTO_MDS_0 "mistic1[Group 0]:IT.EXCEL_BOOL_TABLE[1]" * mergeformat \t}	1

Figure 5-7: Field Codes Shown for Word Example

- 4. The following is a basic explanation of the DDE field code. The general syntax for the formula is:

DDEAUTO “Application” “Topic” “Item”

The field code begins with the DDEAUTO command for automatic DDE updates, followed by the Application. Blank spaces are required to separate the Application, Topic, and Item strings.

Application

If Word and MDS are on the same PC (the same network node), the application is simply:

MDS

If Word and MDS are on different PCs (different network nodes), the application is:

“\NodeName\NDDE\$”

where *nodeName* is the Windows for Workgroups node name as seen in any Workgroup node browser.

Topic

If Word and MDS are on the same PC (the same network node), the topic expression is:

“Opto_Mds_n”

If Excel and MDS are on a different PC (different network nodes), the topic expression is:

“\$Opto_Mds_n.DDE”

n is 0, 1, 2, or 3 and designates one of the four topics supported by MDS. Topics correspond to security levels defined for data items in a Cyrano strategy. Refer to Table 5-1 for security level information.

Item

The syntax for the item is:

“ControllerName[RefreshGroup]:ItemType.ItemName[start-end].Field.BITn”

Refer to Table 5-2 for item parameter explanations and Table 5-3 for supported item and field types.

To Activate DDE Links

1. From Word, activate the DDE field codes by selecting the “EditLinks...” menu option.

The “Links” dialog box appears. All DDE links are listed.

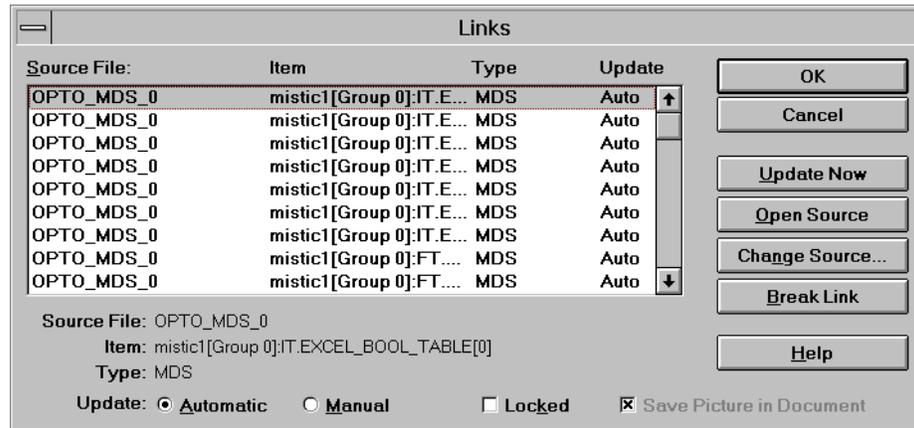


Figure 5-8: Links Dialog Box (Word)

2. Choose a link from the list.

You can select more than one link by choosing a link and dragging the mouse pointer down the list of links until you reach the last desired link.
3. Choose the Automatic option button in the Update field and click OK.
4. If MDS is running and the links are established, you'll notice linked values change automatically.

Method #2: Using a Word Basic Macro in Word for MDS updates

Macros created in Word Basic were used along with field codes to update the DDE_TST1.DOC sample program with Mystic controller information. This section reviews the main aspects of this DDE linking approach.

1. Make sure MDS is running and you've configured it for this example by going through the steps outlined in a previous section "Linking Word and MDS".
2. Start up Word and open the "...EXAMPLES\WORD\DDE_TST1.DOC" document.

The Word document (which is actually a table) is displayed.

Double Click Here to Run ClearStuff Macro

Cyrano Tag	Value (DDE Advise Loop)	Value (DDE Requests)
EXCEL_BOOL_TABLE[0]	1	1
EXCEL_BOOL_TABLE[1]	1	1
EXCEL_BOOL_TABLE[2]	1	1
EXCEL_BOOL_TABLE[3]	1	1
EXCEL_BOOL_TABLE[4]	1	1
EXCEL_BOOL_TABLE[5]	1	1
EXCEL_BOOL_TABLE[0-5]	1, 1, 1, 1, 1, 1	1, 1, 1, 1, 1, 1

Figure 5-9: DDE_TST1.DOC Example (Word)

Tip: Notice the "Double Click Here to Run ClearStuff Macro" push button displayed in the document. You can insert a button to run a macro.

3. To view the macros created in Word Basic for this example, choose the "Tools\Macro..." command.

The Macro dialog is displayed.

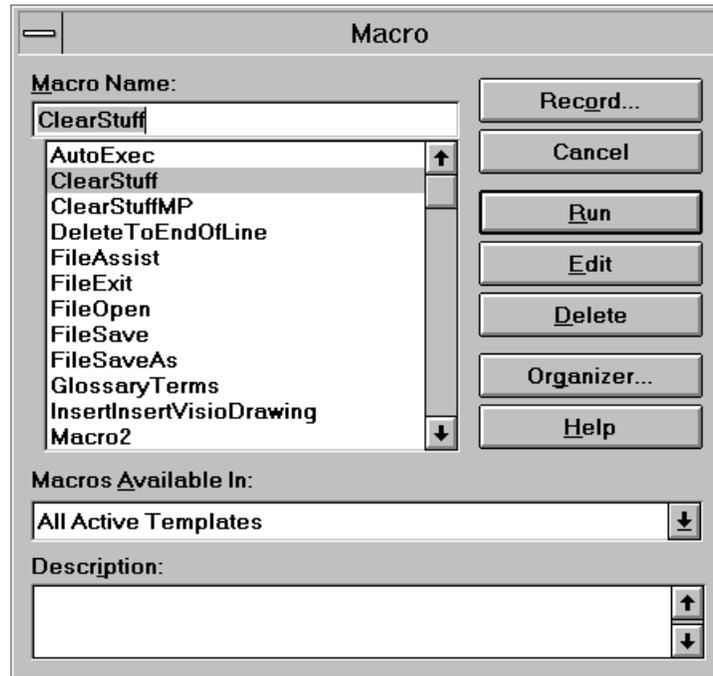


Figure 5-10: Macro Dialog (Word)

- a. Click on the ClearStuff macro name listed in the dialog box.
- b. Click the "Edit" button to view the ClearStuff Word Basic macro code.

```

*****
'.Name: .ClearStuff.Macro
'
'.Author: .OPTO.22
'
'.Language: .WordBasic.for.Microsoft.Word.V6.0a
'
'.Purpose:
'. .A Word Basic program to exercise the OPTO.22.MDS (DDE.side)
'. .with Word.
'
'.Notes:
'
*****
'
'
Sub MAIN
'
'.iInc.=.1
'.iStartElement.=.0
'.iEndElement.=.49
'.iStartCell.=.0
'.iEndCell.=.5
'.iDelayMax.=.20
'
'
'.!*****.Goto.Top.*****
EditGoTo .Destination.=."Top"

```

Figure 5-11: Word Basic Macro (Word)

- c. Use the scroll bars and arrows to scroll through the macro to view the code.
- d. To close the Word Basic macro, double-click its control-menu box.
4. Turn off the field codes by selecting the "Tools\Option..." command and choosing the "View" tab. Click the Field Codes check box to remove the X. Click OK.
5. Double-click the push button to run the macro. Word is updated by MDS and writes out to a Mystic controller.

The push button is actually a field code that uses the MACROBUTTON command. This command runs a macro and labels the button's text.

Summary

After going through this section, you should be familiar with some of the highlighted aspects of DDE linking to MDS using Word with respect to the DDE_TST1.DOC sample program. For more specific details about DDE linking and Word, please consult the Microsoft Word manuals.

ACCESS AND MDS

Use MDS to update your Access applications with Mystic controller information. This section presents an overview of the Access programming elements used in a sample program provided on your MDS software disks. The primary function of the sample program is to demonstrate how to get Mystic controller data in and out of Access database tables. The example was created using Access version 2.0.

When you first open the DDE_TST1.MDB sample program, the database and main form windows appear.

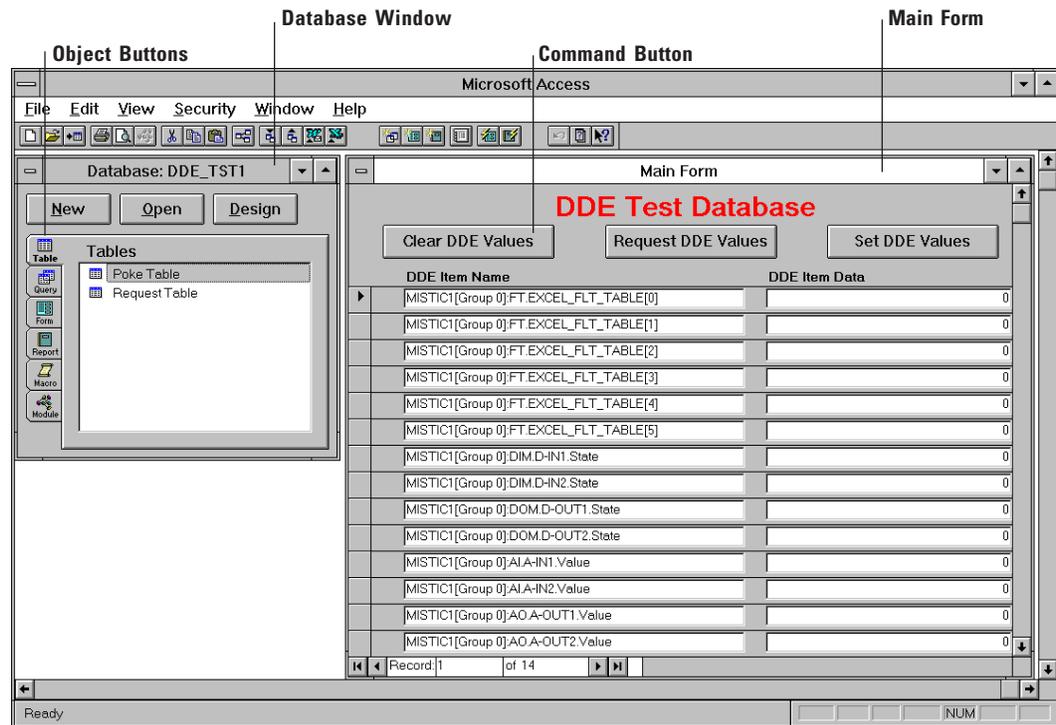


Figure 5-12: Opening the Access Database Example

The form displays data and is used to run macros via the command buttons to read and write data to the database tables. The Database window displays object buttons and lists available options for each object. For example, clicking the Macro button displays available macros.

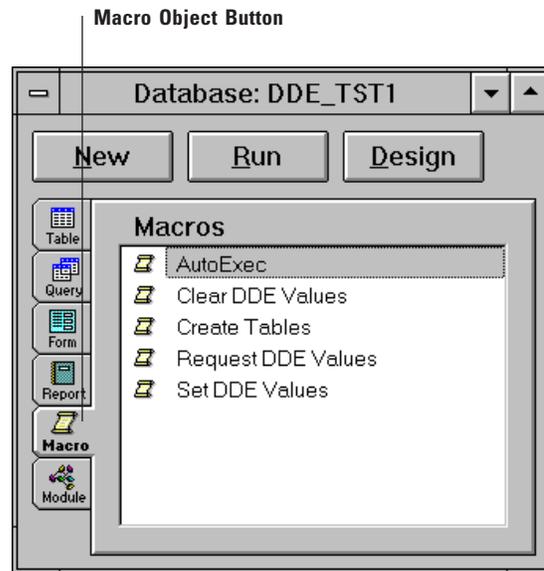


Figure 5-13: List of Macros (Access)

For this sample program, the main objects (components) of the Access program are tables, forms, macros, and modules.

Go through the next section to open and view the main components of the sample program. For specific details about DDE linking with Access, consult your Microsoft Access manuals.

Linking Access and MDS

1. Consult the "Quick Start" guide, Chapter 2 for instructions to verify your Mystic controller and Cyrano strategy are running properly.
2. Also consult Chapter 2 for instructions on configuring MDS with the MDS Administrator.

Before closing the MDS Administrator and running MDS, configure a Refresh Group name for use by the DDE-aware client. See Chapter 3, "MDS Administrator Menu" to explain the "Configure\Refresh Group" dialog box parameters.

3. Run MDS and verify your controller is attached to MDS.
4. Start up Access and open the "...\EXAMPLES\ACCESS\DDE_TST1.MDB" example.

A database window and main form appear. Notice the form has three command buttons (Figure 5-12).

5. Choose the "Clear DDE Values" command button. This clears the form's DDE Item Data values and also clears the data items in the controller.
6. Next, choose the "Request DDE Values" command button to read values into the database tables from MDS.
7. Click the "Set DDE Values" command button to write out values to the controller via MDS.

You've now stepped through some basic request and poke routines that use MDS to update the database tables.

Viewing an Object Button's Contents

To take a closer look at the objects associated with the object buttons, we'll start by viewing the contents of a macro.

1. Select the Macro object button from the Database window.
2. Click on the 'AutoExec' macro.
3. Click the Database window's Design button to view the contents of the macro.

The action list of functions for the macro is displayed. Notice the first action (RunCode) runs the CreateTables() function. The next action (OpenForm) displays the DDE Test Database main form.

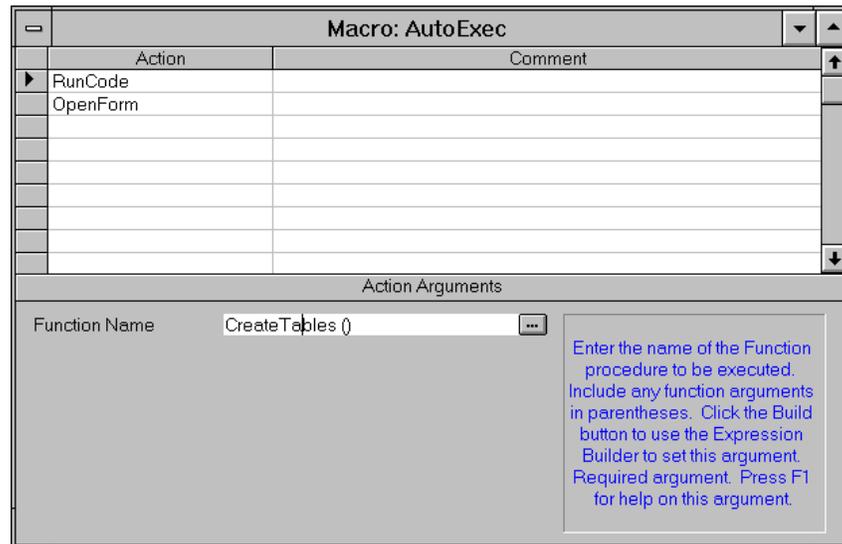


Figure 5-14: Viewing a Macro's Function Contents (Access)

4. View a function's commands by clicking on its name in the Action Arguments section of the macro's dialog, and then by clicking on the Expression Builder button.

The Expression Builder dialog box appears.

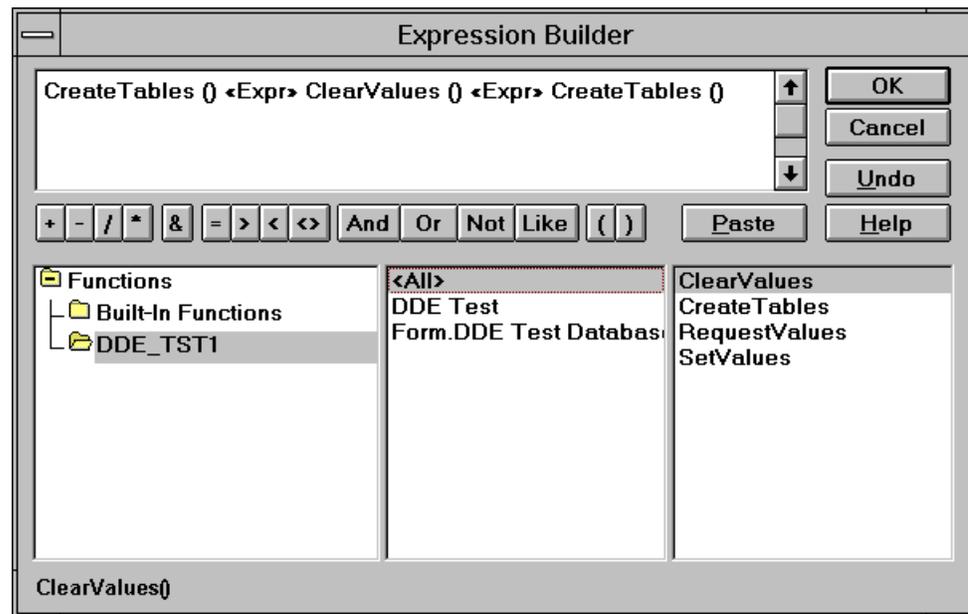


Figure 5-15: Viewing a Function's Commands (Access)

5. Double-click 'Functions' and 'DDE_TST1' to view a list of commands.
6. Close the Expression Builder and macro by double-clicking their respective control-menu boxes.

Similarly, you can select each object button (Table, Form, and Module) to view its list of defined objects and then click the Design button to view the object's definition.

Summary

After going through this section, you should be able to navigate around in Access with the DDE_TST1.MDB example provided with MDS. For more specific details about DDE linking and Access, please consult the Microsoft Access manuals.

VISUAL BASIC AND MDS

Use MDS to update your Visual Basic applications with Mystic controller information. This section presents an overview of the Visual Basic programming elements used in a sample program provided on your MDS software disks. The primary function of the sample program is to demonstrate how to poke and request Mystic controller information into a Visual Basic program by using a timer. The example was created using Visual Basic version 3.0.

When you first open the DDE_TST1.MAK sample program, the Form, Toolbox, Project window, and Properties window appear.

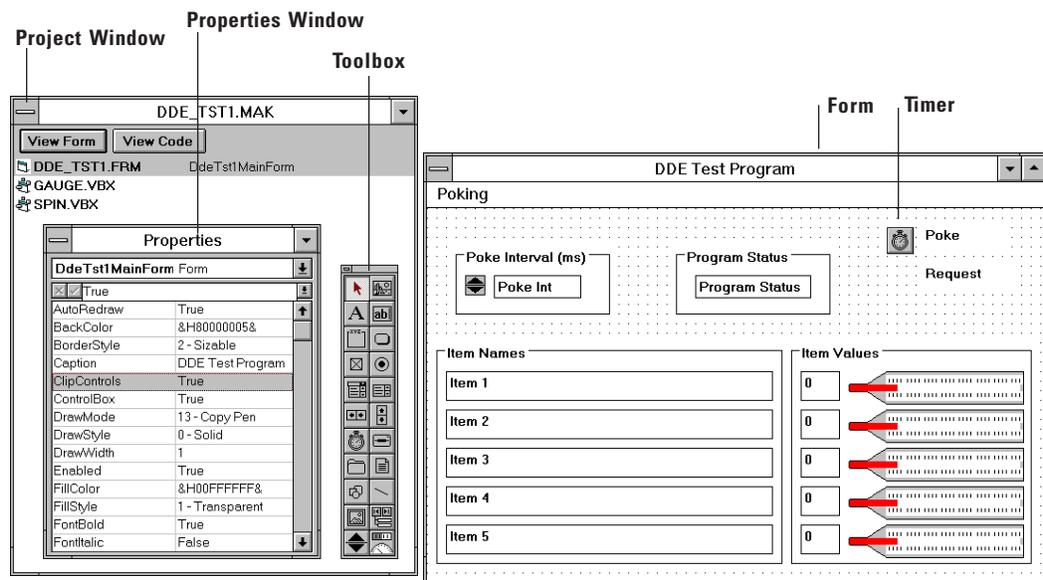


Figure 5-16: Opening the Visual Basic Example

The Project window displays the main form and two Visual Basic extensions. The “View Form” button displays the .FRM file and the “View Code” button displays Visual Basic code for project components. A form is a collection of objects, each with associated Visual Basic code which can be viewed by double-clicking on the object.

Go through the next section to open and view the main components of the sample program. For specific details about DDE linking with Visual Basic, consult your Microsoft Visual Basic manuals.

Linking Visual Basic and MDS

1. Consult the “Quick Start” guide, Chapter 2 for instructions to verify your Mystic controller and Cyrano strategy are running properly.

- Also consult Chapter 2 for instructions on configuring MDS with the MDS Administrator.

Before closing the MDS Administrator and running MDS, configure a Refresh Group name for use by the DDE-aware client. See Chapter 3, "MDS Administrator Menu" to explain the "Configure\Refresh Group" dialog box parameters.

- Run MDS and verify your controller is attached to MDS.
- Start up Visual Basic and open the "...\EXAMPLES\VB\DDE_TST1.MAK" example.

The Form, Toolbox, Project window, and Properties window appear.

- To run the program, choose the "Run\Start" command.

When you start running the DDE_TST1.MAK program, startup code found in the Form_Load event for the main form, DDE_TST1.FRM, is executed. A DDE warm link (a Visual Basic 'Notify') is established to MDS and a program timer is initialized. Notice the form changes slightly and does not display the "Poke" and "Request" objects that were in the upper right quadrant of the form. The Program Status displays the message "Stopped".

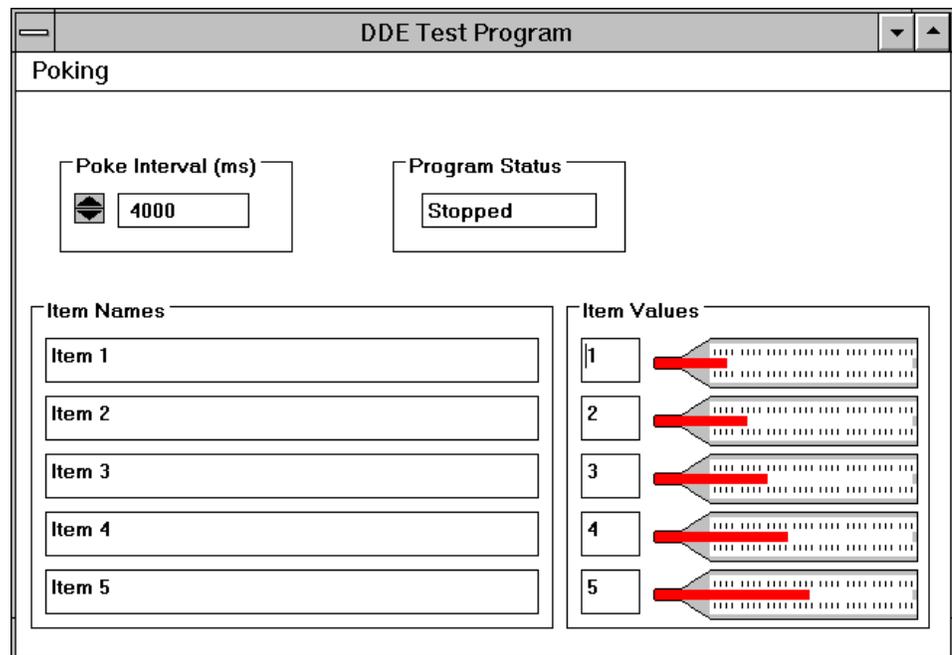


Figure 5-17: Project Form at the Start of Runtime

- Next, choose the "Poking" menu's "Start" command.

The project begins and the Program Status changes to "Waiting". Values are poked out to the controller and then read back. The Item Names and Values are displayed along with changes to their respective bar graphs. Change the Poke Interval to increase or decrease the time between pokes and requests.

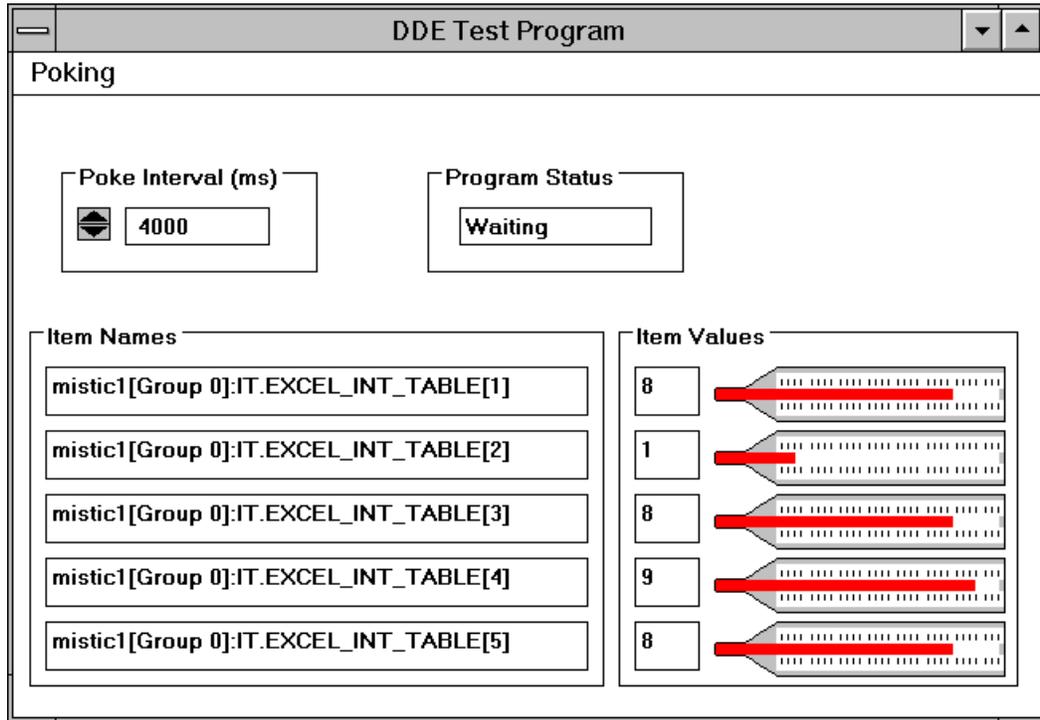


Figure 5-18: Project Form After Starting the Program

7. To stop the example, choose the "Poking\Stop" command.

You've now run the sample DDE_TST1.MAK program which makes basic DDE pokes and requests from a Mystic controller to update the displayed Visual Basic form.

Viewing the Main Components of the Visual Basic Sample Program

To take a closer look at the objects associated with the Visual Basic program, we'll start by viewing the contents of the form.

1. After running the sample program, go back to the design programming environment by choosing the "Run\End" command.

The DDE Test Program form is displayed and may be edited or viewed.

2. Double-click on the timer graphic in the upper right section of the form .

The Code window for this object appears. Most of the Visual Basic code for this example is found in this object's code module (DdePokeTimer).

View the code by scrolling through it. Click the Object drop-down list to see other code modules and objects. Close the Code window by double-clicking its control-menu box.

```

DDE_TST1.FRM
Object: DdePokeTimer Proc: Timer

Sub DdePokeTimer_Timer ()
' Poke 5 random integers

ProgramStatusText.Text = "Poking"

' Setup the hidden poke item box
DdePokeValues.LinkTopic = "MDS\OPTO_MDS_0"

DoEvents
DdePokeValues.LinkItem = "mistic1[Group 0]:IT.EXCEL_INT_TABLE[1]"
DdeItemName1.Text = DdePokeValues.LinkItem
DdePokeValues.LinkMode = 2 'Manual
DdePokeValues.Text = Str$(Int(10 * Rnd + 1)) ' Generate Poke value 1.
' Poke the values out

```

Figure 5-19: The Timer Object's Visual Basic Code Window

3. Double-click on other objects displayed in the form.

Each object's Code window is displayed. Notice the Properties window displays information about the selected object. Close each Code window with its control-menu box.

4. Click on the "Request" text box.

This object senses changes to the MDS data (warm link) and requests the new data from MDS about the controller. Data is returned in a comma delimited fashion. The code parses the information and displays it in the text boxes on the form. It also changes the message displayed in the "Program Status" text box. Close the Code window with its control-menu box.

Summary

After going through this section, you should be able to navigate around in Visual Basic with the DDE_TST1.MAK example provided with MDS. For more specific details about DDE linking and Visual Basic, please consult the Microsoft Visual Basic manuals.

ADVANCED TOPICS

BACKUP SERVERS

A hot backup MDS server may be added to a Mystic MMI client to increase system reliability. If for any reason the main MDS server goes down (power outage, etc.), the Mystic MMI automatically switches to the backup server and scanning is resumed. Control goes back to the main server once it comes back on-line. Figure 6-1 shows a system defined with a main and backup server.

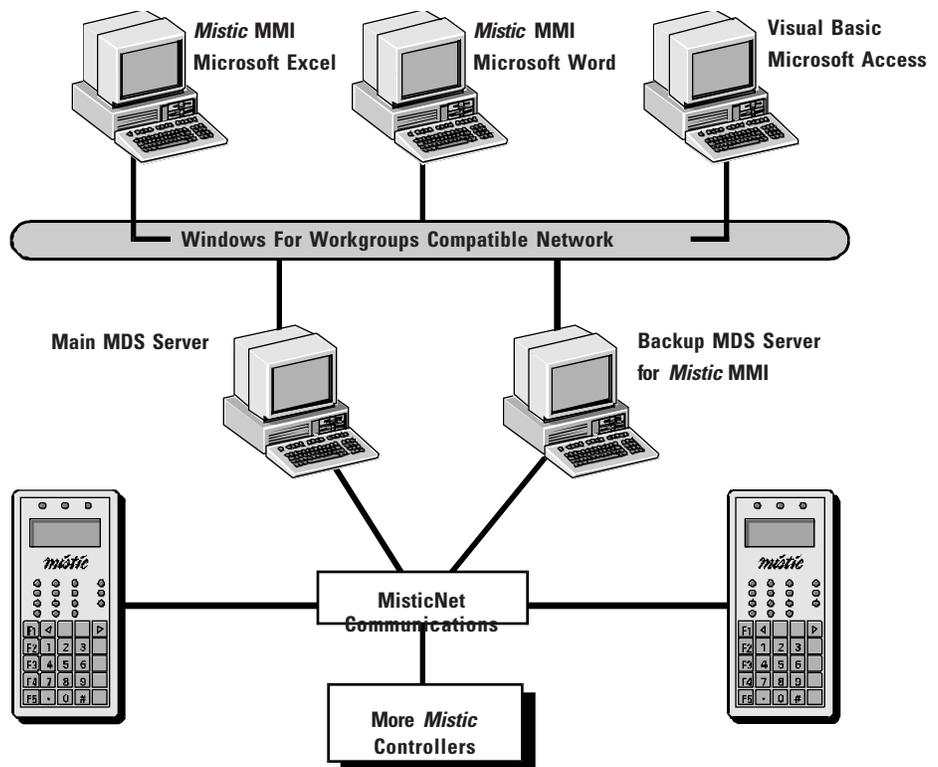


Figure 6-1: Mystic MMI and DDE-Aware Clients on a Network with a Backup MDS Node

In this example, three of many Mystic MMI Runtime client nodes are shown. Each client is also running other DDE-aware clients. All are accessing data from Mystic controllers over MysticNet (RS-485 , ARCnet, etc.). Client nodes are connected to MDS nodes over Ethernet and each is running Windows for Workgroups, version 3.11 (or greater). During normal operation, all clients access data from the main MDS node. The backup MDS node is used when the main MDS node goes off-line.

Control passes to the backup server when the Mystic MMI client ceases to detect communication from the main server. Communication is either data or a *heartbeat* sent from MDS. A heartbeat is an empty data packet sent to a Mystic MMI client simply to let it know MDS is up. A heartbeat is sent if data is not sent within a *heartbeat interval*. The *heartbeat interval* is based on the configured timeout value (Figure 6-2) . Once control is transferred to the backup server, the Mystic MMI tries to connect to the main server every "Re-enable" interval (Figure 6-2). Control goes back to the main MDS server when Mystic MMI successfully communicates to it.

To add a backup server to your Mystic MMI client, simply:

1. Use the Mystic MMI Configurator to specify a "Backup Node" for the Mystic MMI project
2. Use MDS Administrator to add the controller(s) for the new backup client
3. Run MDS on the main and backup server nodes
4. Run the Mystic MMI project

The following discussions describe how to add a backup server to your Mystic system. Details of the startup process are discussed in Chapter 2, "Quick Start".

Adding a Backup Server to the Mystic MMI Project

1. Run the Mystic MMI Configurator and open a project.
2. Choose the "ConfigureMistic controller(s)..." command.
The "Controllers" dialog box appears.
3. Click on the name of the controller you want defined with a backup server and click "Modify...".
The "Controller Properties" dialog box appears.
4. Choose the "Set up..." button to change the MDS port settings.
The "MDS Network Server" dialog box appears.

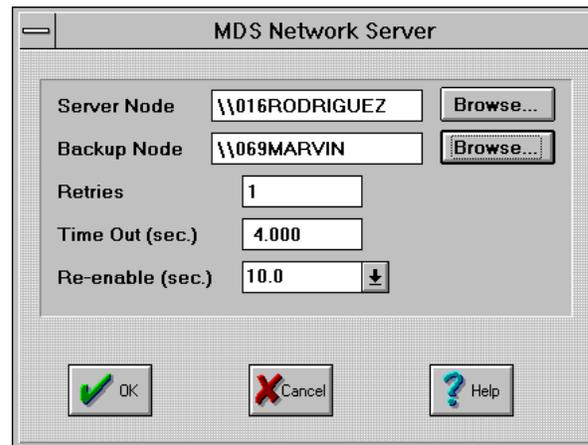


Figure 6-2: Configure Backups from the MDS Network Server Dialog Box (Mistic MMI)

5. Enter the network node name of the backup MDS.
Use the "Browse..." button to quickly locate and enter the node name.
6. Click OK to accept the new settings and click OK again from the "Controller Properties" dialog box.
7. Repeat steps 3 through 5 to configure any other controllers you want serviced by a backup server. When done, click OK from the "Controllers" dialog box.
8. Choose "File\Save project " to save changes.
9. Exit the Configurator.

To Configure MDS

The backup server needs to know about all controllers it may potentially service. Controllers which had backups added in the previous section now need to be registered with the backup server. Refer to the “Configure the MDS Administrator section” in Chapter 2 to set up the main MDS server. Setting up the backup MDS server is a similar process.

1. On the backup node, run the MDS Administrator and choose the “Configure\Controllers...” menu option.
The “Controllers” dialog box appears.
2. Click the “Add...” button.
The “Controller Properties” dialog box appears.

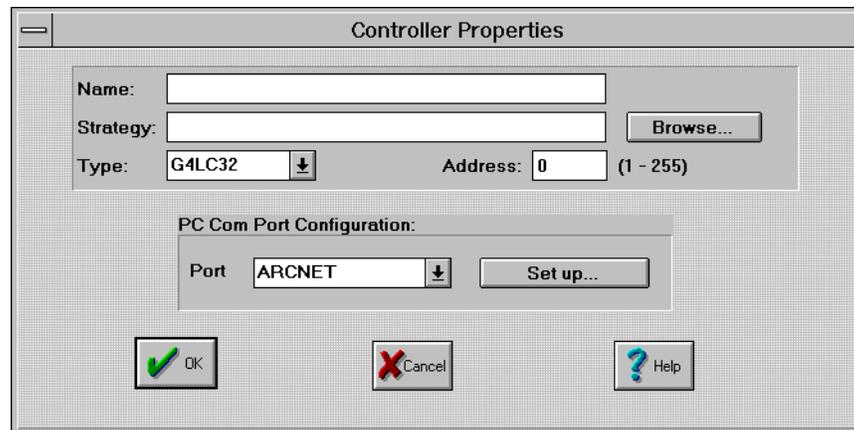


Figure 6-3: Define the Controllers MDS Services from the Controller Properties Dialog

3. Enter the name of the controller and Cyrano strategy, and verify the port settings are correctly defined for the backup node connection to the controller.

Use the “Browse...” button to quickly find the Cyrano strategy and configure your controller.

4. Click OK to accept the new settings and click OK again from the “Controllers” dialog box.
5. Close the MDS Administrator by double-clicking the control menu box.

To Run MDS on the Main and Backup Nodes

If the main MDS node is already running, there’s no need to stop and start MDS. If it’s not already running, start MDS on the main node and choose the desired logging options. Click the minimize button to reduce the MDS window to an icon. Start MDS on the backup node, select the logging options, and minimize the MDS window to an icon.

To Run the Mystic MMI Project

Start the Mystic MMI Runtime and examine the “Event Log Viewer” to verify the Mystic MMI is connected to MDS. Figure 6-4 shows messages of a successful Mystic MMI to MDS connection.

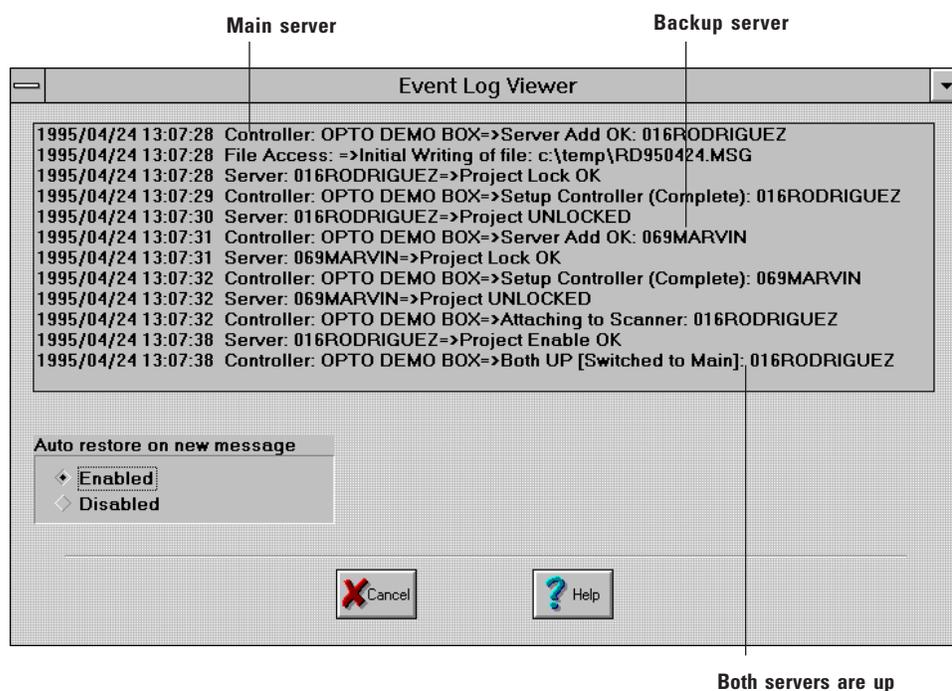


Figure 6-4: Successful Backup Connection Displayed by Event Log Viewer Dialog Box

OPTIMIZING MDS SCANNING

The MDS server scans controllers for data at rates configured in the Mystic MMI Configurator for Mystic MMI clients, and at rates configured in the MDS Administrator for DDE-aware clients. Up to seven scan rates may be configured for the Mystic MMI or MDS server. Several scan rates allow you to scan data at different rates, depending upon the importance of the data. For example, digital points can be scanned at a rate of 1 second, and a group of temperature inputs can be scanned at a rate of 5 seconds, since temperatures usually change slowly. If a PC cannot keep up with the scanning requirements, “scanner overrun” errors occur. Ultimately, scanner overrun errors result in data loss either by the controller or by the server. The controller gets scanner overrun errors if the time it takes to scan the data is longer than the configured scan time. MDS gets a “server data overrun” if the server scans for new data before it can send already scanned data to the client. Scanner overrun error notification can be enabled or disabled in the “Refresh Times” dialog in the Mystic MMI Configurator.

MDS combines data items into groups for Mystic MMI requests but not for other DDE-aware clients requests. Due to communications overhead, sending data in one large group is faster than sending several smaller data requests. Keep in mind the following data group characteristics and how they affect MDS scanning:

- Each Mystic MMI draw window has its own group of data items.
- Data items with different scan times from the same Mystic MMI draw window are combined into separate groups.
- The maximum number of data items in a group is 50.
- Strings are not combined into groups.
- Data written to a controller is not grouped.

Table 6-1: Scanning Tips for *Mistic* MMI and/or DDE-Aware Clients

Tip	Description
Scan Times	Use as few and as slow as possible to reduce the frequency of data requests to the controller .
Mistic MMI Draw Windows	Keep a minimum open or reduced to an icon to reduce the frequency of data request to the controller.
Strings	Minimize their use and scan as slow as possible.
Mistic MMI Projects	Multiple clients with the same project name and time/data stamp only scan data once from the controller.

How to Adjust Scan Times

Here's a suggested method you can use to find an optimum scan time for your MDS system to help avoid scanner overrun errors. The "goal" you are seeking in adjusting the scan time is for MDS to scan the controller(s) as often as possible (to provide the latest data to its clients) without affecting the controller's throughput and avoid constant scanner overrun errors.

1. Set all client scan times to a long interval to ensure a "quiet-time" (no communication activity) between scans. Start out with a 30 second interval. For Mystic MMI clients, set scan times in the Configurator. For DDE-aware clients, set the scan times in the MDS Administrator.
2. Run your Cyrano, MDS, and Mystic MMI applications.
3. Use a stop watch to time the duration of communication activity during a scan interval.
Use the communication LEDs on the Mystic controller to monitor the activity.
4. Adjust your scan times to a value greater than the communication activity duration you measured.
5. To further adjust your scan times:
 - a. Shorten the digital I/O scan times and lengthen the analog I/O scan times.
 - b. Set the refresh group name's freshness value equal to or greater than its scan time. By doing so, the controller is less likely to have to scan I/O units for data so that its throughput is not affected.

TROUBLESHOOTING

OVERVIEW

Problems using MDS have different causes ranging from simply entering incorrect configuration parameters to network compatibility problems. Use the “Logging\Log Level Diagnostics” command in the MDS program to display diagnostic messages that may help you troubleshoot your system. Messages displayed under the “Logging\Log Level Normal” option are described in Appendix B, “Messages”.

Also try the following troubleshooting tips to help isolate any problems you may have with MDS operation. For additional help, call Opto 22 Product Support. See Appendix C for a complete list of service phone numbers.

TROUBLESHOOTING TIPS

To verify NetDDE is working over the network, start the Microsoft Windows Network Program Group’s Chat utility on the MDS computer and on the client’s computer. If these two computers are communicating back and forth, the network is working. Use this to decide if there’re problems with the client/server or with the network.

If a MDS and Mystic MMI session continually disconnects from the network, lengthen the time MDS waits for NetBIOS communication transactions to complete. Change this time by choosing the MDS Administrator’s “Configure\Options...” command and increase the time displayed in the “NetBIOS Timeout for MMI (Seconds)” option. The default time is 10 seconds.

If you are having trouble with the mouse, make sure you are using a Microsoft mouse and a Microsoft mouse driver. An example of this type of problem is the mouse not working when MDS is started.

To troubleshoot DDE communications between MDS and a DDE-aware client, try swapping out the server or the client with another DDE-aware client such as Excel. Example: MDS and a Visual Basic client are not “talking” to each other. If swapping out Visual Basic with Excel shows communication is fine between Excel and MDS, this indicates there may be a problem with the swapped out application setup.

View the MDS main log window to view MDS transaction and error messages. Log level Diagnostics displays all messages sent out and received from clients. Messages displayed under log level Normal conditions are explained in Appendix B, Messages.

To force Excel to reattach to a server, go into Excel, click on a cell with a DDE link, and place your cursor at the end of the DDE link formula in the formula bar. Type a space after the last character of the string and press <ENTER>. Excel detects the changed formula and forces itself to try to reattach to MDS. Closing the spreadsheet and reopening it also forces reattachment.

To see if a client is attached to MDS, click the MDS command “Clients” from the View menu. The “Client List” dialog shows an 8-digit client handle number for each connected DDE-aware client, and the node name for each connected Mystic MMI client .

To view communication exchanges at the controller level, run the MWSNIFF.EXE utility that’s included with MDS. From the MWSNIFF main window, choose the “Enable sniff” command from the File menu. Anything sent or received by the controller is displayed in the main window. You can also use the MWTERM utility as a terminal emulator to send and receive from the controller.

To verify the DDE-aware client works with MDS, download a simple Cyrano program to the controller and see if the client is being updated by MDS. An example of a simple Cyrano program is a one chart, one variable program that increments the variable in an infinite loop.

To verify communications between Excel and MDS work without a Cyrano program, type the following DDE link formula in the formula bar for a selected cell:

=MDS\System!Status

The response from MDS is: *Ready. Opto 22 MDS ver X.X MmiRt >X.X*, where X.X is the current MDS version.

Make sure you do not install a Windows network driver on the ARCnet card in your PC at the time you install a Windows programming environment. Operating systems such as Windows 95 and Windows NT automatically try to install a network driver on an ARCnet card. Allowing the driver to be installed can produce unpredictable results from MDS.

Verify the “Retries” port parameter is not masking other problems. Set the retries parameter to 0 and find out exactly what happens by analyzing whether MDS is not responding, there are long delays, or it’s getting a sequence I/O error.

Verify there are no Windows Control Panel COM port conflicts. Make sure there’s no conflict between the ports configured in the Windows Control Panel and in MDS. Choose the “Ports” icon from the Control Panel group in the Main program group. Click the “Settings...” button, and then click the “Advanced...” button to view the port address and IRQ settings. Check the IRQ settings are unique for each port and match the settings used in the MDS Administrator.

MESSAGES

OVERVIEW

This appendix contains an alphabetic listing of the log level Normal messages that may be displayed to the MDS log window. The messages include error messages as well as typical transaction messages. “Tagname” and “data item” are used interchangeably and refer to a DDE item.

Adding item: <TagName>

A DDE-aware client establishes an advise loop (hot link) to request data for data item <TagName>.

Advise loop start failed: <Explanation> <TagName>

DDE Advise loop setup failed due to an invalid tag name (item name). Check the item name for a syntax error. Look up the <Explanation> in this appendix for more information about the message.

Bit has bad format

A syntax error was found in the DDE-aware client’s DDE link message. The DDE item’s BIT parameter syntax is not valid.

Bit must be between 0 and 31

A syntax error was found in the DDE-aware client’s DDE link message. Make sure the BIT number specified is between 0 and 31.

Bit only applies to tags of base type integer

A syntax error was found in the DDE-aware client’s DDE link message. The BIT parameter applies only to integer data items.

Connect to <DdeHandle> on topic <DdeTopic> and service <DdeService>

The DDE-aware client <DdeHandle> is connected to MDS for a particular topic <DdeTopic> and service <DdeService>. This is part of the setup prior to starting an advise loop.

Controller does not exist

The controller called out in the DDE item is not registered with MDS. Make sure the controller was defined in the MDS Administrator. Verify it’s the controller defined in the Cyrano strategy.

Could not load nddeapi.dll. Shares not added.

Running MDS caused an error while setting up DDE services. Make sure Windows for Workgroups (version 3.11 and up) is loaded. Also, the Mystic MMI does not work with MDS if they are running on the same node which is running Microsoft Windows version 3.1.

Data poke from <DdeHandle>, item <Ddelitem>, clipboard <Format>

This message indicates the DDE poke from a DDE-aware client <DdeHandle> was done.

DDE poke failed, <DataType> <DataString> <TagName>

The DDE poke item passed from the DDE-aware client to <TagName> did not convert to a valid floating-point, discrete, or integer <DataType>. For example, this error can occur if an integer is expected from an Excel poke and instead Excel sends "ABC".

DDE poke failed, controller not found <TagName>

The controller that's to receive the poked information is not recognized by MDS. Make sure it was registered with MDS in the the MDS Administrator. Make sure the controller name is correct.

DDE poke failed, data type not supported <TagName>

The <TagName> data type used in a DDE poke is not valid. Call Opto 22 Technical Support for help.

DDE poke failed, specified range and passed data amount mismatch <TagName>

The number of table elements passed for a DDE poke exceeds the number of elements configured in the [start-end] range. Example: The [start-end] range is [1-10] and 20 elements are passed.

DDE request failed, controller not found

A DDE-aware client requested data from a controller MDS does not recognize. Make sure it was registered with MDS in the the MDS Administrator. Verify the controller name is correct.

DDE request failed, ControllerName must match ItemName

A DDE-aware client request for a data item of type "controller" (pneumonic CTRLR) failed. Check the DDE Item message. The ItemName must match the name specified in the ControllerName parameter.

DDE request failed, could not format data returned from controller

The data sent back from the controller could not be processed. Call Opto 22 Technical Support for help.

DDE request failed, data type not supported

A DDE-aware client request for data failed because its data type was not recognized. Verify the data type syntax is correct.

DDE request failed, Insufficient privilege to access Item

A DDE-aware client request for data failed because the security level passed in the DDE topic is too low to read the item. The following are the four security levels and their corresponding DDE topics: level 0 and OPTO_MDS_0; level 1 and OPTO_MDS1; level 2 and OPTO_MDS2; level 3 and OPTO_MDS3. Level 3 is the highest security and allows access to all items with other levels of security; level 2 is limited to items with security level 0, 1, or 2; etc. Find out what security level you need to access the data item and verify you're sending a DDE topic name with sufficient privileges.

DDE request failed, Item name is not an object on controller

The item name requested by the DDE-aware application is defined as an executable FORTH word on the controller, not as a data item. Check the spelling of the data item you've requested.

DDE request failed, Item name not defined on controller

The item name requested by the DDE-aware client was not found in the controller's strategy. Make sure you are requesting an item from the correct controller.

DDE request failed, Item Type mismatch for Item

The DDE-aware client request for an Item does not match the type defined for the item in the controller's Cyrano strategy. Example: The data item requested is an integer, but it's defined as a float in the Cyrano strategy. Check the Item Type mnemonic in Table 5-3. Also check the type defined for the item in the Cyrano program.

DDE request failed, Table limit exceeded

The DDE-aware client request for a data item from a table defined in the Cyrano strategy failed. The element requested is greater than the defined range of the table. Check your [start-end] range of the DDE Item.

Disconnect for client <DdeHandle>

A DDE-aware client <DdeHandle> has been disconnected from MDS.

Element is invalid

The table element specified is invalid for the table. Example: Table elements *myarray*[-1] or *myarray*[11] for a 5 element table are invalid elements.

Element only valid for tables

A table range or element was specified for a data item that is not a table. Verify the item type of the ItemName.

Error 0xNNN <ErrorDescription> dispatching to client <ComputerName>

Error number 0xNN occurred when data was dispatched to a client at network node <ComputerName>. Message 0x08 "invalid session" and 0x0a "session closed" both indicate trouble communicating from MDS to the Mystic MMI. Slow down scan times or use a faster computer.

Error adding item: <TagName>

A DDE-aware client could not establish an advise loop (hot link) to MDS for data item <TagName>. Check the syntax of the data item requested.

Error <Explanation> creating share <DdeShareName>

Error setting up DDE services. Call Opto 22 Technical Support for help.

Error creating handle for "<DdeTopic>"

Error setting up DDE services. Call Opto 22 Technical Support for help.

Error creating MmiServer

The computer ran out of memory during the MDS setup. More specifically, MDS was attempting to set up the Mystic MMI client portion of the MDS software. Close other Windows applications to free up memory. It might also be necessary to close and restart Windows. Verify your computer has at least 8 MB of RAM. Increase RAM if you're still having errors.

Error creating NonMdsServer.

The computer ran out of memory during the MDS setup. More specifically, MDS was attempting to set up the DDE-aware client portion of the MDS software. Close other Windows applications to free up memory. It might also be necessary to close and restart Windows. Verify your computer has at least 8 MB of RAM. Increase RAM if you're still having problems.

Error: ReEntrancy in CMdsNetBios::ProcessIncomingRequests

A Network error occurred while running the MDS program. Call Opto 22 Technical Support for help.

Error registering service <DdeTopic>

Error setting up DDE services. Call Opto 22 Technical Support for help.

Error: Size of request is incorrect

The actual size of the request received from the Mystic MMI client does not match the size the request should be. The message size is programmed into the request. Call Opto 22 Technical Support for help.

Failure setting up another server session

The computer ran out of memory while trying to establish another MDS network session. Normally, after a network session is established with a Mystic MMI client, another session is created to 'listen' for another new client. Close other Windows applications to free up memory. It might also be necessary to close and restart Windows. Verify your computer has at least 8 MB of RAM. Increase RAM if you're still having errors.

Failure to start advise for <DdeHandle>, security <Level>, item <Ddeltem>, clipboard <Format>

An advise loop for DDE-aware client <DdeHandle> could not be started. Check the <Ddeltem> name syntax. Verify the security <Level> of the DDE topic is the required level for this hot link.

Field type does not apply to item type

The Field specified in the DDE Item message is not available for the item type. Check Table 5-3 for the ItemType's 'Applicable Fields'. Verify the Field's spelling is correct.

Field type is invalid

The Field specified in the DDE item message is not recognized as a valid Field type. Verify the Field's spelling is correct.

Index range only valid for integer or float tables

An index range was used for a data item that is not an integer or a float table. Check the item type of the data item.

Item type does not exist

The Item type used in the DDE item message was not recognized. Check the item type spelling.

Item type not supported

Error parsing tag descriptor

Item type requires a field

The item type specified in the DDE item message needs a Field parameter. Check Table 5-3 for the item type's applicable fields.

Log level is <LogLevel>

The log level currently active is <LogLevel>, where <LogLevel> is: Normal, Diagnostic, or Advanced diagnostic.

MMI client <ComputerName> has disconnected

A *Mistic* MMI client named <ComputerName> disconnected from the network.

MMI network service initialization failed

NetBIOS services were not found when trying to run MDS. This indicates the networking protocol selected from the Windows for Workgroups setup does not support NetBIOS. Check the protocol setup for your computer. Examples of NetBIOS compatible protocols are Microsoft NetBEUI and IPX/SPX Compatible Transport with NetBIOS.

NetBIOS Send error 0xNNN

A network error response to a client request, where 0xNNN is a network error number displayed in hex. This occurs if MDS sends a message to a very busy or a Mistic MMI client that's down. Slow down scan times or use a faster computer. Verify the Mistic MMI client is running.

New MMI client <ComputerName>

The Mistic MMI client at node name <ComputerName> successfully connected to the network.

Out of memory creating another server session

The computer ran out of memory while trying to establish another MDS network session. Normally, after a network session is established with a Mistic MMI client, another session is created to 'listen' for another new client. Close other Windows applications to free up memory. It might also be necessary to close and restart Windows. Verify your computer has at least 8 MB of RAM. Increase RAM if you're still having problems.

Refresh time does not exist

The RefreshGroupName used in the DDE item request was not recognized by MDS. Make sure the RefreshGroupName was spelled correctly and registered with MDS in the MDS Administrator.

Server initialization failed.

Error setting up DDE services. Call Opto 22 Technical Support for help.

Setup of server callback failed.

Error setting up DDE services. Call Opto 22 Technical Support for help.

Setup of timer callback failed

Too many timer resources are being used by Windows applications. Close other Windows applications to free up timers. It might also be necessary to close and restart Windows.

Setup of timer failed.

Too many timer resources are being used by Windows applications. Close other Windows applications to free up timers. It might also be necessary to close and restart Windows.

Start advise for <DdeHandle>, security <Level>, item <DdelItem>, clipboard <Format>

An advise loop for DDE-aware client <DdeHandle> has begun.

Starting server

The MDS server has begun. This message appears at startup.

Startup complete

The MDS server has completed the startup process.

Syntax Error, item name missing

The item name is missing from the DDE-aware client's DDE link formula. Check the item's syntax.

Syntax Error, missing close bracket (i.e., ']') delimiting table element

A syntax error was found in the DDE-aware client's DDE link formula. The ']' bracket is missing from the ItemName table range in the DDE item.

Syntax Error, missing closing bracket (i.e., ']') after Refresh Group

A syntax error was found in the DDE-aware client's DDE link formula. The ']' bracket is missing after the RefreshGroupName in the DDE item.

Syntax Error, missing colon (i.e., ':') after controller

A syntax error was found in the DDE-aware client's DDE link formula. A ':' is missing after the ControllerName in the DDE item. If the optional RefreshGroupName parameter is included, the ':' follows the RefreshGroupName right bracket ']'.
'

Syntax Error, missing open bracket (i.e., '[') after controller

A syntax error was found in the DDE-aware client's DDE link formula. The '[' bracket is missing after the ControllerName and before the optional RefreshGroupName parameter in the DDE item.

Syntax Error, missing period (i.e., '.') delimiting Item Type

A syntax error was found in the DDE-aware client's DDE link formula. The '.' is missing between the ItemType and ItemName parameters.

Table end index must be greater than start index

A syntax error was found in the DDE-aware client's DDE link formula. The ItemName table's 'end' index is not valid because it is not a number or it exceed the table's range size.

Table end index not valid

A syntax error was found in the DDE-aware client's DDE link formula. The ItemName table's 'end' index is not valid because it is not a number, or it exceeds the number of elements MDS scans from a controller.

Table range exceeds supported limit

A syntax error was found in the DDE-aware client's DDE link formula. The ItemName table's end index is not valid because it exceeds the maximum number of table elements returned by one MDS scan.

Table requires an index

A syntax error was found in the DDE-aware client's DDE link formula. The ItemName specified is a table and requires an index or a range of elements.

Table start index not valid

The ItemName table's 'start' index is not valid. Make sure the index is not a negative number.

Write failed: <Explanation>

A DDE poke (write) failed due to an invalid tag name (item name). Check the item name for a syntax error. Look up the <Explanation> in this appendix for more information about the message.

XTYP_EXECUTE not processed

This DDE command is not supported by MDS.

PRODUCT SUPPORT

If you have any questions about this product, contact Opto 22 Product Support Monday through Friday, 8 a.m. to 5 p.m. Pacific Time.

Phone:	800-TEK-OPTO (835-6786) 951-695-3080
Fax:	951-695-3017
E-mail:	support@opto22.com
Opto 22 Web site:	www.opto22.com

When calling for technical support, be prepared to provide the following information about your system to the Product Support engineer:

- Software and version being used
- Controller firmware version
- PC configuration
- A complete description of your hardware and operating systems, including:
 - jumper configuration
 - accessories installed (such as expansion daughter cards)
 - type of power supply
 - types of I/O units installed
 - third-party devices installed (e.g., barcode readers)
- Specific error messages seen

GLOSSARY

A

AC37 A high-speed, half and full-duplex RS-485 serial card for AT class, IBM compatible computers. The card is installed in a PC and provides a communications interface to Mystic bricks and controllers along with an optional hardware interrupt capability. Communications are made with a shielded, single twisted-pair cable. The card is manufactured by Opto 22.

AC42 A fiber optic serial communications card for AT class, IBM compatible computers. The card is installed in a PC and provides a communications interface to Mystic bricks and controllers. Communications are made with two fiber optic cables. The card is manufactured by Opto 22.

Administrator *See* MDS Administrator.

application In a DDE message, it is the name of the DDE server the information is being requested from. It is one of three elements (application, topic, item) used by a client in a DDE message to identify a particular piece of data (such as an integer, a string, an I/O point, a range of cells in a worksheet, etc.) from a server.

ASCII mode *See* communication mode

B

backup node An alternate computer running MDS on a network. If the computer running the primary MDS program goes down, MDS clients are switched to the MDS backup node. Backup nodes render control back to the main MDS PC if it comes online again.

binary mode *See* communication mode

C

client A program running on a computer node that uses a service provided by a server. For example, file servers provide the service of a "big hard disk". Clients use files provided by the server. DDE Servers provide a source of data and can automatically inform clients when data changes. MDS clients include the Mystic MMI and any DDE aware program such as Microsoft Excel, Word, Access, and Visual Basic.

communication mode The protocol used to represent the information packets exchanged between a Mystic controller and a PC. Two modes are available: ASCII and binary modes. Command messages are transmitted as a series of ASCII characters in ASCII mode. Use ASCII mode if there is a modem between the MDS PC and a connected Mystic controller, or if you if you want to view communication messages on an ASCII display terminal. In binary mode, messages are represented as binary data. Binary mode is typically used because it is a faster protocol.

Configurator (Cyrano) A program from the Cyrano software package used to design and configure a Mystic controller strategy.

Configurator (Mistic MMI) A program from the Mistic MMI package used to configure a Mistic MMI project. The Configurator is used to draw display windows and attach graphical elements in the window to "tags", data elements in a Mistic controller's Cyrano strategy.

conversation The exchange of DDE messages between a DDE client and server. A conversation is conducted through a channel. The syntax of the messages exchanged varies among DDE aware programs, DDE link types, and the content of the data being transferred. DDE clients initiate a conversation; DDE servers respond to the DDE client request.

Cyrano Opto 22's flow chart based software package used to program Mistic controllers. The two-part software package consists of the Cyrano Configurator and the Cyrano Debugger. Programs are developed in the Cyrano Configurator and then downloaded and debugged on the controller with the Cyrano Debugger.

D

DDE (Dynamic Data Exchange) A standard protocol for establishing communication channels between dissimilar programs and exchange data on a real-time basis in a format each can understand. Programs can either be on the same PC or on different PCs in a Windows for Workgroups network environment.

A DDE link is initiated by a client. Three elements in a DDE message identify the desired data-application, topic, and item. Application is the name of the DDE server. Topic refers to a category of data from the server. For MDS, this corresponds to the security levels assigned in a Cyrano strategy (OPTO_MDS_0, etc.). For Excel, this corresponds to the spreadsheet's filename. Item identifies a particular piece of data in the topic.

DDE-aware client A registered software program with a server that understands DDE protocol.

Debugger See Cyrano.

F

freshness rate The age of data a Mistic controller has for I/O points. When a controller reads I/O points, the value is timestamped. If the age of data is equal to or less than the configured freshness rate, the value is reported to the Mistic MMI Runtime application. If the freshness value is greater than the configured value, the controller must read the I/O point again before reporting. The higher the freshness value, the less frequently the controller has to scan I/O for new data. For MDS, the possible configured freshness rate value is from 0 to 9999 with units of milliseconds, seconds, minutes, hours, days, or months. The freshness value must be less than or equal to the scan rate.

G

.GML The file extension of a Cyrano strategy that can be loaded by the Cyrano Configurator.

H

handle Number assigned by DDE to a DDE-aware client. This number matches the number in the log file/log window. This number is all that is known about a client. Handles are not assigned to Mistic MMI projects.

heartbeat An empty data packet sent to Mystic MMI simply to let it know MDS is up and running. A *heartbeat* is sent from MDS to the Mystic MMI if data is not sent within a *heartbeat interval*. The heartbeat interval is based on the timeout value. Typically, an acknowledgement is received by MDS at the network level that the heartbeat was received by the Mystic MMI client. If an acknowledgement is not received, MDS eventually disconnects this client.

A heartbeat is also used by the Mystic MMI to determine if the MDS application is running. Missed heartbeats signals the Mystic MMI application to switch to the backup node server.

I

item One of three elements (application, topic, item) used by a DDE-aware client in a DDE message to identify a particular piece of data (such as an integer, a string, an I/O point, a range of cells in a worksheet, etc.) from a server. For example, between MDS and a Mystic controller, an item could be a particular I/O point. Between MDS and Excel, an item could be a specific cell from a spreadsheet. The syntax for the item is:

```
ControllerName[RefreshGroupName]:ItemType.ItemName[start-end].Field.BITn
```

L

log messages Information reported by MDS about its communication transactions. Log messages may be displayed to the MDS main log window or to a file.

log window The MDS main window where log messages are displayed.

M

MDS (Mistic Data Server) Opto 22's server used to allow Mystic MMI and DDE aware clients to access real-time data from Mystic controllers. MDS is a two program software package consisting of the MDS Administrator and MDS.

The MDS program is a stand-alone program that runs on a PC and collects data from attached Mystic controllers. It can report data from Mystic controllers to the Mystic MMI or to other third-party DDE-aware software packages such as Microsoft Excel, Word, Access, and Visual Basic.

MDS Administrator One of two programs that make up the MDS software package. Communication parameters such as port type, I/O address, baud rate, and time-outs, as well as scan/refresh times are configured with the MDS Administrator.

MDSLOG.LOG The default filename of the message logging file for MDS. When the "Logging\Log to File" option is selected in MDS, communication messages are sent to the file as well as to the main MDS display window. The file is found in the MDS root directory, typically c:\OPTOMDS. The filename and its location may be changed by using the MDS command "Logging>Select Log File".

Mistic MMI (Man Machine Interface) A Microsoft Windows software package used to develop and run animated graphical representations of data from a Mystic control system and a Cyrano strategy. Its two major components are the Mystic MMI Configurator and Mystic MMI Runtime. The Configurator is the development environment used to create the operator interface, while the Runtime is used to display and run the operator interface with your Mystic system.

Mistic MMI project The collection of draw windows, graphical elements, attributes, and all elements defining one operator interface designed with the Mistic MMI Configurator.

MisticNet Coined term used to refer to networked communications to Mistic controllers. Protocols include half-duplex RS-485 and ARCnet communications.

mwdriver.dll A dynamic link library that provides communications to Mistic controllers. Mwdriver.dll can handle up to 16 connections. An example of a connection is an application with specific port settings requests a session to MDS. This is one connection. Another application requests three sessions to MDS, each over different physical ports. This one application uses up three connections to mwdriver.dll.

N

node name Another term used to refer to a computer name on a network.

O

OPTOMDS.INI The OPTOMDS.INI file is created when you exit the MDS Administrator for the first time. The OPTOMDS.INI file contains controller and scan rate information about the options you entered in the MDS Administrator. Information in this file is read by MDS once when the program is initially started. If you make configuration changes in the MDS Administrator while MDS is running, you must stop and restart the MDS program to have these changes take effect. The OPTOMDS.INI file is created in the MDS root directory (typically C:\OPTOMDS\OPTOMDS.INI).

P

project (Mistic MMI) see Mistic MMI project

R

refresh time Refers to the scan time and freshness values for data read by MDS from a Mistic controller. The scan time is how often MDS reads the controller's I/O data. The freshness value is the maximum age the data read from the controller must be to be considered valid.

re-enable A communication port property used by the MDS node (computer) to specify the time interval to wait before checking for a Mistic controller response. This property frees up the computer's CPU for other tasks during this waiting period. MDS options available are 1, 3, 10, and 30 seconds. The MDS default re-enable time is 3 seconds.

report-by-exception The basis by which MDS notifies its clients that data has changed. Data is reported only if it has changed from the last time it was reported to the client.

retries A communication port property that sets the number of times MDS tries to communicate with a Mistic controller after its first attempt, before timing out. The range for this parameter is from 1 to 9. The MDS default is 1 retry.

Runtime See Mistic MMI

S

scan time The time interval between Mystic controller I/O readings by MDS. Typical scan times are 1 second or less for time-critical data, or 60 seconds for less frequently changing data such as outdoor air temperature. The scan time does not determine the frequency MDS sends data to clients. Unchanging data since the last scan is not reported to a client. The MDS scan time is from 0-9999, with units of time in milliseconds, seconds, minutes, hours, days, or months.

server In a DDE conversation, it is the program supplying the data requested by a DDE-aware client. MDS is a server that provides data from a Mystic controller to Mystic MMI and other DDE aware clients.

share Automatically created by MDS to allow clients access to MDS across a Windows for Workgroups network. Each node has resources (such as disks or files) that may be made available for access by others on the network. Resources that can be shared are file directories or DDE Application/Topic pairs. Shares may be password protected to control read or write privileges.

T

tag name The name of a piece of data in a Mystic controller as configured in a Cyrano program.

time-out This sets the time between each communication attempt from MDS to a Mystic controller. Valid values are from .200 to 600 seconds. The number of communication retries after the initial attempt is set by the *retries* parameter.

throughput On a Mystic controller, it is the time its microprocessor takes to complete transactions (commands). It is greatly affected by how fast the controller can read and write I/O from the Mystic I/O units.

topic Identifies a category of data from the MDS server. It is one of three elements (application, topic, item) used by a client in a DDE message to identify a particular piece of data (such as an integer, a string, an I/O point, a range of cells in a worksheet, etc.) from a server. For MDS, this corresponds to the security levels assigned in a Cyrano strategy (OPTO_MDS_0, etc.). For Excel, this corresponds to the spreadsheet's filename.

W

workgroup A logical group of network nodes running Windows for Workgroups.

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