DeviceNet Configurator
User Guide

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Notes to Readers

The *DeviceNet Configurator User Guide* provides the following information:

- Installing and operating the DeviceNet Configurator.

- Configuring communications between the 2716D master module and the Configurator.

- Offline configuration - creating a configuration file from EDS files; creating links; mapping I/O points; setting parameters; building explicit messages.

- DeviceNet Monitor - general description of the Monitor interface and how to build a configuration file by using an active network connection.

Related Documents

The following documents contain additional information:

- For information on Quickstep, refer to the *Quickstep™ Language and Programming Guide* or the *Quickstep™ User Guide*.

- For information on your controller and its modules, refer to the appropriate Installation and Applications Guide.

- For information on on the registers in your controller, refer to the *Register Reference Guide*.

- For information on Microsoft Windows or your PC, refer to the manuals provided by the vendor.

- For information on the 2716D, refer to the *2716D DeviceNet Module Installation Guide*.

Book Conventions

The following conventions are used in this book:

ALL CAPS BOLDFACE	Identifies DOS, Windows, installation program file names.
Boldface	Indicates information you must enter, an action you must perform, or a selection you can make on a dialog box or menu.
Italics	Indicates a word requiring an appropriate substitution. For example, replace *filename* with an actual file name.
Text_Connected_With_Underlines	Indicates symbolic names used in Quickstep programs. Step Names are ALL_CAPITALS. Other symbolic names can be Initial_Capitals or lower_case.
SMALL CAPS	Identifies the names of Quickstep instructions in text.
Courier font	Identifies step names, comments, output changes, and Quickstep instructions appearing in the Quickstep editor.
Art Code	Identifies the file name of a particular graphic image.

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Getting Started

Contents

Overview

The DeviceNet Configurator is a powerful program that gives you the ability to actively configure your DeviceNet network from a "live" network with DeviceNet Monitor or build a configuration offline with the standard set of Configurator tools.

In Monitor mode, your physical network connections must already be established. The scanner must first be identified, followed by each device on the network. You must know a device's MACID before the device can be identified on the network. After connections are established, you can then verify the types of messaging supported by each device.

In offline mode, you can import EDS files for all devices you want to add to your network or you can build a configuration from scratch by using the series of buttons accessible from the main screen. Network connections are not required in offline mode. You merely build your configuration, save it to a configuration (.DNC) file, and download it to the 2716D module where it is stored in flash memory.

Installation

Install the DeviceNet Configurator software from Windows as follows:

1. Insert the CD into the CD-ROM drive; the installer program (**autorun.exe**) launches automatically. Press **NEXT** and the **Select Components** screen displays.

2. Select the application components that you want to install on your PC, then press **NEXT**. Press **NEXT** on the next several screens until the **Choose Destination Location** screen displays.

3. Select a destination folder for your files.

4. After pressing **NEXT** several times, the installer will install the proper system components.

5. Press **FINISH** on the next two screens to complete the installation.

DeviceNet Configurator Main Screen - Overview

The following illustration shows the DeviceNet Configurator's main window and describes the different parts of the window.

Menu Bar - Contains the File, Configuration, View and Help menus.

Title Bar - Displays the application name and the name of your configuration file.

Device Buttons - Use these buttons to add a scanner and DeviceNet devices or to delete devices from the network.

Toolbar - Gives you access to the most common tools used in the Configurator.
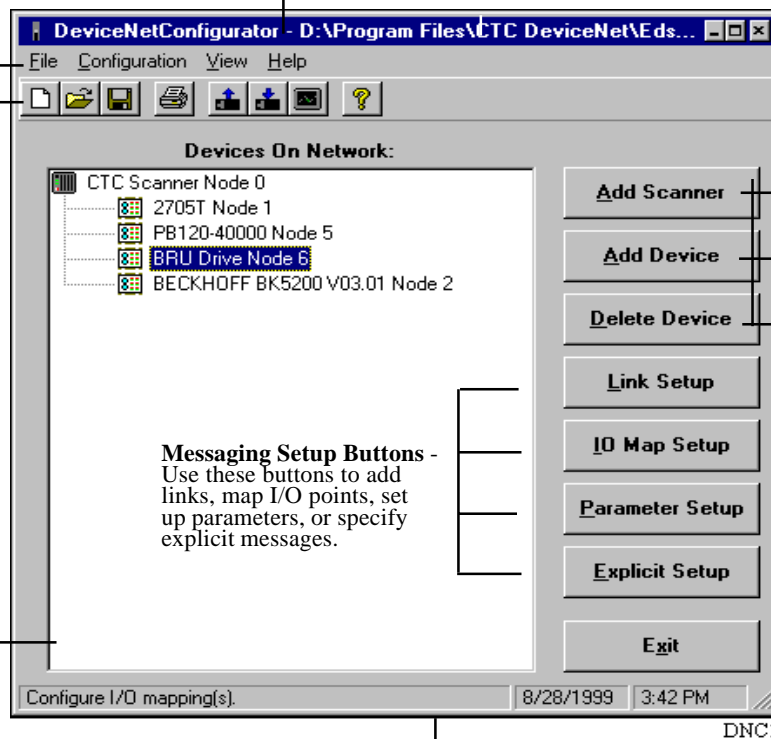
Messaging Setup Buttons - Use these buttons to add links, map I/O points, set up parameters, or specify explicit messages.

Devices on Network window - Lists all the configured DeviceNet devices along with their MACID. The master device is displayed at the top and all slave devices are shown indented.

Status Bar - Lists the last completed activity, the current date, and the current time.

Configurator Toolbar - Main Screen

The Toolbar appears directly below the menu bar at the top of the Configurator's main screen. To hide or display the toolbar, choose Toolbar from the View menu. The main screen toolbar is illustrated below along with a description of each icon.
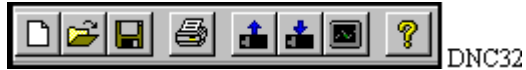
New - Deletes the currently loaded configuration and starts a new session. If you have a configuration file open and have pressed this icon, the program will prompt you to save changes to this file.

Open - Opens an existing DeviceNet configuration (.DNC) file.

Save - Saves new configuration files or saves changes to existing configuration files.

Print - Prints out your configuration file.

Upload Configuration - Transfers a configuration file to the Configurator from the 2716D scanner module.

Download Configuration - Transfers a configuration file from the Configurator to the 2716D scanner module.

DeviceNet Monitor - Opens the DeviceNet monitor utility, which is used to scan the DeviceNet network and retrieve configuration information from all connected devices.

Help - Launches online help for the DeviceNet Configurator program.

Configurator Menu Bar

The menu bar, which is illustrated below, appears directly below the Configurator's title bar at the top of the screen. The following section contains a brief description of each menu.

DNC42

File Menu

The **File** menu provides access to the most common file functions. You can start a new configuration session, open existing configuration files, save changes to configuration files, import a list of vendors, export a symbol file to Quickstep, print out configuration files, and exit the Configurator.
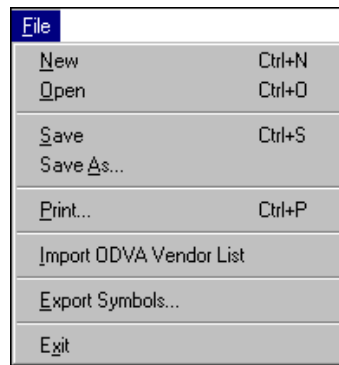
DNC14

Configuration Menu

The **Configuration** menu allows you to download configuration files from the Configurator to the 2716D module, upload configuration files from the 2716D module to the Configurator, set up communications between the module and your host PC, or access the DeviceNet Monitor utility.
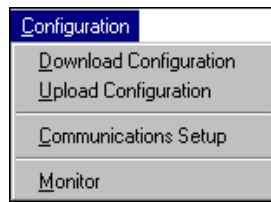
```
Configuration
   Download Configuration
   Upload Configuration

   Communications Setup

   Monitor
```
DNC15

View Menu

The **View** menu allows you to toggle the toolbar and status bars on or off and also provides access to the CTC DeviceNet home page at http://www.ctc-control.com/devicenet.

```
View
 ✔ Toolbar
 ✔ Status Bar

   CTC DeviceNet Home Page
```
DNC16

Help Menu

The Help menu allows you to launch the Configurator's online help file, provides online help search capability, and gives information on the program version and function.
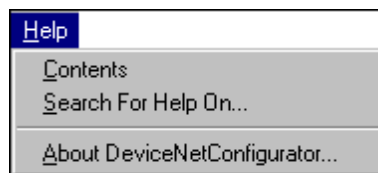
```
Help
   Contents
   Search For Help On...

   About DeviceNetConfigurator...
```
DNC17

Opening Files

Opening a New Configuration File

To open a new DeviceNet configuration (.DNC) file:

Choose **New** from the **File** menu (shortcut, type **CTRL + N**) or choose the **New** icon [ ] on the main screen toolbar.

NOTE: **New** has no visible effect unless you have already started building your configuration. If so, the system will prompt you to save changes to your current configuration. If you don't save your file at this time, the program will delete your configuration information.

Opening an Existing Configuration File

To open an existing DeviceNet configuration file:

1. Choose **Open** from the **File** menu (shortcut, type **CTRL + O**) or choose the **Open** icon [ ] on the main screen toolbar

2. The **Open** dialog box appears as shown below. Note that the File name box initially displays the name of the most recently opened file. Locate the desired file and open it by typing its name in the File name box or by selecting it from the list of displayed files.
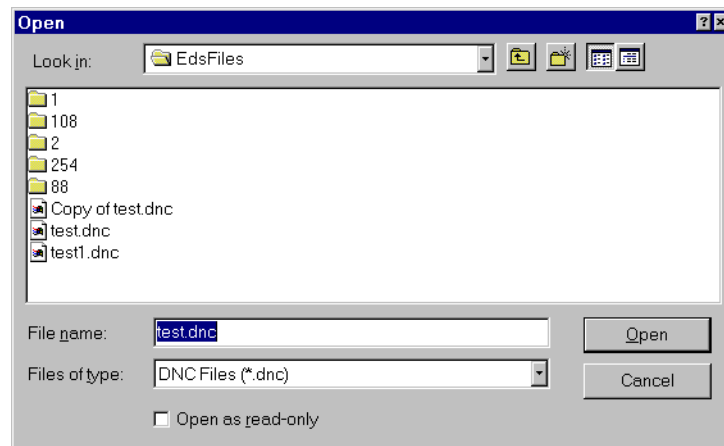
DNC31

3. Press the **Open** button to open the file in the Configurator's main screen.

Saving Files

You can save a new configuration file or save changes to existing files by using the **Save** and **Save As** commands.

Saving New Configuration Files

To save a new configuration file:

1. Choose **Save** (shortcut, type **CTRL + S**) or **Save As** from the **File** menu or press the **Save** icon 💾 on the main screen toolbar.

   The **Save As** dialog box appears as shown below.
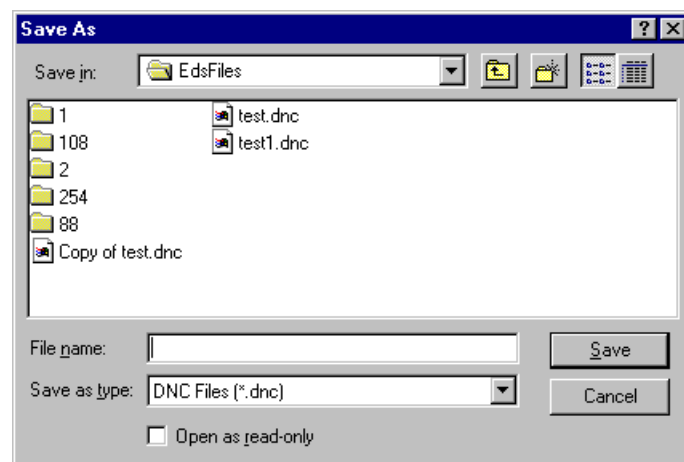
DNC9

2. Enter a name for the new file. Locate the directory you want to save your files in, then select **Save** to save the file.

Saving Changes to Existing Configuration Files

To save changes to existing configuration files:

1. Choose **Save** (shortcut, type **CTRL + S**) from the **File** menu or press the **Save** icon 💾 on the main screen toolbar.

2. The program saves all changes made to the file since it was last saved.

NOTE: If you want to assign a new name to the file, select **Save As** from the **File** menu.

Printing Files

To print out a configuration file:

1. Choose **Print** (shortcut, type **CTRL + P**) from the **File** menu or select the **Print** icon ![print icon] on the toolbar.

2. The **Print Setup** dialog box displays as shown below. You can set the destination printer by pressing the **Network** button. In addition, you can specify the paper size, page orientation, color, number of copies, and other attributes that are dependent on the printer selected.
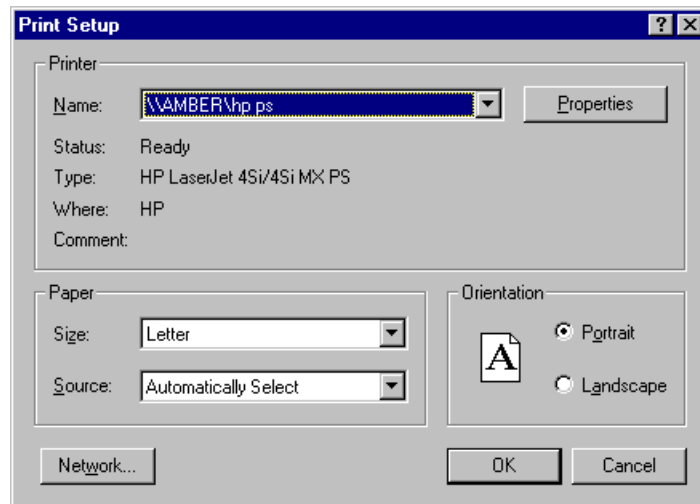
DNC41

Configuration Files

The configuration file lists all the attributes of the master and slave devices such as:

- MACIDs for the master and all slave devices

- Baud rate for the scanner

- Device name, revision level, and manufacturer

- Parameter settings for all devices

- I/O message setup-includes items such as message type, scan and inhibit times (if applicable) and so forth

- I/O mapping information-includes items such as data type, starting bytes, significant bits, and so forth

- Explicit messages-contains specific setup information for explicit messaging

NOTES: You cannot view the configuration file except by printing it. A typical example of a printed file is shown on the following page.

Downloading a blank configuration file to the 2716D disables scanning and allows you to switch from Master mode to Slave mode. A blank configuration file only defines the scanner and does not define any devices.

Typical Printed Configuration File

[CTC Scanner]

MACid = 63
Baud =500Kbs

[Devices]

MACid	Revision	Product	Vendor
1	1.1	CTC 2716D DeviceNet	Control Technology Corporation
2	1.100	DeviceNet NIU	GE Fanuc Automation
12	3.0	BECKHOFF BK5200 V03.00	Beckhoff Industrie Elektronik

[Parameters]

MACid	Number	Data Bits	Data Type	Control	Path	Value
1	8	2	2	0	[6] 20 50 24 03 30 01	13005
1	9	1	8	0	[6] 20 50 24 03 30 02	1

[IO Links]

MACId	Link	Scan	Inhibit	Input Size	Output Size	Input Path	Output Path
1	Poll	50	1000	8:64	8:64	[0]	[0]
I	Strobe	100	1000	4:32	0:0	[0]	[0]
2	Poll	50	1000	4:32	4:32	[0]	[0]
12	Poll	50	1000	11:88	6:48	[0]	[0]

[I0 Mappings]

| MACid	Link	Data Type	StartByte	DataBits	StartBit	SigBits	Address	Length	Min	Max	Name
1	Poll	Digin	1	1	1	1	129	16	0	1	CTC Ins
1	Poll	DigOut	1	1	1	1	129	16	0	1	CTC Outs
1	Strobe	DigIn	1	1	1	1	185	32	0	1	CTC Strobe
2	Poll	DigIn	3	16	1	1	65	16	0	1	GE Ins
2	Poll	DigOut	3	16	1	1	65	16	0	1	GE Outs
12	Poll	Digin	1	8	1	1	89	8	0	1	Beck Counter Ins
12	Poll	Digin	10	8	1	1	81	8	0	1	BeckIns
12	Poll	AnalIn	2	16	1	16	17	4	0	0	Beck Counters/Analog Ins
12	Poll	DigOut	1	1	1	1	145	40	0	1	Beck Counter Control
12	Poll	DigOut	6	8	1	1	81	8	0	1	Beck Digital Outs

[Explicit Messages]

There are no Explicit message settings.

Communications Setup

The **Communications Setup** box is used to configure the connection between the Configurator and the 2716D DeviceNet module. From this dialog box, you can specify a connection type, set the communcations port, define the host and target nodes or IP address, and set a communications timeout.

To configure communcations, proceed as follows:

1. Select **Communications Setup** from the **Configuration** menu. The **Communications Setup** dialog box appears as shown below.
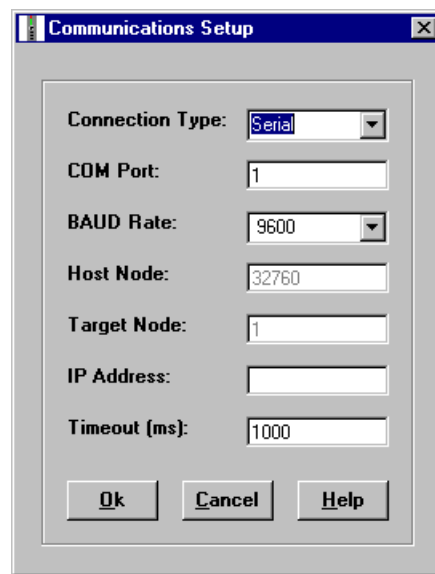
DNC20

2. Click the arrow on the right side of the **Connection Type** field to display the applicable connection type. This field establishes the network connection type to the 2716D module.
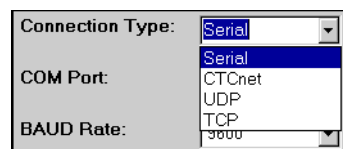
DNC21

NOTE: All serial communications are with user-selected baud rate, NO parity, 8 Data Bits, and 1 Stop Bit.

3. Specify the communications port (COM1 through COM8) on the back of your PC by typing it in the **COM Port** field.

4. Click the arrow on the right side of the **BAUD Rate** field to display a list of baud rates. This field sets the baud rate for your connection. Baud rate selections from 300 to 38,400 are available. Although the baud rate is selectable, some controllers have a fixed baud rate. Refer to your controller's installation guide for configuration specifications.
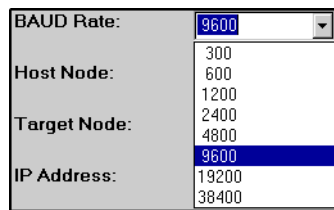

DNC22

NOTE: The **COM Port** and **Baud Rate** fields are only available for serial connections.

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5. Specify the network node address (if applicable) of the host computer running the Configurator program by typing it in the **Host Node** field.

6. Specify the network node address (if applicable) of the 2716D module by typing it in the **Target Node** field.

NOTE: The **Host Node** and **Target Node** fields are only available for CTCnet connections.

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7. Specify the IP address (if applicable) for the connection by typing it in the **IP Address** field.

NOTE: The **IP Address** field is only available for UDP or TCP connections.

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8. Enter a delay time in milliseconds by typing it in the **Timeout (ms)** field. This value is the amount of time elapsed before a communications failure is reported. The default value is 1000 milliseconds (1 second).

NOTE: Some messages have fixed timeouts that may override this setting.

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9. Select **Ok** when you have finished making your selections.

Importing the ODVA Vendor List

The **Import ODVA Vendor List** command (located on the **File** menu) allows you to import a copy of the ODVA's DeviceNet vendor list in Excel spreadsheet format. This information is then added to the Configurator's database and is accessible through the **DeviceNet Device Selection** screen. To import the vendor list:

NOTE: You must have Excel installed on your PC to import the vendor list.

1. Select **Import ODVA Vendor List** from the **File** menu.

2. The **Open** dialog box appears as shown below. Locate the **vendor.xls** file and open it by typing its name in the **File name** box or by selecting it from the list of displayed files.
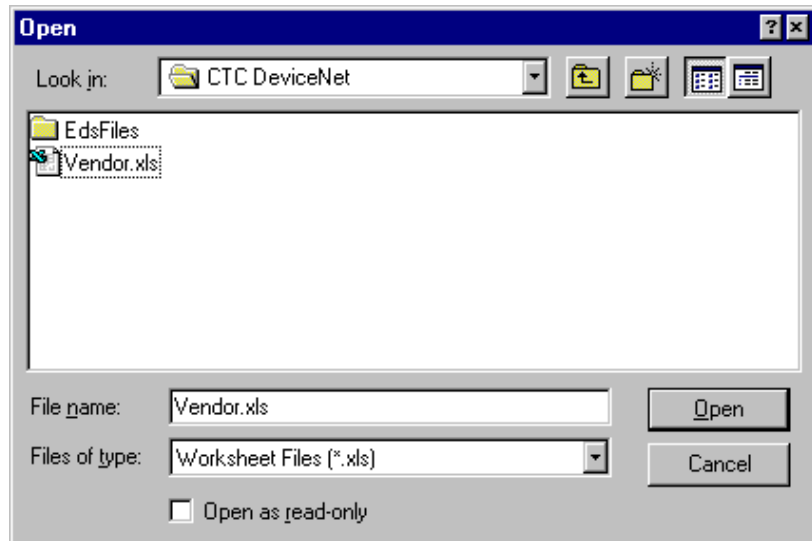
DNC74

3. Press the **Open** button; the file opens up in Microsoft Excel. The spreadsheet displays behind the Configurator's main screen. Once the file is imported, Excel is closed down and the Configurator tells you that the vendor list is imported.

Exporting Symbols

The **Export Symbols** command (located on the **File** menu) is used to export symbol files into Quickstep. When you configure your devices, you can assign I/O points and symbolic names. This information is part of the configuration (.DNC) file. Invoking this command extracts this information and saves it to a compatible Quickstep symbol (.sym) format. To export symbol information:

1. Select **Export Symbols** from the **File** menu.

2. The **Save As** dialog box appears as shown below. Note that the **File name** box initially displays the name of the currently loaded configuration file.

DNC75

3. Enter a name for the symbol file or re-use the existing name.

4. Locate the directory you want to save your files in, then press the **Save** button to save the file in Quickstep's symbol (.sym) format. You can now load this file into Quickstep's symbol browser. For example, if you map digital inputs 17-22 and then export them as a symbol file, you can open the file in the symbol browser as shown below.

DNC76

DeviceNet Configurator User Guide

Offline Configuration

Contents

Adding a Scanner

This section describes how to add a scanner to your configuration file.

NOTES: All other buttons remain inactive until you've added a scanner.

You can also add a scanner from the DeviceNet Monitor window. For more information, refer to *Chapter 3*, *DeviceNet Monitor*.

This procedure assumes that the main Configurator screen is displayed on your PC.

1. Press the **Add Scanner** button. The **DeviceNet Master Address** window displays as shown below.
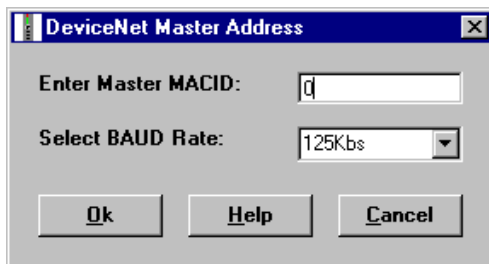
DNC2

2. Type a master MACID between 0-63 in the **Enter Master MACID** field.

3. Select a baud rate (default rate is 125 Kbs) from the **Select BAUD Rate** field.

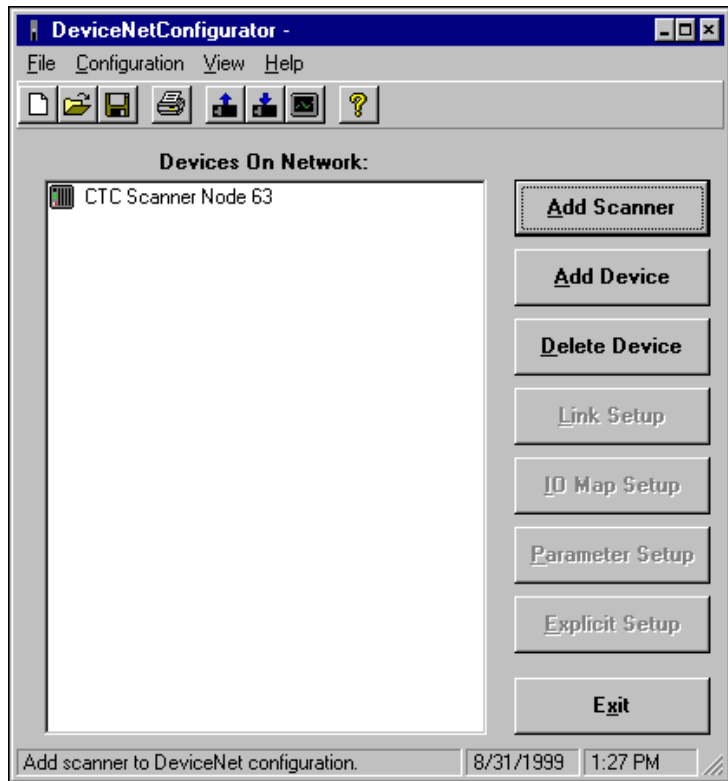4. Press **Ok**. The CTC scanner is listed in the **Devices on Network** window along with its node number as shown below.

DNC63

Adding a Device with the Configurator's Database

This section describes how to add a device to your configuration.

1. Press the **Add Device** button. The **DeviceNet Device Selection** window displays as shown below.
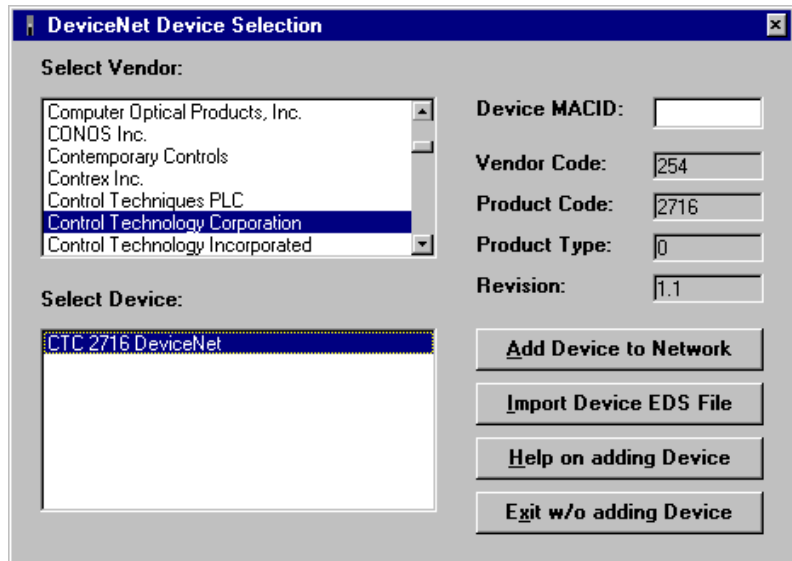
DNC3

2. Select a vendor from the list of companies provided in the **Select Vendor** window by clicking once on a vendor name. This window displays a scrollable list of DeviceNet vendors.

3. Select a device type from the **Select Device** window. This window displays all devices for a specific vendor. Select a device by clicking once on the device name.

NOTES: Devices do not appear in the **Select Device** window until they are part of the Configurator's database.

Devices may appear multiple times in the Configurator's database. This occurs when different versions of an EDS file have been imported into the database. Be certain that the version number or revision for the selected device matches your actual device before adding the device with the **Add Device to Network** button. If the revision number is more recent than your physical device, it may contain parameters that aren't supported by the device.

4. Type a device MACID between 0-63 in the **Device MACID** field. If the ID is already assigned to another device, the Configurator will prompt you to enter a different number.

NOTES: Devices often have DIP switches that are used to set the MACID and/or the baud rate. If these hardware settings are valid, then they override any software settings on the device. Devices without switches may also be set through Explicit messages.

The 2716D has rotary switches that normally have priority over any software settings. However, if the baud rate is set to 3 or the MACID is greater than 63, then the switch settings are ignored and the software settings (set by explicit messages) take priority. If both hardware and software settings are invalid, then the baud rate defaults to 125 kBd and the MACID defaults to 63.

Make sure that the MACID entered through the **Device MACID** field matches the device's active settings (hardware or software). If you assign a MACID to the 2716D with this field and the ID differs from the current card settings, then scanning will not occur and the 2716D will only operate as a slave instead of both as a slave and a scanner.

The vendor code, product code, product type, and revision are automatically filled in when you import an EDS file or select a device from the Configurator's existing database. You cannot enter this information directly since these boxes are unavailable.

5. Press the **Add Device to Network** button to add the device to your DeviceNet network. The program verifies that the device has been added and returns to the main screen, where it displays a device icon as part of the DeviceNet configuration (see the illustration below).
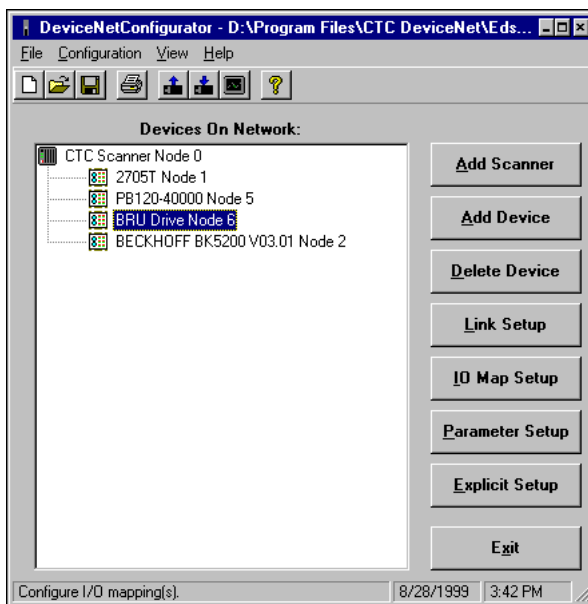
DNC1

Adding a Device by Importing an EDS File

This section describes how to add a device to your configuration by using an EDS file.

NOTE: Make sure that the EDS file you are importing matches the software version supported by the device. If you have downloaded the latest version of an EDS file from a device vendor's web site, it may contain parameters that are not supported by the device.

1. Press the **Add Device** button. The **DeviceNet Device Selection** window displays as shown on the previous page.

2. Press the **Import Device EDS File** button to import a device's EDS file into your Configurator's database.

NOTE: Once a file is added to the database, the device is associated with a specific vendor and appears in the **Select Device** window.

3. The **Open** screen displays as shown below. Locate the desired file and open it by typing its name in the **File name** box or by selecting it from the list of displayed files.

DNC23

4. Press the **Open** button or the **Enter** key. The **Import EDS File** dialog box appears as shown below.
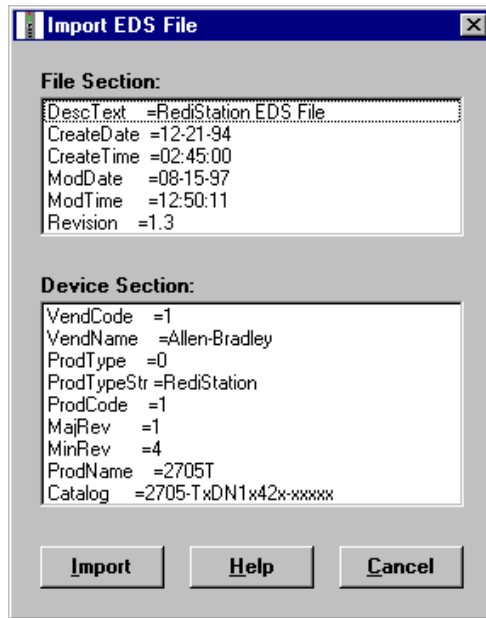
DNC24

5. Press the **Import** button to import the EDS file into the Configurator's database. The program returns to the **DeviceNet Device Selection** window.

6. Follow steps 2 through 5 from the *Adding Devices with the Configurator's Database* procedure to add the device to your DeviceNet network.

Deleting a Device

This button deletes a device from your DeviceNet configuration. Select a device from the **Devices on Network** window by clicking on it once with the mouse. Press the **Delete Device** button to delete the device.

Creating I/O Links

The **DeviceNet Links** screen summarizes all I/O connections for a particular device on the DeviceNet network and provides access to the **Device IO Setup** screen, which is used to configure I/O communications between the 2716D module and devices out on the network.

To create an I/O link:

1. Select a device from the list displayed in the **Devices on Network** window (main Configurator screen).

2. Press the **Link Setup** button; the **DeviceNet Links** screen displays. The example below shows a link that has already been created on the I/O setup screen.
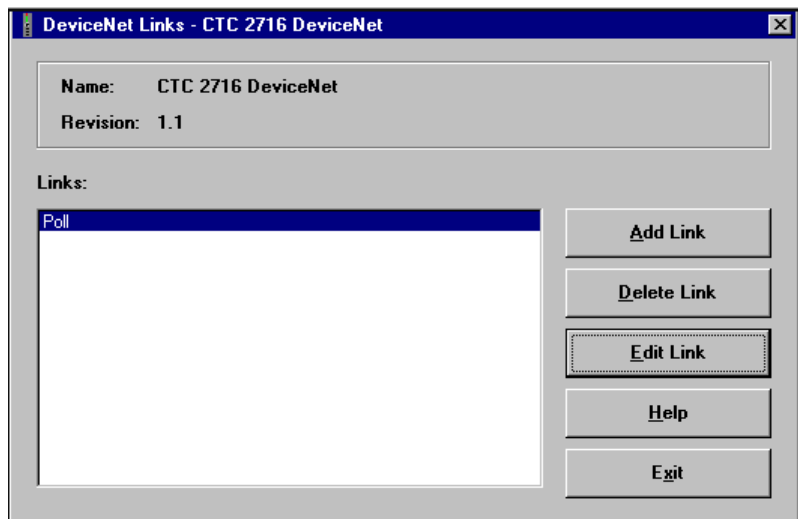
DNC65

3. Add a new link by pressing the **Add Link** button; the **Device I/O Setup** screen displays as shown on the next page.

DNC4

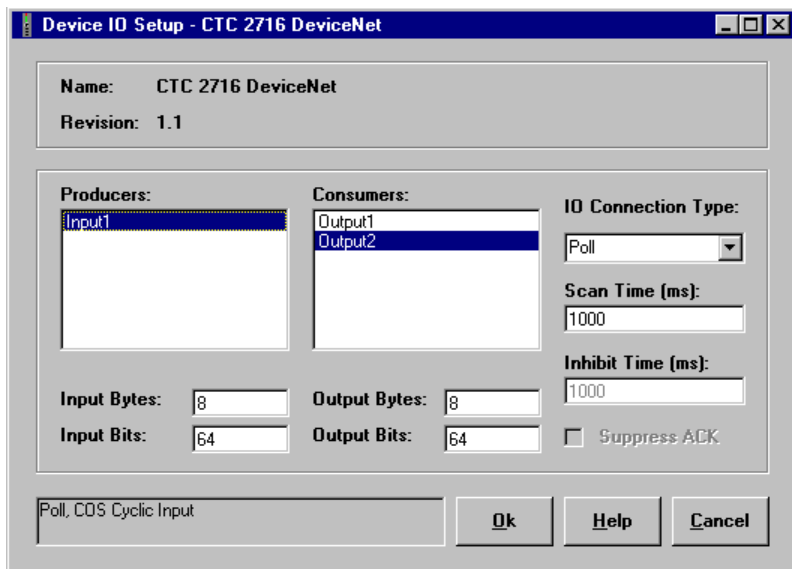**NOTES:** This procedure assumes that the I/O Setup fields are empty, which means there is no EDS file for the device or the EDS file is incomplete.

If the I/O Setup fields are filled in by the EDS files (as shown above), you can still change their values. If these values are changed to the incorrect number, you may get strange results.

Record lengths (size of an I/O message) for a device may depend on its configuration. Check the device's documentation or the DeviceNet Monitor window to ensure that the record lengths imported with its EDS file are correct for the configuration in use. Some EDS files do not contain this information, so this data must be entered manually.

Producers and consumers are imported into the Configurator as part of an EDS file and provide a way to have record lengths of different sizes. For example, Output 1 and Output 2 shown above may each have a different record length. The **Producers** window lists the responses produced by the device and sent to the scanner. The **Consumers** window lists the requests produced by the scanner and sent to the device. **Neither of these fields is user-configurable**.

4. Specify the number of input bytes in the **Input Bytes** field. This field lists the number of input bytes in the message sent by the producer. For example, when the device sends out a message to the scanner, it will contain the specified number of input bytes.

NOTE: Input bytes consist of data bits and status bits. The data bits are specified in the **Input Bits** field.

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5. Specify the number of input bits in the **Input Bits** field. This field lists the number of data bits in the message sent by the producer. For example, when the device sends a message to the scanner, it will contain the specified number of input bits.

6. Specify the number of output bytes in the **Output Bytes** field. This field lists the number of output bytes in the message sent by the consumer. For example, when the scanner sends a message to the device, it will contain the specified number of output bytes.

NOTE: Output bytes consist of data bits and status bits. The data bits are specified in the **Output Bits** field.

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7. Specify the number of output bits in the **Output Bits** field. This field lists the number of data bits in the message sent by the consumer. For example, when the scanner sends a message to the device, it will contain the specified number of output bits.

8. Select the type of messaging you require from the **I/O Connection Type** field. This field allows you to choose between Poll, Strobe, COS, or Cyclic messages.

NOTE: The link types listed above are not necessarily supported by a device. Selecting an invalid link type will result in a configuration failure.

---

9. Specify the scan time in the **Scan Time** field. This is the amount of time that the scanner will scan for a message from a particular device. Refer to the *Theory of Operation* section in the *2716D Installation Guide* for details on setting an appropriate scan time.

10. Set an inhibit time in the **Inhibit Time** field. This is the amount of time that a device must maintain a change of state (COS) condition. This allows for debounce conditions where a set of contacts closes or opens and "bounces" between states before settling down to one value. During the inhibit time, change of state values are ignored until the inhibit time has elapsed.

NOTE: The **Inhibit Time** field is only active for COS and Cyclic messages.

11. Check the **Suppress ACK** (Acknowledgment) checkbox to suppress acknowledgment messages from the scanner for both COS and Cyclic connections. For example, when a device changes state and sends out a COS message to the scanner, it may expect an acknowledgment from the scanner. In cases where the device is continuously changing state, it makes sense to suppress this acknowledgment to avoid bogging down the network with unnecessary traffic.

12. Press the **Ok** button to add the link to your configuration. The program returns to the **DeviceNet Links** screen.

Additional Notes

The **DeviceNet Links** screen also provides the following options:

- **Deleting Links** - Delete an existing link by selecting the link name in the **Links** window and then pressing the **Delete Link** button.

- **Editing Links** - Edit an existing link by selecting the link name in the **Links** window and then pressing the **Edit Link** button; the **Device IO Setup** screen displays. You can then change the applicable link information.

Mapping I/O Points

The **DeviceNet IO Mapping** screen summarizes all maps for a particular device and provides access to the **Device IO Map** screen, which is then used to map the data transferred between the controller, the 2716D module, and the specified device. To map a connection:

1. Select a device from the list displayed in the **Devices on Network** window (main Configurator screen).

2. Press the **IO Map Setup** button; the **DeviceNet IO Mapping** screen displays.
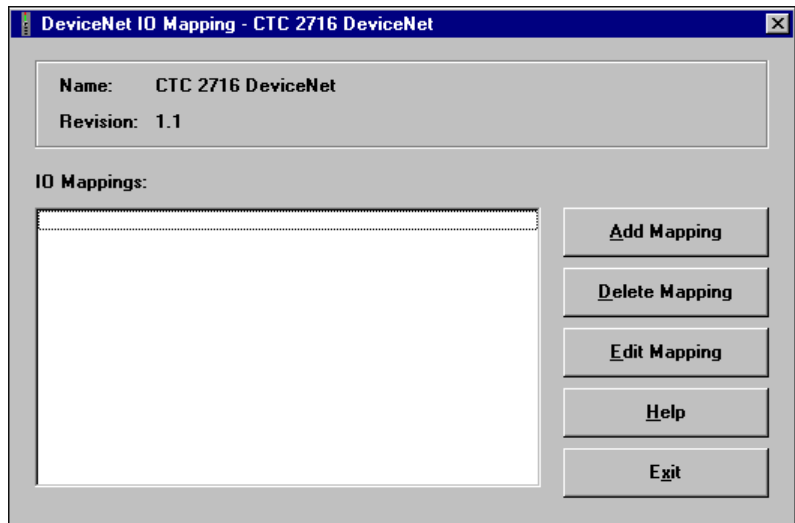
DNC66

3. Add a new map by pressing the **Add Mapping** button; the **Device IO Map** screen displays as shown on the next page.

NOTE: The information created on the Device I/O Map screen can be exported as a symbol file and opened in Quickstep. Refer to the *Exporting Symbols* section in *Chapter 1, Getting Started* for more information.

DNC62

NOTE: The four Input Size and Output Size fields are not user-configurable and are filled with the values that were entered on the **Device IO Setup** screen.

---

4. Choose a link type from the **Select Link Type** pull-down menu. This menu allows you to select from links that were added through the **Device I/O Setup** screen. For example, if you added a poll connection and a COS connection, then these two choices are available in the selection menu.

5. Choose a data type from the **Select Data Type** pull-down menu. This menu allows you to select analog I/O, digital I/O, register reads, and register writes. For each connection, you must specify an input and output map.

6. Set the starting byte for your link in the **Starting Byte** field.

                                            DeviceNet Configurator User Guide

7. Set the number of data bits in the **Data Bits** field. This sets the length of an individual I/O point such as a digital I/O point, which has 1 data bit.

NOTE: I/O addressing must be done in blocks of 8 bits, or 1 byte. Each block of 8 inputs or outputs must either be mapped to a single device or remain unmapped. For example, if you map a digital I/O point to address 17, then the remaining 7 bits may not be used for any other device. In addition, mappings must start with an I/O number that is a multiple of 8 plus 1 (1,9,17,25, etc.).

8. Set the starting bit for your link in the **Starting Bit** field. This tells a device where to look in a message for the start of your data.

NOTE: Digital I/O always have 1 significant bit and are 1 bit in length.

9. Set the number of significant bits for your connection in the **Significant Bits** field. You may need to check the documentation for your device to determine this information.

10. Set the starting address for your connection in the **CTC Address** field.

NOTE: CTC recommends that you mount the 2716D module into the right-hand most slot of your controller and assign I/O addresses that do not conflict with local I/O assignments. For example, suppose you have a 2203 (16 inputs, 16 outputs) module installed in your controller as input number 8. When the controller powers up, it creates a resource map of all the installed modules. This map allows Quickstep to know what its resources are as well as how to address them. The controller only checks DeviceNet I/O assignments if it hasn't already found these addresses on another board. Therefore, since input 8 is already assigned to the 2203 module, it will be masked by the local I/O map and not added to the resource map.

11. Set the number of I/O points for your connection in the **IO Points** field.

12. Set any optional minimum and maximum scale values in the **Optional Scale Values Minimum Value** and **Maximum Value** fields. This field sets the minimum and maximum values for your connection. For digital I/O, the minimum is 0 and the maximum is 1. For analog I/O, these values will vary according to your application and device type.

13. Specify a map name in the **Map Name** field. This field can be used to describe a device's manufacturer and map type and appears in the I/O Mappings window after you have exited from the setup screen.

14. Press the **Ok** button to add the map to your configuration. The program returns to the **DeviceNet IO Mapping** screen.

Additional Notes

The **DeviceNet IO Mapping** screen also provides the following options:

- **Deleting Maps** - Delete an existing map by selecting the map name in the **IO Mappings** window and then pressing the **Delete Mapping** button.

- **Editing Maps** - Edit an existing map by selecting the map name in the **IO Mappings** window and then pressing the **Edit Mapping** button; the **Device IO Map** screen displays. You can then change the applicable mapping information.

Setting Parameters

Parameters are configuration items that are stored within the device and are generally part of a device's EDS file. These items can be set or verified during system initialization to ensure that the DeviceNet module is in a known state and is configured for a particular application. For example, if the 2716D is operating in slave mode, parameters are used to verify that the correct registers are being read in response to a Poll commmand. Once this information is processed by a master device and the network is operational, then the parameters are no longer required.

Parameters may also be parameter objects. These are a set of objects inside a device that are related to the parameters in an EDS file. One required attribute is the parameter's value. Other attributes may provide a name, description, type and range of data, etc. If the object is completely defined, it is possible to extract the information and use it to build your configuration like you would with an EDS file.

NOTES: Check the device's documentation for more information on parameters and their assigned values.

Many of the parameter fields are filled in by the EDS file and are not user-configurable.

If parameters are not specified in an EDS file, you can use Explicit Messaging to achieve the same result. Refer to the *Explicit Messages* section for more information.

The **DeviceNet Parameters** screen summarizes all parameters for a particular device and provides access to the **Device Parameters** screen, which is then used to specify parameter settings. Set parameters as follows:

1. Select a device from the list displayed in the **Devices on Network** window (main Configurator screen).

2. Press the **Parameter Setup** button; the **DeviceNet Parameters** screen displays as shown on the next page.
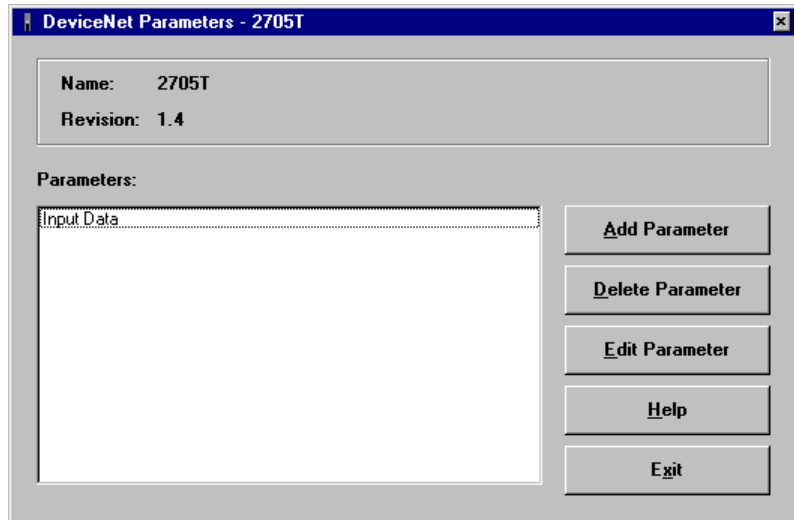
DNC67

3. Add a new parameter by pressing the **Add Parameter** button; the **Device Parameters** screen displays as shown below.
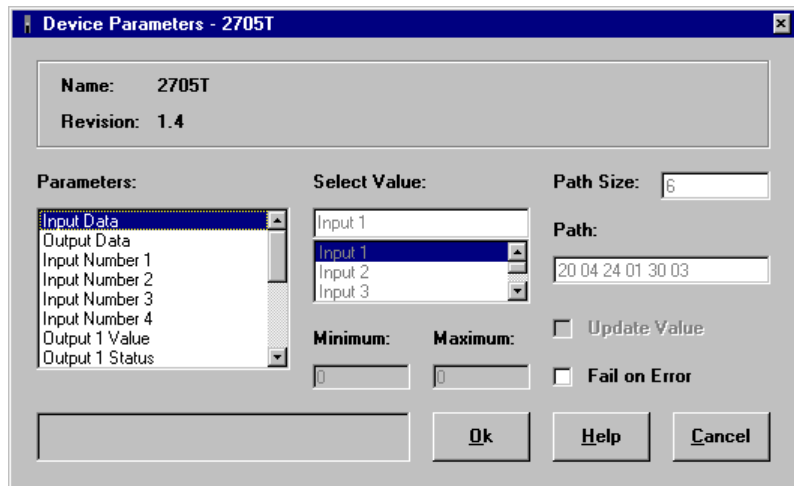
DNC8

4. Select a parameter from the **Parameters** list. This list is filled in by a device's EDS file if one exists and is a list of a device's operating parameters.

5. Select a parameter. The **Select Value** list displays the possible values you can assign to a parameter. If no selection information is supplied by the EDS file, then **Select Value** is replaced by the **Enter Value** list and you are prompted to type in a value.

NOTES: The **Path Size** field displays the number of bytes in the path (address) of a specific parameter and the **Path** field displays the hexadecimal location of where a parameter is stored inside a device.

The **Minimum** and **Maximum** fields display the minimum and maximum acceptable values for a parameter.

These fields are not user-configurable.

6. Select the following checkboxes for additional control over your parameter configuration:

•   **Update Value** - Instructs the scanner to read in the value of a parameter. The value is compared to the specified parameter value. If the actual value is different, the scanner tries to write the new value to the device. The scanner will perform different actions based on whether the **Fail on Error** checkbox is also selected.

•   **Fail on Error** - After the scanner determines that a parameter has changed, it tries to write the new value to the intended device. If it cannot update this information and the **Fail on Error** box is checked, it checks the value a second time. If it matches, the communication is accepted. If the value is different, then the configuration of that device has presumably failed and the module will not be added to the scanner's active configuration. The module is then disconnected from the network and I/O is not updated.

7. Press the **Ok** button to add the parameter to your configuration. The program returns to the **DeviceNet Parameters** screen.

Additional Notes

The **DeviceNet Parameters** screen also provides the following options:

- **Deleting Parameters** - Delete an existing parameter by selecting the parameter name in the **Parameters** window and then pressing the **Delete Parameter** button.

- **Editing Parameters** - Edit an existing parameter by selecting the parameter name in the **Parameters** window and then pressing the **Edit Parameter** button; the **Device Parameters** screen displays. You can then change the applicable parameter specifications.
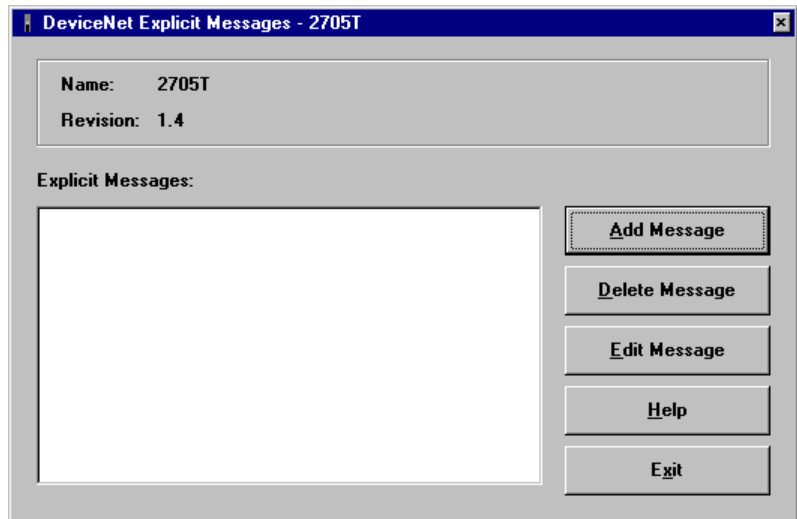
Explicit Messages

Explicit messages are used to transmit and receive specific information between the scanner module and a device. For example, if you want to slow down a motor that is out on the network, you can reduce the velocity by sending it a message.

The **DeviceNet Explicit Messages** screen summarizes all explicit messages for a particular device and provides access to the **Explicit Messages** screen, which is then used to build explicit messages. Specify an explicit message as follows:

1. Select a device from the list displayed in the **Devices on Network** window (main Configurator screen).

2. Press the **Explicit Setup** button; the **DeviceNet Explicit Messages** screen displays as shown below.

DNC68

3. Create a new explicit message by pressing the **Add Message** button; the **Explicit Messages** screen displays as shown on the next page.

```
Explicit Messages - 2705T                                    _ □ ×

  Name:      2705T

  Revision:  1.4


Select Service Code:   [Get_Attribute_Single        ▼]   ○  DeviceNet 8/8

Enter Class ID:        [              ]                  ○  DeviceNet 8/16

Enter Instance ID:     [              ]                  ○  DeviceNet 16/16

Enter Attribute ID:    [              ]                  ○  DeviceNet 16/8

Enter Explicit Message (message can be up to 240 hex values separated by spaces):

  [                                        ]    [  Insert Variable  ]

  [                                        ]    □  Configuration

  [                                        ]

  [                                        ]    [  Format Reponse  ]


Enter Symbolic Name:   [              ]      [ Ok ]  [ Help ]  [ Cancel ]
```

DNC10

NOTE: Refer to your device's documentation for specific information on items such as service codes and class, instance, and attribute IDs.

---

4. Select a service code from the **Select Service Code** list. The **Service Code** list is a standard list of codes for all devices that is used to build messages. The first three codes (**Get_Attribute_Single, Set_Attribute_Single, Reset**) are the most commonly used codes.

5. Specify a class ID by typing it in the **Enter Class ID** field. The **Class ID** is a category that defines subdivisions of the functionality of a device. For example, a device might perform some sort of operation on the data it receives. This is an example of an application class (or object).

6. Specify an instance ID by typing it in the **Enter Instance ID** field. The **Instance ID** might be used to define different categories of the same class in situations where the same set of functions is required but for different reasons or in different ways. Every instance shares a common data structure for the characteristics but has its own set of this data and the individual values in the data structure are often different between the instances. Each instance can then have different operating characteristics.

7. Specify an attribute ID by typing it in the **Enter Attribute ID** field. The **Attribute ID** controls all behavioral characteristics for each instance. Each instance can then have its own unique set of the same attributes.

8. Type an explicit message in the **Enter Explicit Message** window. The **Enter Explicit Message** window can be used to enter messages in hexadecimal notation.

9. Specify the byte length for your class and instance by clicking on one of the **Class/Instance Byte Length** buttons. This series of radio buttons defines the byte length for classes and instances. For example, DeviceNet 8/8 indicates that the class ID is one byte in length and the instance ID is one byte in length. Byte length is specific to a device.

10. Press either the **Insert Variable** or **Format Response** buttons to insert a variable into your explicit message or to specify a register location within the controller for the contents of an explicit message. **The Explicit Variable Format** or the **Explicit Response Format** screens display as shown below. The **Enter Register Number** field is used to enter the register number for this information and the **Output Value** radio buttons control the byte length for this data. Press **Ok** to exit from this screen.

DNC12

11. Check the **Configuration** checkbox if you want the scanner module to treat the explicit message like a configuration message that is only sent once.

12. Specify a symbolic name for the explicit message in the **Symbolic Name** field. This field can be used to describe the contents of the explicit message. Once this information is created, you can export it as part of a symbol file and open it in Quickstep. See the *Exporting Symbols* section in *Chapter 1* for more information.

13. Press the **Ok** button to add the explicit message to your configuration. The program returns to the **DeviceNet Explicit Messages** screen.

Additional Notes

The **DeviceNet Explicit Messages** screen also provides the following options:

• **Deleting Explicit Messages**- Delete an existing message by selecting the message name in the **Explicit Messages** window and then pressing the **Delete Message** button.

• **Editing Parameters** - Edit an existing message by selecting the message name in the **Explicit Messages** window and then pressing the **Edit Message** button; the **Explicit Messages** screen displays. You can then change the applicable message information.

DeviceNet Monitor

Contents

Overview

DeviceNet Monitor is used to actively scan the DeviceNet network and retrieve configuration information from all connected devices. To launch DeviceNet Monitor, do one of the following:

- Select **Monitor** from the **Configuration** menu

- Select the **DeviceNet Monitor** icon ![icon] on the main screen toolbar

The **DeviceNet Monitor** window displays as shown below.
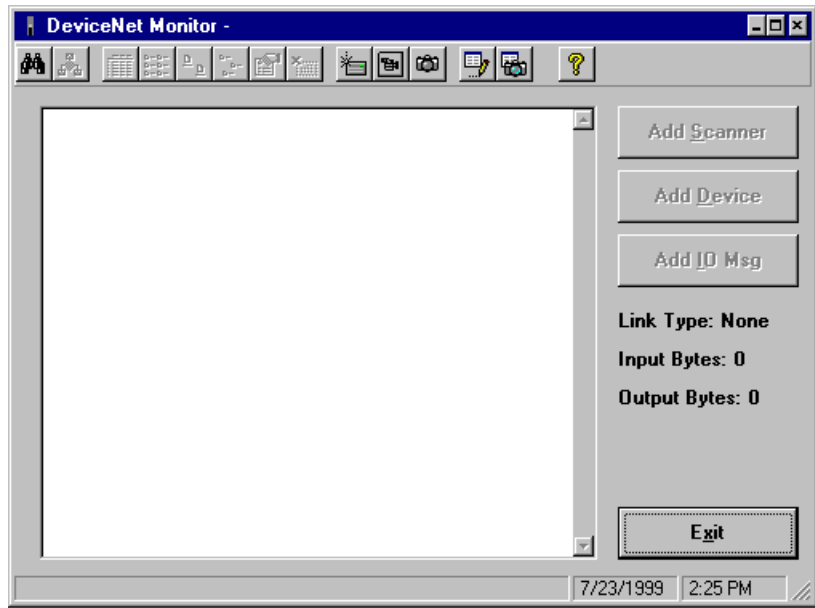
DNC26

Monitor Toolbar

The Monitor Toolbar appears across the top of the DeviceNet Monitor window. The toolbar is illustrated below along with a description of each icon.

DNC43

NOTE: Although the illustration above shows all the buttons enabled, this does not occur until after the first device is added to the network.

Identify Scanner button - Scans the network for the master device and displays the scanner's MACID and baud rate. You can also clear the Monitor window by pressing this button.

Identify Device button - Enter a device's MACID when the program prompts you for this value. The network scans for that device and returns information to the Monitor's main window.

Setup Poll Link button - Sets up a poll connection for the currently enabled device. If poll commands are not supported by that device, the program will display a message telling you that poll messaging is not supported.

Setup Bit Strobe Link button - Sets up a bit strobe connection for the currently enabled device. If bit strobe commands are not supported by that device, the program will display a message telling you that bit strobe messaging is not supported.

Setup Change of State Link button - Sets up a change of state connection for the currently enabled device. If change of state commands are not supported by that device, the program will display a message telling you that change of state messaging is not supported.

Setup Cyclic Link button - Sets up a cyclic connection for the currently enabled device. If cyclic commands are not supported by that device, the program will display a message telling you that cyclic messaging is not supported.

Setup Explicit Message Link button - Sets up an explicit message connection for the currently enabled device.

Monitor Toolbar

Execute Link Command button - Execute a link command and sends a message. You press this button after verifying the message types supported by a device. The **Message Data** screen displays for all message types except explicit messaging. For explicit messages, all the fields in the top section are enabled.

Enable/Disable Network Scan button - Turns on or turns off network scanning.

Enable/Disable Message Logging button - Enables and disables network logging and provides setup for specific message groups by group ID, message IDs, and MACIDs.

Get Message Log button - Displays a message log that lists a time stamp, message ID number, and the hexadecimal equivalent of the message being transmitted or received.

Configure Event Logging button - Contains events such as controller communications, scanner operational messages, and DeviceNet slave operations. Once this is configured, the event log displays the checked items after the Get Event Log Update button is pressed.

Get Event Log Update button - Displays an event log based on the items selected from the Event Log Setup screen. Event logs are often used for troubleshooting purposes.

Help button - Displays help on using the DeviceNet Monitor utility.

DeviceNet Monitor- Network Configuration

This section describes how to build your configuration by using a DeviceNet network.

After launching the DeviceNet Monitor utility, proceed as follows:

NOTE: You should not try to monitor the network while it's in active scan mode. Stop the scan by pressing the **Enable/Disable Network Scan** button.

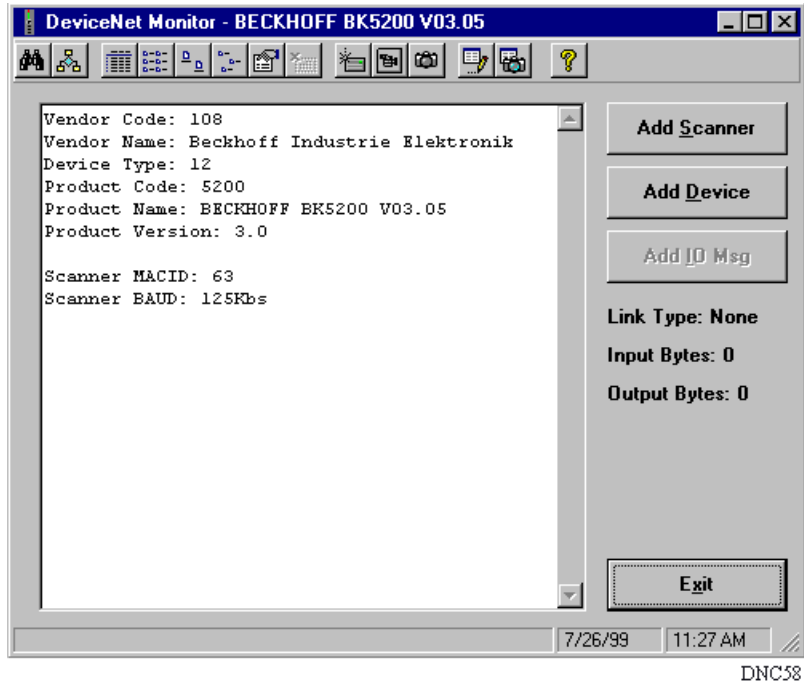1. Identify the scanner on your network by pressing the **Identify Scanner** button. The utility returns the scanner's MACID and baud rate as shown below.
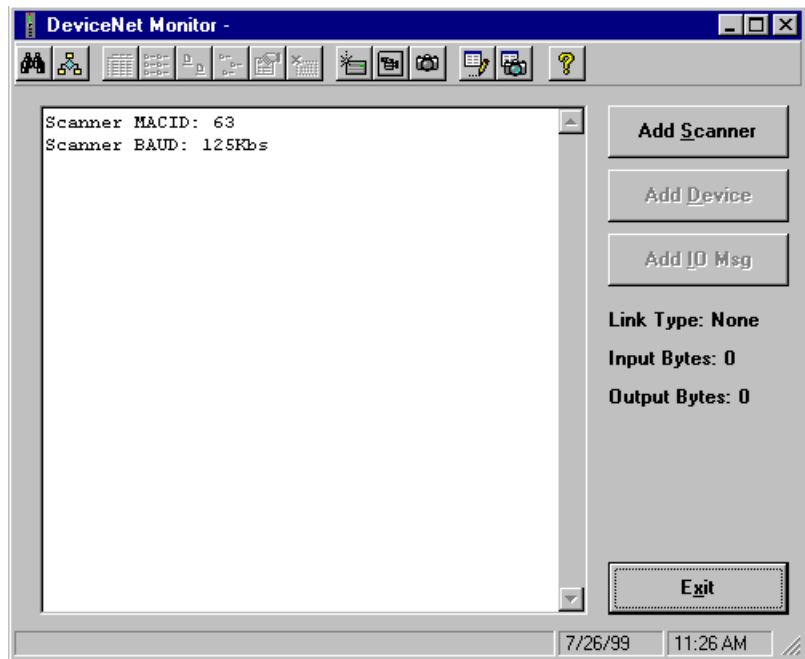
DNC64

NOTE: You can also use the **Identify Scanner** button to clear the screen of all messages.

2. Press the **Add Scanner** button to add the scanner to your configuration.

3. Identify the device on your network by pressing the **Identify Device** button. The utility returns the type of information shown below.


```
DeviceNet Monitor - BECKHOFF BK5200 V03.05

Vendor Code: 108
Vendor Name: Beckhoff Industrie Elektronik
Device Type: 12
Product Code: 5200
Product Name: BECKHOFF BK5200 V03.05
Product Version: 3.0

Scanner MACID: 63
Scanner BAUD: 125Kbs
```

Add Scanner

Add Device

Add IO Msg

Link Type: None

Input Bytes: 0

Output Bytes: 0

Exit

7/26/99   11:27 AM

DNC58

NOTE: Once the device has been identified, all the messaging buttons become enabled.

4. Press the **Add Device** button to add the device to your configuration.

5. Determine the type of messaging that is supported by the device by pressing any of the following buttons:

- Setup Poll Link

- Setup Bit Strobe Link

- Setup Change of State Link

- Setup Cyclic Link

If the message type is not supported, the Configurator will alert you. For example, let's suppose we want to establish a poll link with a Beckhoff BK5200 bus coupler. After pressing the **Setup Poll Link** button, the display looks similar to the figure below. Note that the message size is also provided (6 input bytes, 6 output bytes).
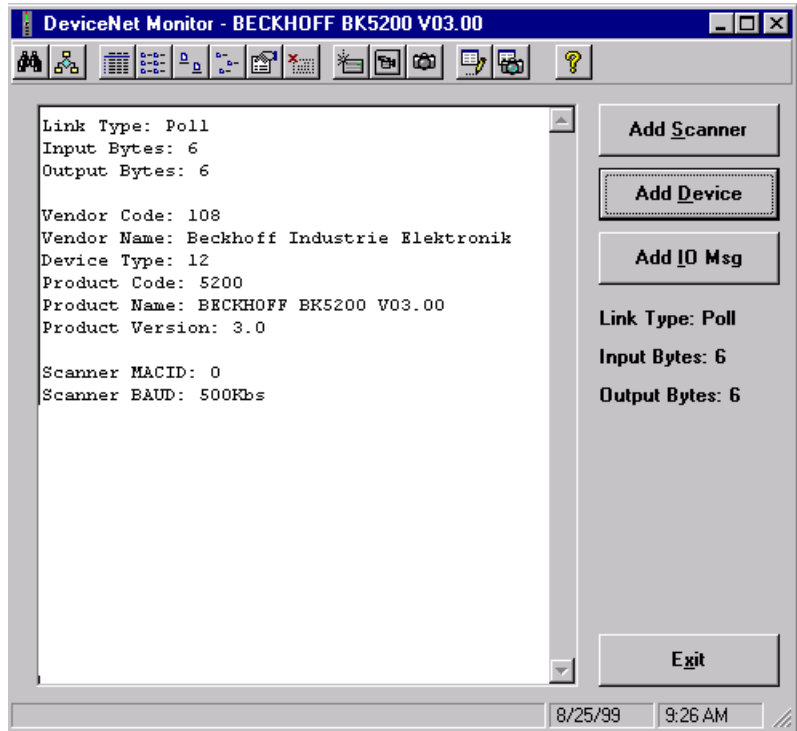
DNC82

6. Press the **Add IO Msg** button once a successful connection has been established. This button provides access to the **Device IO Setup** screen, where you can configure messaging for a particular device. Once you have done so, the program returns to the Monitor utility.

NOTE: For more information on adding I/O messages, refer to *Creating I/O Links* in *Chapter 2*.

---

7. Press the **Execute Link Command** button to send a message once you've verified the types of messages that are supported by a device. The **Message Data** screen displays as shown below for all message types except explicit messages. For explicit messages, all the fields in the top section are enabled.
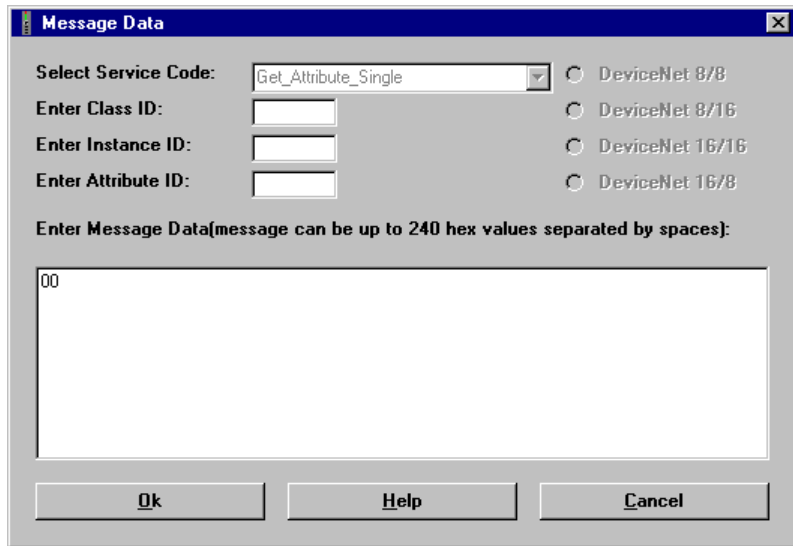
DNC59

NOTE: For more information on explicit messages, refer to *Explicit Messages* in *Chapter 2*.

---

8. Type your message in the **Enter Message Data** field, then press **Ok** to send the message. The DeviceNet Monitor screen appears as shown below.

DeviceNet Monitor - BECKHOFF BK5200 V03.00

```
Message: 00 00 00 00 00 00
Response: 03 23 1F 39 A1 00

Message: 00 00 00 00 00 0F
Response: 00 22 1F 38 A1 00

Message: 00 00 00 00 00 08
Response: 00 22 1F 38 A1 00

Message: 00 00 00 00 00 04
Response: 02 22 1F 38 A1 00

Message: 00 00 00 00 00 02
Response: 01 22 1F 37 A1 00

Message: 00 00 00 00 00 01
Response: 00 21 1F 37 A1 00

Link Type: Poll
Input Bytes: 6
Output Bytes: 6

Vendor Code: 108
Vendor Name: Beckhoff Industrie Elektronik
Device Type: 12
Product Code: 5200
Product Name: BECKHOFF BK5200 V03.00
Product Version: 3.0

Scanner MACID: 0
Scanner BAUD: 500Kbs
```

Add Scanner
Add Device
Add IO Msg

Link Type: Poll
Input Bytes: 6
Output Bytes: 6

Exit

8/25/99   11:04 AM

DNC83

In this example, the four least significant bits in each message correspond to four digital outputs on the device. This is verified by the messages transmitted in the figure above. In the first four messages, the four bits are turned on and off one at a time (1, 2, 4, 8). In the fifth message, the outputs are all turned on simultaneously (F), and the sixth message turns all outputs off (0).

9. Configure message logging by pressing the **Configure Message Logging** button. The **Message Log Setup** screen displays as shown below.

DNC77

This screen provides the following options:

- Logging Message Traffic - You can log traffic for a single device by specifying its MACID (Enter Device Address) or for several devices by specifying various types of IDs (group, message, MAC ID fields).

- Group ID - Select from the four DeviceNet message groups. Group 1 messages are the highest priority and Group 4 messages are the lowest priority. If you select Any, then all four group types will be logged.

- Msg ID - Select from a series of message IDs for each DeviceNet message group. The IDs change depending on what is selected in the Group ID field. This field defaults to Any when Any is selected in the Group ID field.

- Match/Mask Pairs - This window displays a list of hexadecimal match/mask pairs for each set of messages you want to log. These numbers are automatically generated by the Configurator and depend on the selections you make in the **Group ID, Msg ID,** and **MACID** fields. You can add or delete match/mask pairs by using the **Add Pair** and **Delete Pair** buttons.

- Clear Message Log - Check this box to clear out any messages previously selected for logging and to log only newly selected messages.

- Disable Message Logging - Check this box to disable message logging.

  Once you have specified all your logging options, press **Ok** to accept the current message log configuration and return to the Monitor screen.

10. Press the **Get Message Log** button to display a message log similar to the one shown below. The log lists a time stamp (clock ticks), message ID number, and the hexadecimal equivalent of the message being transmitted or received.
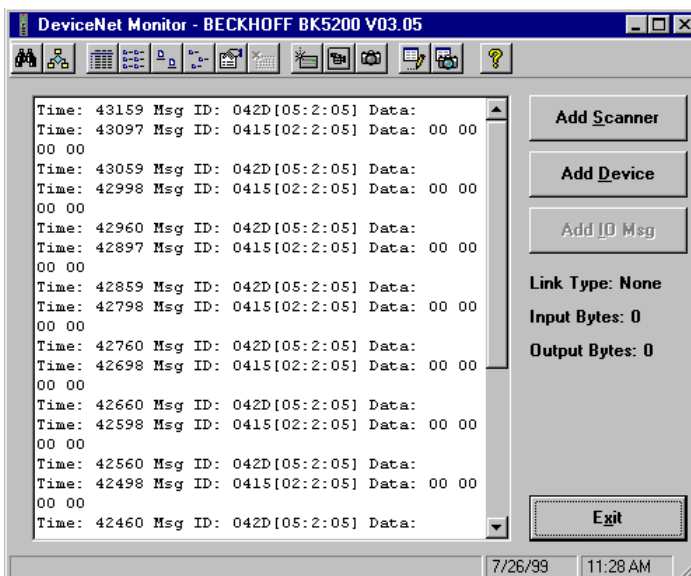
DNC57

11. Configure event logging by pressing the **Configure Event Logging** button. The **Event Log Setup** screen displays as shown below. You can choose items such as controller communications, scanner operational messages, and CAN protocol messages.

DNC69

DeviceNet Configurator User Guide
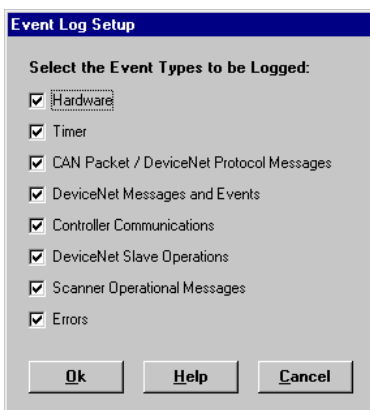
12. Select the items you want to see in the event log, then press **Ok** to accept these settings.

NOTE: The setup screen's default setting has all the boxes checked off. You can specify the settings you require, and the event log will capture the requested information, but if you return to the setup screen, your previous settings are ignored and all boxes are selected.

---

13. Press the **Get Event Log Update** button to display a log similar to the one displayed on the next page. The log will display whatever items you have specified in the **Event Log Setup** screen.
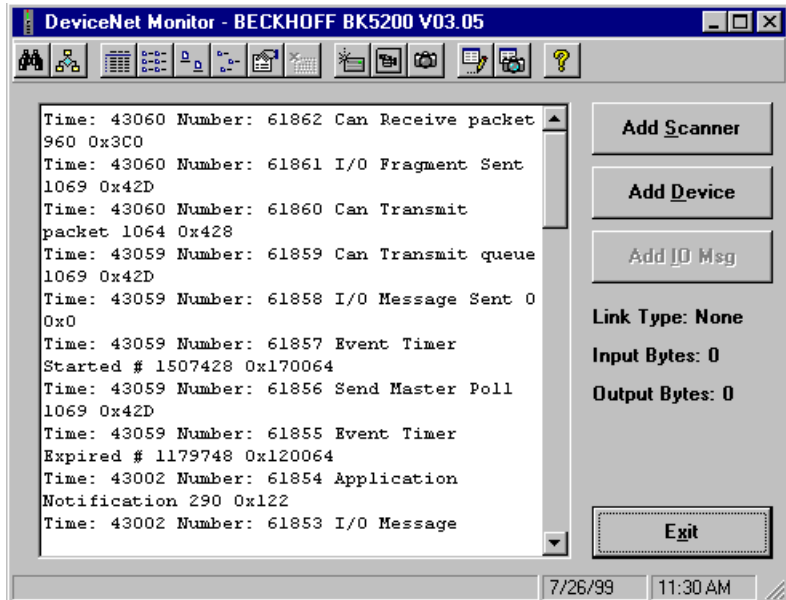
DNC71

NOTE: When you are finished monitoring the network, make sure you resume network scanning by pressing the **Enable/Disable Network Scan** button.

14. Once you are satisfied with your configuration setup, exit from DeviceNet Monitor by pressing the **Exit** button. The program returns you to the main Configurator screen.

NOTE: The scanner and devices that were added through DeviceNet Monitor are displayed in the **Devices on Network** window.

15. Save your configuration file as described in the *Saving Files* section in *Chapter 1*.

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