

## INTRODUCTION

The computer that runs the Dostek MultiPort DNC software is referred to as the 'MultiPort DNC Server Computer', or simply 'DNC Server'.

This document provides an overview of how the Dostek MultiPort DNC software works, how to set it up, and how to deal with problems that may arise. For detailed information, refer to the Dostek DNC Configuration Guide and the Dostek DNC User Guide. These guides are available as a printed manual, and are also available for viewing on your computer in the Dostek DNC group in the Windows File menu (Start, Program, Dostek DNC).

## RESOURCES

The following resources are available to help with installation, configuration, testing and troubleshooting the Dostek MultiPort DNC software:

- v MultiPort DNC help file. Choose 'Help', 'Introduction to MultiPort DNC' from the DMDNC32 menu. Topics include 'Configure and Test' and 'Remote Examples'
- v Dostek DNC *Getting Started Guide* help file. Choose 'Help', 'Getting Started Guide' from the DMDNC32 menu. In particular, view topics under the heading 'MultiPort Edition'.
- v When editing a CNC communication configuration file in the Dostek DNC Configuration application, choose 'Help', 'Help' from the menu to view detailed descriptions and examples for each configuration option on the current page.
- v *Communication Testing and Troubleshooting* help file. Choose 'Help', 'Communication Troubleshooting' from the DMDNC32 menu.
- v Dostek DNC Navigator application provides categorized links to most Dostek DNC resources including programs, manuals, help files, application notes, and online links. To start the Dostek DNC Navigator, click the Windows 'Start' button and choose 'All Programs', 'Dostek DNC', 'Dostek DNC Navigator'.

| Device | Mode         | Status           | Files         | Folder             |
|--------|--------------|------------------|---------------|--------------------|
| HM12V  | Receiving    | 1130 char receiv | A43-824.TAP   | D:\NC\Mill\HM12V   |
| LC30   | Transmitting | 84%, 29648 char  | 6308472B.TAP  | D:\NC\Laser\LC30   |
| QT-800 | Transmitting | 29%, 15734 char  | 0107-DNS-0665 | D:\NC\Lathe\QT-800 |
| LRP300 | Receiving    | 44856 char rece  | LRP-77483AZ-1 | D:\NC\Mill\LRP300  |

  

| Device | Date/Time           | Message   |
|--------|---------------------|---|
| QT-800 | 09/17/1999 07:22 AM | Transmitting file D:\NC\Lathe\QT-800\0107-DNC-0665-77.TAP |
| LRP300 | 09/17/1999 07:23 AM | Receiving file D:\NC\Mill\LRP300\LRP-77483AZ-184.TAP      |
| HM12V  | 09/17/1999 07:23 AM | Receiving file D:\NC\Mill\HM12V\A43-824.TAP               |

COM2:9600,Even,7,2 -XON/XOFF - ISO

**DOSTEK**

Dostek Incorporated  
238 Westheights Drive  
Kitchener, Ontario  
Canada N2N 1J9  
<http://www.dostek.com>

**Sales and Customer Service**  
Tel: 519/742-5721  
Toll free: 1-888-355-5735  
Fax: 519/741-8669  
email: [sales@dostek.com](mailto:sales@dostek.com)

**Technical Support**  
Tel: 519/742-5721  
Fax: 519/741-8669  
email: [support@dostek.com](mailto:support@dostek.com)  
downloads: [www.dostek.com](http://www.dostek.com)

## SOFTWARE OVERVIEW

This section describes the Dostek MultiPort DNC software components, explains how remote commands work, and provides several typical sample remote command files.

### 1. Software Components

Dostek MultiPort DNC includes two main software components: a communication server module and a user interface module. The communication server module, DMComm, runs in the background and continuously monitors data received from the CNCs and sends requested files or information requested by the individual CNC operators. The user interface module, DMDNC32, allows the system administrator to monitor and control system activity. Because the DMComm module does not have a user interface, it does not appear as an icon in the Windows Task Bar.

The MultiPort DNC user interface (DMDNC32) displays a form with a table in the top part of the window and a message list in the bottom part (see screen image on page 6). Each row in the table represents one 'communication channel', and one CNC is assigned to each channel. Table columns display current activity including status and error messages. Each event for each channel is displayed sequentially in the message window to allow the administrator to view recent activity.

When MultiPort DNC is running as a Windows service, an icon appears in the Windows System Tray and the user interface is not visible initially. The user interface may be activated by double clicking the system tray icon, and may be hidden again by clicking the 'Hide' button in the upper right of the MultiPort DNC window.

The CNC operator communicates with the DNC Server by sending or punching 'command' files from the CNC to the computer. MultiPort DNC continuously monitors all CNCs and stores each file received from the CNC into the 'Receive To' folder. If the received file is a designated command file, MultiPort DNC scans the file for commands.

### 2. How Remote Commands Work

Dostek MultiPort DNC Server continuously monitors all CNCs and automatically stores all received data. To save a file from the CNC to the computer, the operator simply sends the file using the CNC's punch, send or output command. To download a file from the computer to the CNC, the operator follows a simple 3-step procedure:

- √ Create a simple one-line program file in the CNC that contains the designated command plus the name of the file to be loaded. For example:  
(L O1234.TAP)
- √ Send the command file to the computer.
- √ Execute a read or input command.

Dostek MultiPort DNC sends the requested file to the CNC. If the file is not found, MultiPort DNC sends an error message in place of the requested file.

Four remote commands are currently supported by Dostek DNC: Transmit to CNC, Receive from CNC, Transmit messages to CNC, Transmit file directory list to CNC.

Dostek MultiPort DNC provides a great deal of flexibility in setting up remote command operation. However, it is a good practice to use the same command format for all CNCs. However, Dostek recommends setting up all CNCs to use the same command format, and designating specific CNC program numbers for each function. Specifically, Dostek has adopted the following convention for remote commands:

Designate program numbers O7990 to O7999 as DNC command files:

- O7990 - Request computer to transmit file to CNC.
- O7991 - Request computer to save multiple programs from CNC to a single file on computer.
- O7992 - Request computer to terminate a program save command.
- O7997 - Request computer to transmit recent messages to CNC.
- O7998 - Request computer to transmit file directory listing to CNC.
- O7999 - Error and information messages received from computer.

### 3. Sample Remote Command Files

The CNC part programs listed on the following page are examples of Dostek MultiPort DNC 'command templates'. They are called templates because they are created in the CNC once (or created on the computer and loaded to the CNC) and are thereafter edited by the CNC operator to change only the filename parameter.

The examples include a comment on the first line of the file to indicate the function of each command template. This information is visible to the CNC operator when editing the command template, and may also appear in the program directory screen on many CNC models.

The examples also include comments that provide instructions to the operator. The comments are not required for remote command operation. Command template O7990 could be written simply as:

```
O7990
(L filename)
```

In these examples, the commands are designated as:

- L - Transmit requested file from computer to CNC.
- S - Save file(s) from CNC to computer.
- M - Transmit messages from computer to CNC.
- D - Transmit file directory from computer to CNC.

You may reconfigure commands to use different characters or phrases. For example, you could configure the 'Transmit to CNC' command to 'SEND' instead of 'L':

```
O7990
(SEND filename)
```

You may also designate a different program number range. O7990 to O7999 are designated in these examples because these are the highest unprotected numbers available on most Fanuc CNCs.

Program O7999 is designated as the 'Feedback' or 'Message' file. When Dostek MultiPort DNC needs to send an error message or requested information such as messages or file directory listing, it sends this information as program number O7999. For example, if the CNC operator requests a file but the file is not found on the computer, Dostek MultiPort DNC returns error message 'FILE NOT FOUND' in program number O7999. The CNC operator will recognize that an error occurred when the CNC indicates that program O7999 is received, and should immediately view O7999 to read the message, then delete O7999 to ensure the number is available for the next time a message is sent.

```
O7990 (DNC - REQUEST FILE)
(L filename)
(TO REQUEST FILE FROM DNC)
(1. ENTER FILE NAME AFTER L ABOVE)
(2. PUNCH O7990 TO COMPUTER)
(3. WAIT 5 SECONDS)
(4. PRESS READ)
```

```
O7991 (DNC - STORE MULTIPLE)
(SS)
(TO STORE A MAIN PROGRAM AND)
(SUBPROGRAMS IN SINGLE FILE)
(ON DNC COMPUTER USING NAME)
(OFF MAIN PROGRAM)
(1. PUNCH O7991 TO COMPUTER)
(2. WAIT 5 SECONDS)
(3. PUNCH MAIN PROGRAM)
(4. PUNCH EACH SUBPROGRAM)
(5. PUNCH O7992 TO COMPUTER)
```

```
O7992 (DNC - TERMINATE STORE)
(S)
(TO CLOSE FILE ON COMPUTER AFTER)
(STORING LAST SUBPROGRAM)
(PUNCH O7992 TO COMPUTER)
```

```
O7993 (DNC - STORE MANUAL)
(S filename)
(TO STORE ONE OR MORE PROGRAMS TO A)
(SPECIFIC FILE ON DNC COMPUTER)
(1. ENTER FILE NAME AFTER S ABOVE)
(2. PUNCH O7993 TO COMPUTER)
(3. WAIT 5 SECONDS)
(4. PUNCH PROGRAM)
(5. PUNCH O7992 TO COMPUTER)
```

```
O7997 (DNC - REQUEST DIRECTORY)
(D)
(TO REQUEST FILE DIRECTORY FROM DNC)
(1. OPTIONAL - ENTER FILE SPEC AFTER D ABOVE)
(2. PUNCH O7997 TO COMPUTER)
(3. WAIT 5 SECONDS)
(4. PRESS READ)
```

```
O7998 (DNC - REQUEST MESSAGES)
(M)
(TO REQUEST SYSTEM MESSAGES FROM DNC)
(1. PUNCH O7998 TO COMPUTER)
(2. WAIT 5 SECONDS)
(3. PRESS READ)
```

```
O7999 (DNC MESSAGES)
(FILE NOT FOUND= C=/NC/O3453.TAP)
```

## INITIAL SETUP

Initial setup involves five steps: install COM ports and cables, configure and test CNC communication, configure remote commands, configure DNC server, and test remote operation.

### 4. Install COM Ports and CNC Cables

Because MultiPort DNC communicates with all CNCs simultaneously, each must be connected to a separate COM port. MultiPort DNC will work with any serial communication device, including multiport boards and Ethernet/Serial hubs, that can be configured as a Windows COM port.

Recommended cable wiring is provided in Section 5 of the Dostek DNC Configuration Guide.

### 5. Configure and Test CNC Communication

Before starting the MultiPort DNC Server, first create and test a separate device configuration file for each CNC. Even if all of the CNCs use the same communication parameters, a separate configuration file is required for each because each must use a different COM port.

Use the Professional Edition file manager, configuration and communication components to test each device configuration. Make sure you can upload and download files using the File Manager's 'Send' and 'Receive' commands before you attempt to use the MultiPort DNC Server.

In addition to basic parameters like baud rate, ensure the following features are configured and working properly:

*Transmit Trigger.* Most CNCs send a DC1 (XOn) code or turn on the RS-232 'DTR' (Data Terminal Ready) signal when you execute a 'Read' or 'Input' command on the CNC. The 'Transmit Trigger' setting allows Dostek DNC to detect this event and start sending data right away. (Configuration Guide, Section 4.4.1)

*Receive AutoName.* Most CNCs output a program name or number at the start of each file. Dostek DNC can name received files accordingly. (Configuration Guide, Section 4.6)

*Receive Terminate.* Dostek DNC needs to know when the CNC stops sending data. Some CNCs output a specific character when finished, and you can configure Dostek DNC to recognize this as the end of the file. However, setting Receive Terminate to a 'Timeout' of 2 seconds works with all CNCs. (Configuration Guide, Section 4.5.2)

### 6. Configure Remote Commands

Remote commands allow the CNC operator to upload and download files and messages. MultiPort DNC provides much flexibility in defining remote commands in order to handle CNC limitations and personal preferences. Remote commands are normally typed into designated program files on the CNC. Before configuring remote commands, you should determine the editing capabilities of each CNC to determine which of the following the CNC allows you to type into a program file:

- √ comments enclosed in parenthesis ( )
- √ alphabetic characters A - Z
- √ punctuation characters (space, comma, period, colon, semicolon, plus, minus, etc.)

If possible, you should configure commands as comments so nothing undesirable will happen if the CNC operator executes a command file by mistake. For example:

```
( L MB1234A )
```

If your CNC does not allow input of comments and all alphabetic characters, you can set up a simple command format such as:

```
L-1234
```

If you need to enter alphabetic or punctuation characters that the CNC keyboard does not allow, you can specify characters using their standard ASCII code. For example, if the CNC does not let you type a letter 'A', you could enter the command:

```
L-1234.65
```

In the above example, MultiPort DNC is configured to recognize the period as the ASCII designator, and the following two numeric digits as the ASCII code.

You may need to request long file names with numerous alphabetic characters but cannot define a suitable command format because of CNC data entry limitations. You could rename all of your files to use numeric digits only. Alternately, MultiPort DNC supports a special file name format that includes the long name plus a short numeric name<sup>†</sup>. For example, you could request file:

```
'A44-3692 Cylinder.443692.tap'
```

with a command like:

```
L-443692
```

For a complete description of MultiPort DNC commands, refer to Configuration Guide Section 6.2.

<sup>†</sup> New feature, may require software upgrade.

When Dostek MultiPort DNC receives a file from the CNC, it checks the file to determine if it is a CNC command file or a CNC part program file. Files within a specified range of program numbers are designated as command files. You can designate any range you wish, but programs O7990 to O7999 are designated in Dostek's sample configurations as well as the examples in the documentation. See Configuration Guide Section 6.2.4 for more information.

## 7. Configure DNC Server

When you start MultiPort DNC for the first time, the CNC table is empty. Choose 'Configure', 'Add Device' from the menu to add a CNC. Select a configuration from the list of CNC configurations you created and tested earlier, and specify the 'Root Folder' and 'Receive To' folder for each.

The 'Root Folder' is the folder where MultiPort DNC looks for files requested by the CNC operator. MultiPort DNC can automatically search up to 3 levels of folders below the root folder. A different root folder may be specified for each CNC, or several CNCs can access the same root folder.

The 'Receive To' folder is the location where files received from the CNC are stored. The receive folder can be the same as the root folder, it can be a sub-folder of the root folder, or it can be a completely independent folder (even on a different drive or server). Usually, however, the receive folder is a sub-folder of the root folder named 'Uploads' (or similar).

If the specified receive folder does not already exist, you must create it using Dostek DNC File Manager, Windows Explorer or My Computer. If the receive folder is on a network file server, the folder must have read and create permissions enabled. If you are using MultiPort DNC as a Windows service, MultiPort DNC must be able to create files in the receive folder even if no user is logged in to the computer.

## 8. Test Remote Operation

To test remote operation for a particular CNC, first punch a normal part program from the CNC to the computer. View the messages at the bottom of the MultiPort DNC window on the computer. You should see two messages. The first indicates that MultiPort DNC has started receiving a file and the second indicates that receiving is finished. Verify that the file is named properly according to the settings you specified.

Next, create a command file (O7990 for example) to request a file from the computer. Punch the file to the computer, wait about 5 seconds and execute a read or input command on the CNC. You should receive the

requested file from the computer. If the file is not received or an error message is received in the designated message program (typically O7999), return to the computer and view the messages on the MultiPort DNC window. You should see messages indicating that a file is being received, receive is completed, and transmitting is started.

If no messages refer to remote request commands, you may not have the 'Command Files' setting on the 'MultiPort Configuration' tab (Dostek DNC Configuration) configured properly.

If a message indicates that no remote request commands were found, 'Command Files' is properly configured, but the command in the file does not match the 'Commands' and 'Command Format' settings.

## 9. Run as Windows Service

Dostek MultiPort DNC may be configured to run as a Windows 'service'. A service is a special category of Windows application which may be started automatically when the computer starts. The advantage of running Dostek MultiPort DNC as a service is that the DNC system functions even if a user is not logged in to the computer, and continues to function without interruption as users log in and out of the computer.

However, running MultiPort DNC as a Windows service has the following disadvantages due to restrictions imposed by Windows upon service applications. Service applications may not access network files. Therefore, Dostek DNC must be configured to access files on the computer's local hard drive. Service applications may not access some areas of the Windows Registry. Therefore, user preferences such as window size and location are not 'remembered'. Additional restrictions may be imposed by security policies or future Windows updates.

If you configure Dostek MultiPort DNC to access files on the network, the computer must be logged in to a user account. For unattended operation, configure Windows to automatically log in to the designated user account and, if unauthorized access is a concern, install the computer in a secure location such as a lockable room or cabinet. For more information about automatic login, visit [www.microsoft.com](http://www.microsoft.com) and search for 'automatic login'.

To run Dostek MultiPort DNC as a Windows Service, first configure and test remote operations with all CNCs, then choose 'Configure', 'Options' from the DMDNC32 menu and check the 'Start as a Windows service' option.

When running as a Windows service, Dostek MultiPort DNC provides an icon in the Windows System Tray. To view the DMDNC32 user interface, simply click this icon.

## IN CASE OF DIFFICULTY

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This section explains how to recover from a problem you may encounter *after* the system has been completely configured and has been working properly. Problems may arise due to software errors, memory shortages, network problems, communication port errors, and so on.

Open the MultiPort DNC user interface and enter the 'Supervisor' mode.

### 10. Reset Channel

If you encounter a problem with a single channel, select the channel (click on its row in the table) and choose Channel, Reset from the menu. If the channel does not reset properly, there may be a problem with the communication ports or you may need to restart the software.

### 11. Reset All Channels

If you encounter a problem with multiple channels, choose Channel, Reset All from the menu. However, first check the channel table to ensure no transfers are in progress with any of the CNCs. If the channels do not reset properly, there may be a problem with the communication ports or you may need to restart the software.

### 12. Restart Software

If MultiPort DNC is running as a Windows service, you must restart the computer in order to restart the software. Otherwise, close the DMDNC32 application, wait at least 10 seconds and restart the application. You must wait in order to allow Windows to unload and de-allocate all of the resources associated with the communication ports and DMComm application. If you do not wait enough, MultiPort DNC may not be able to reopen the COM ports.

### 13. Restart Computer

To restart the computer, click the Windows Start button and choose Shut Down. Turn the computer off completely; do not simply restart it. This may be necessary to properly reset certain computer or serial port circuits.

If restarting the computer does not correct the problem, ensure the computer, serial ports, hubs, network and related hardware are all working properly. Replace the computer or selected components as necessary.

You can test the computer and communication ports by sending and receiving files manually as explained in the next section. If you are able to send and receive manually, you can operate in this mode until you are able to correct MultiPort DNC operation problems.

It may be possible that a corrupt configuration file or data file prevents MultiPort DNC from functioning properly. Refer to 'Testing MultiPort DNC' below for more information.

### 14. Test Serial Ports

If you restart the computer and Dostek MultiPort DNC server reports that it is unable to open one or more of the COM ports, test the COM ports. First, either shut down the MultiPort DNC software or ensure that the affected channels are 'disconnected'. Try to open the COM ports using the Dostek DNC Com Test terminal application. If you are unable to open the COM port, and you are using a USB- or Ethernet-connected serial hub, ensure the device is plugged in and functioning properly, or power the device off and back on again. If you are using a Quatech Ethernet/serial device server (hub), open Windows Device Manager, choose the hub under the 'MultiPort Serial Adapters' section, open the property pages dialog, choose the 'SDS Configuration' tab, and click the 'Ping the SDS' button. If the device does not respond, check the network connections or replace the device.

### 15. Send/Receive Manually

To test the communication hardware and your CNC configuration files, send and receive files manually using the Dostek DNC File Manager like you did during initial setup. However, you must first stop the MultiPort DNC software to free up the COM ports. If MultiPort DNC is running as a Windows service, choose Configure, Options, uncheck the 'Windows Service' option and reboot the computer. If MultiPort DNC is not running as a Windows service, simply close the application.

### 16. Test MultiPort DNC

A basic test of the MultiPort DNC server software can be performed as follows:

1. Using Windows Explorer, rename the 'ddncw32.ini' file in the 'C:\Dostek DNC\Settings' folder to 'ddncw32.ini.sav'.
2. Start Dostek MultiPort DNC. The CNC channel table should be blank. If an error occurs at this point, try reinstalling Dostek DNC.
3. Add CNC channels one at a time, just like a first-time setup. Immediately test remote communication as you add each CNC channel. If you encounter a problem with a specific CNC, remove it and continue adding the remaining channels. If certain CNC configurations cause problems, clear the channel table and add the problem CNCs again one at a time. Check the CNC configuration for each problem channel for inappropriate settings.