



## CNCnet **DNC**

<b>Configuration / Operating Manual</b>	<b>Technical Support</b>
Edition ..... 07/10 Applies to ..... CNCnet DNC Ver. 8.4.1.3 Part number ..... 00004062	Adapted controls... <a href="http://controls.inventcom.us">http://controls.inventcom.us</a> Downloads ..... <a href="http://cncnetdnc.inventcom.us">http://cncnetdnc.inventcom.us</a> Contact..... <a href="http://contact.inventcom.us">http://contact.inventcom.us</a>
Inventcom · Office · Bodenseestr. 133 DE 81243 · Munich · Germany E-Mail ..... <a href="mailto:info@inventcom.net">info@inventcom.net</a> Tel. .... ++49 [0] 89 121903-19 Fax ..... ++49 [0] 89 121903-21	
<p>This documentation does only describe the functionality of the standard version. Extensions, customizations or changes made by manufacturers of machine controls are documented by the respective supplier. Other functions not described in this documentation might be executable by the software. This does not represent an obligation to supply such functions with an initial delivery or when servicing. For simplicity, this documentation does not contain all detailed information about all types of the product and cannot cover every conceivable case of installation, operation, or maintenance.</p>	
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## Overview

### Specification of CNCnet DNC

CNCnet DNC can perform bi-directional communications with an unlimited number of serial devices simultaneously (up to 16 serial devices per instance, you can install multiple instances of the program). The possible speed of NC file transmission depends a great deal on the type of serial ports you are using and the length of the cable between the CNC's serial interface and the serial port of the computer / CNC network adapter. While CNCnet-DNC will run on slower computers, we recommend that you use at least a Pentium 4 computer with Operating System Microsoft Windows 2000 SP5 for typical applications. Your serial ports must be of the "buffered" type, using a 16550 UART chip (or equivalent). Non-buffered serial ports will seriously affect performance, limiting the baud rate at which communications will be reliable. With Inventcom CNCnet DNC you can

- Transmit NC-Files, machine parameters and tool setting information's from and to your CNC machines
- Manage your NC-Files
- Edit your NC-Files with various Editors or manipulate / translate the content of the file automatically by using Pre- or Postprocessors.

Beside of its transmission capabilities Inventcom CNCnet DNC also allows you

- to communicate with your controls via manufacturer specific protocols (like Heidenhain or Mazatrol CMT)
- to connect machines that do not have a serial interface by using the tape reader simulator functionality
- the control of all functions (transmission / reception) from the operator panel of the machine
- highest transmission rates on all channels

All DNC functions and settings can be set, modified and saved (machine specific) within CNCnet DNC. For security purposes the integrated password protection functions can be activated.

### See also:

Structure of system »Page 8

Operating CNCnet DNC »Page 7



## Installation

Here's a short description of the installation procedure of CNCnet DNC. First you should check that all parts for successfully building a machine network are available. This includes:

1. The CNCnet DNC Software installer file (.MSI Microsoft Windows Installer)
2. A computer that is connected to your network and runs an Operating System from Microsoft Windows 2000 SP 5 up to Microsoft Windows Server 2008.
3. One or more serial ports that are installed directly on the main board of your computer or a multiport serial interface card or CNC network adapters. If you use CNC network adapters make sure that they are installed and visible on your computer before you set up CNCnet DNC.
4. Appropriate serial cable connections to your machines serial interface.

### Minimum requirements on computer:

While CNCnet-DNC will run on slower computers, we recommend that you use at least a Pentium 4 computer for typical applications. The computer hardware required mainly depends on the operating system you're using.

E.g. for Microsoft Windows 2000 this would be:

- PC AT >= 486 compatible
- 64 MB RAM (minimum)
- 5 MB of free hard disk space for the application (without regard to your NC files)
- VGA compatible graphics adapter with a minimum resolution of 800x600 pixels

Operating Systems supported by CNCnet DNC:

- Microsoft Windows 2000 (SP4)
- Microsoft Windows XP (x32-x64\*)
- Microsoft Windows Vista (x32-x64\*)
- Microsoft Windows Server 2003 (x32-x64\*)
- Microsoft Windows Server 2008 (x32-x64\*)

\* For operation of CNCnet DNC on computers running a 64-bit OS a 32-bit Guest OS has to be installed.

By default one of the following virtualization technologies may be used:

- Microsoft Virtual PC 2004 2007
- Microsoft Virtual Server 2005
- Microsoft Hyper V Server 2008

Hardware for serial connections to CNC machines:

- A sufficient number of serial ports for connecting the controls. The serial ports must be of the "buffered" type, using a 16550 UART chip (or equivalent). Non-buffered serial ports will seriously affect performance, limiting the baud rate at which communications will be reliable.
- If you plan to run your network with CNC network adapters the TCP/IP network protocol has to be installed on the computer. Network cabling to the machines is required.

### See also:

Installation on Windows 2000 »Page 6

Configure Serial Port Hardware »Page 20

Configure Port »Page 23

Configure System »Page 36

Configure Aliases »Page 39

Configure Processors »Page 42

Example: Putting CNCnet DNC into operation »Page 53



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### Installation on Windows 2000

For an optimal performance of the DNC System on Microsoft Windows 2000 Operating System Service Pack 5 should be applied. Please follow the instructions below to install the software:

Setup the serial ports on your computer and verify their existence by using Computer Management -> Device Manager -> Ports (COM and LPT) before you install CNCnet DNC software. Make a note of the COM port numbers as shown in Device Manager.

- Navigate to the place where you have stored the Windows Installer package CNCnet\_DNC.msi
- Double-click CNCnet\_DNC.msi
- The installers welcome dialog window for CNCnet DNC appears
- Confirm the install directory suggested by the installer or choose your desired install directory.
- The installer copies and registers all files required for running CNCnet DNC. Shortcuts to launch CNCnet DNC are created within your programs menu folder and on your desktop.
- After you confirm the installers information dialog window installation of CNCnet DNC is complete.
- If you already have a DEMO Version of CNCnet DNC installed on your computer you can simply install the licensed version over the existing one.

#### See also:

Configure Serial Port Hardware »Page 20

Configure Port »Page 23

Configure System »Page 36

Configure Aliases »Page 39

Configure Processors »Page 42

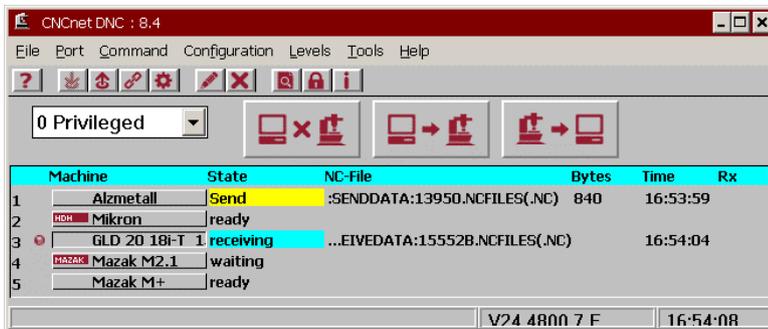
Example: Putting CNCnet DNC into operation »Page 53



## Operating CNCnet DNC

As with many WINDOWS applications CNCnet DNC can alternatively be controlled by either mouse or keyboard (SAA compatible = ALT key + character underlined)

To launch the programs functions you can use CNCnet DNC's command windows menu (at the very top) and a symbol menu (below)



The symbol menu contains common functions out of the command windows contents.

If you select a menu item from the command windows contents a list of all possible functions appears below the item.

Functions and settings that refer to a single machine can be accessed quickly by clicking the machine with the left mouse button followed by the right mouse button. A menu appears where you quickly can select functions for the selected machine.

Most of the programs functions offer context specific help. Context specific help can be accessed either by clicking the Help" button within the functions menu or by choosing the menu item Help from the main window.

To end CNCnet DNC you can use different, well known WINDOWS functions. You can either choose File End from CNCnet DNC's command windows menu, press ALT F + N or ALT + F4 on your keyboard or double-click the left edge on the top of the CNCnet DNC application. To end the program you may have to change the permissions level according to your security policy.

### See also:

Functions » Page 9



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## Functions of CNCnet DNC

### Structure of system

CNCnet DNC consists of the following components:



CNCNET DNC is responsible for...

- the setting of the systems parameters
- the control of all transmission processes
- the status indication concerning protocols and transmission processes
- the file access from the machine control to local or network folders and drives
- the integration of various NC File editors
- the storage of all events concerning NC File transmissions
- the security configuration of the DNC machine network

Multiport serial interface cards and CNC network adapters are responsible for...

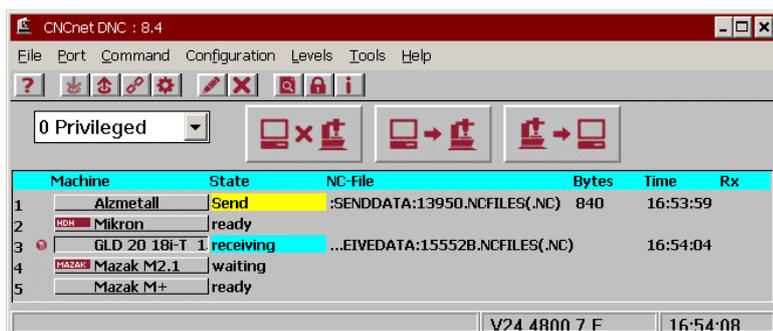
- the handling of the transmission process in concern of timing, speed and latency (the implementation of virtual serial devices can also be made by manufacturer specific products that work compliant with Inventcom's transmission standards)



## Functions of CNCnet DNC

Here you can find a description of all possible functions of the program. For making yourself comfortable with all functions you should first work through an example.

It is important for all functions that you select the desired machine/control prior to performing a specific function. For example if you launch File Edit NC-File CNCnet only shows the files that belong to the selected machine. The actually selected machine / control is shown by a red icon in front of the machines name. To avoid confusion: The machines / controls listed in the main window are called Ports” in CNCnet DNC.



In this particular example the machines Alzmetall (sends) and GLD20 (receives) are active. Just click on the machines / controls name to select it for further actions. The red icon changes its position accordingly.

### Additional functions:

Edit NC File »Page 10

Delete NC File »Page 11

NC File manager »Page 12

Send NC File »Page 13

Receive NC File »Page 14

Turn off / Turn on port »Page 16

Command queue »Page 17

Processor »Page 18

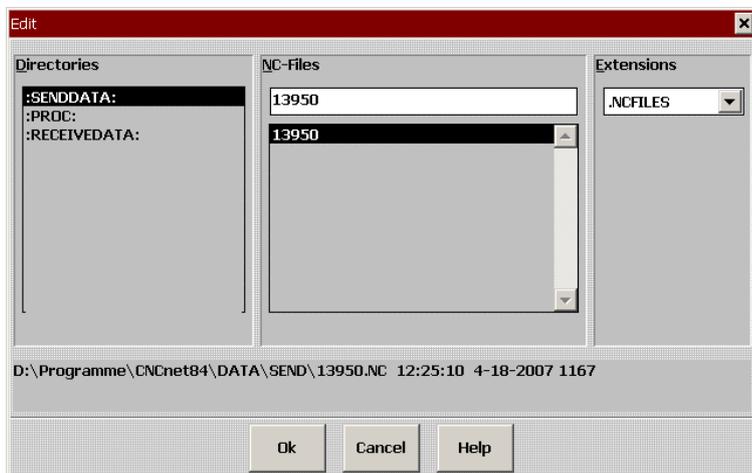
Reset »Page 15

Reset all »Page 19



## Edit NC File

You can launch the CNCnet DNC NC File Editor from the command windows File menu (Alt-F + E), by clicking the symbol , by pressing F4 on your keyboard or by using the NC File Manager (Key F10). In CNCnet DNC's file list box you can select a NC file for editing.



## What's an Alias?

An alias is just a translation of a long, maybe difficult to enter expression into a short name, for example N:\HWK003\99\NCPROG\AXA01\ is translated into AXA1. For editing you can select NC-files out of the aliases that are configured for the machine that is actually selected in the main window: Configure Aliases »Page 39

Comfortable editing of NC Files you can also be done by using the NC File manager »Page 12

## See also:

Send NC File »Page 13

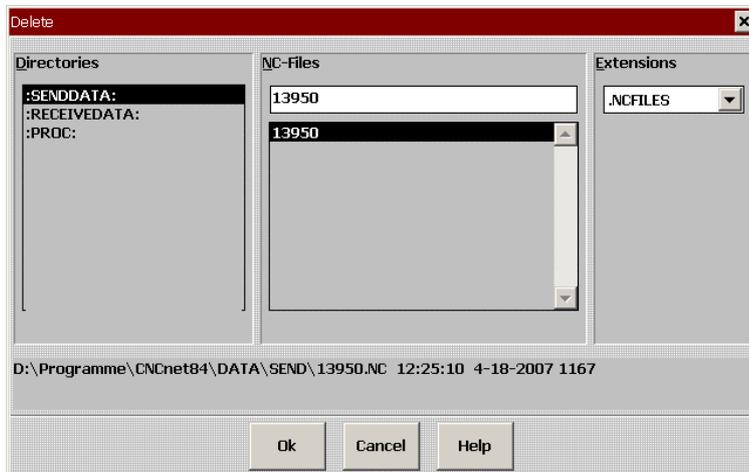
Receive NC File »Page 14

Delete NC File »Page 11



### Delete NC File

After selecting this function from the command windows File menu (Alt-F + D), by clicking the symbol  or by pressing F8 on your keyboard you can choose the NC-file you'd like to delete:

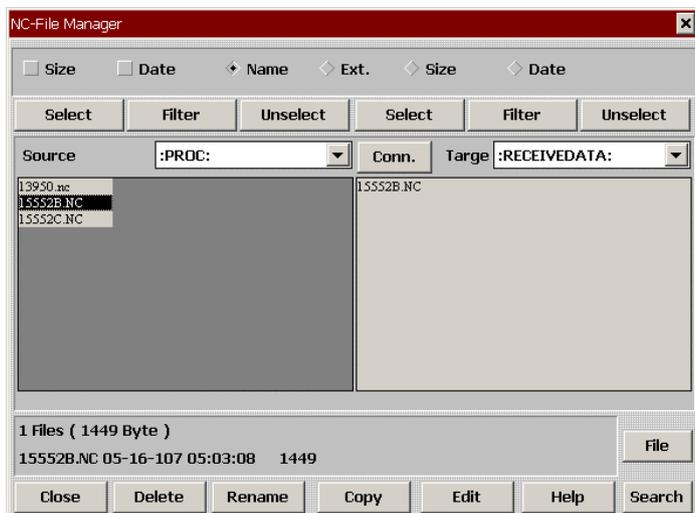


You can also delete NC-Files by using the NC File manager »Page 12



## NC File manager

You can launch CNCnet's NC File manager from the command windows File menu (Alt-F + M) or by pressing F10 on your keyboard.



The NC File manager allows you to  
select one or more NC Files (By using CTRL + mouse click left you can select multiple NC Files)  
copy, rename or delete multiple NC files  
To process multiple NC Files in a single operation:  
1. Select the desired Aliases for source and target.  
2. Select the NC File or Files you'd like to work with. You can use the switch Filter" to select files by wildcard characters. Usage of wildcard characters:

\* The star wildcard has the broadest meaning of any of the wildcards, as it can represent zero characters, all single characters or any string.

(e.g. F\*. \* = all NC Files that begin with F like F1234567.NC or FABCDEFG.DAT)

? The question mark (?) is used as a wildcard character to represent exactly one character, which can be any single character. Thus, two question marks in succession would represent any two characters in succession, and three question marks in succession would represent any string consisting of three characters.

(e.g. F123456?.NC can be F1234567.NC or F123456A.NC)

3. Select the desired function (copy...)

### See also:

Edit NC File »Page 10

Delete NC File »Page 11

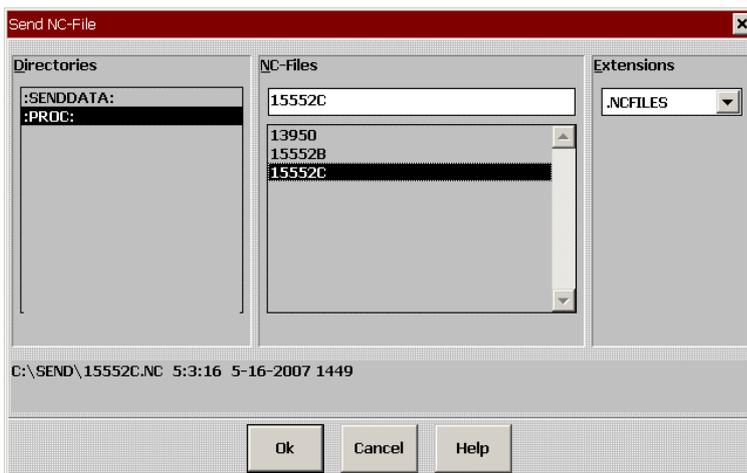


## Send NC File

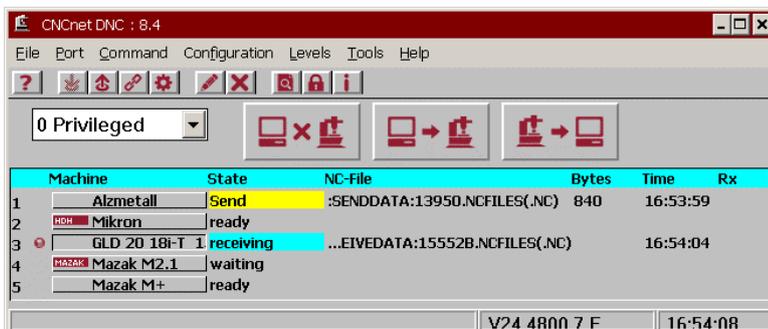
If you want to "force" CNCnet DNC to output a NC-File, such as when sending to tape punch/readers etc., click the "Send NC-File" panel. Normally, a CNC control will request the output of data using a Xon/Xoff or RTS/CTS, you must use the Send NC File panel to send a file. You can also launch this function from the command windows File menu (Alt-C + S), by pressing CTRL+S on your keyboard or by clicking the symbol



CNCnet DNC's list box for NC File selection appears:



After selection of the NC File and confirmation (Button OK or Keyboard: Enter) the selected machine changes its color and is now ready to send:



While the function Send NC File is active the symbol to interrupt the current transmission



also gets active and may be used to terminate the current process.

## Send automatically via Remote Commands):

Configure Terminal Mode »Page 32

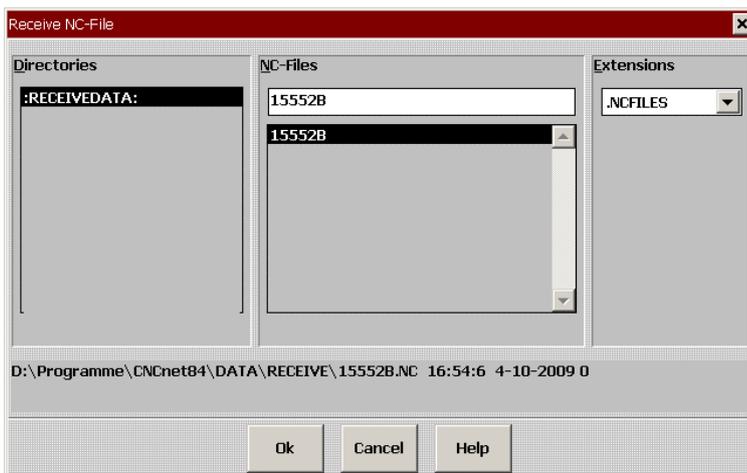


## Receive NC File

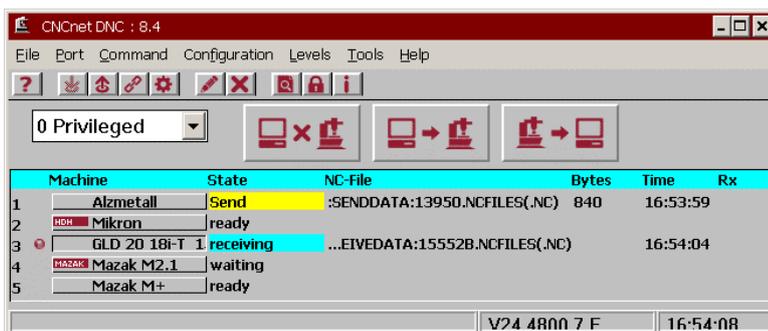
If you want to “force” CNCnet DNC to receive and store the contents of whatever is sent by the machine click the “Receive NC-File” panel. If you currently do not have the Auto Code Recognition” function turned on or if the external device does not send recognizable characters (e.g. binary code) you must use the Receive NC File panel to name and receive. You can also launch this function from the command windows File menu (Alt-C + R), by pressing CTRL+R on your keyboard or by clicking the symbol



CNCnet DNC’s list box for naming the NC File appears:



After you’ve entered a name for the NC file and confirmed your input (Button OK or Keyboard: Enter) the selected machine changes its color and is now ready to receive (GLD 20). You can now send the NC File from the control.



## Receive and name NC Files automatically by the use of Auto Code Recognition:

Auto Code Recognition »Page 24



## Reset

As long as a transmission or reception process is active the Reset symbol



may be used to terminate the current operation. Alternatively this function can be launched from the command windows File menu (Alt-C + T) or by pressing CTRL+B on your keyboard. After selection of this function a confirmation window



appears. Tip: selecting "Delete Queue" is only relevant if, after the current file more NC-Files are still waiting for transmission to the control.

## See also:

Reset all »Page 19



### Turn off / Turn on port

This function can be either launched by pressing (ALT-C + D) / (ALT-C + E) or by clicking the symbols  (switch on port) and  (switch off port). By using this function you can enable or disable all DNC functionality for the selected machine. A port that is turned off is shown by

5  Gilde NEF 600 **switched off**

a port that is turned on is shown by

5  Gilde NEF 600 **ready**

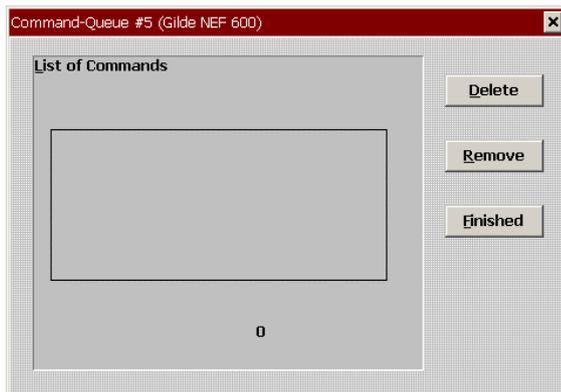
DNC Functions are only available if a port is turned on



## Command queue

A "queue" is simply a list of files that are sent to the CNC in sequence. Each machine has its own queue list. Each file in the queue list is queued up and waits to be sent to the CNC. There are easy ways to queue up files: You can use the command windows "Command" menu and "Command Queue" to add, delete or remove files from a CNC's queue list. To use the queue functionality this feature has to be turned on in the "Configure Port" dialog window.

You can either switch on Queue by pressing (ALT-C + C) on your keyboard or by clicking on the symbol . After entering of 3 commands, the queue looks like:



You can use and view the queuing list independently for every machine. By using the command "Delete" you can clean up the whole queue. A single entry can be removed by pressing the "Remove" button after selection of the entry. The entry then disappears from the queue.



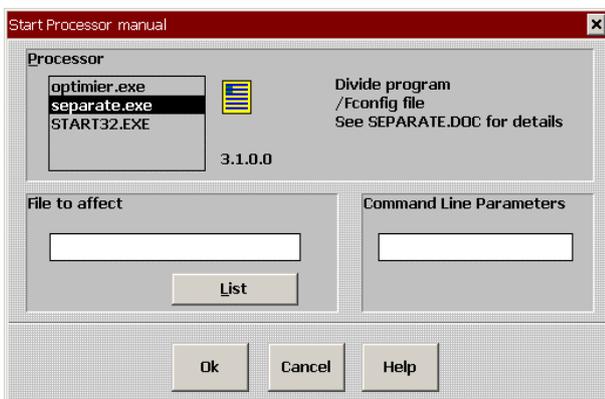
## Processor

Processors are programs that process input data to produce output that is used as input to another program. The output is said to be a processed form of the input data, which is often used by some subsequent programs like CAM applications. The amount and kind of processing done depends on the nature of the processor, most processors are performing relatively simple textual substitutions and macro expansions.

A Preprocessor runs before the NC File is sent to the machine whereas a Postprocessor runs after reception of an NC File from the machine. Typical cases of applications are:

- Separation a NC File into pieces (main program sub program)
- Translation of the NC File format from one machine type to another (e.g. from Fanuc 4-axis wire EDM to AGIE 4-axis)

You can launch and start CNCnet's processors independently from active DNC transmission processes from the command windows Command menu (Alt-C + P) or by clicking the symbol .



Select the processor, enter the name of the file that should be affected and, if needed, enter command line parameters to control the execution.

**Tip:** Processors compiled with a 32-bit compiler can be simply started by the auxiliary program START32.EXE. As processor select START32.EXE and fill in a /P in the Command Line Parameters field followed by the name of your processor without any white space characters between /P and your processor. Is your processors name CAMNEW.EXE you just have to enter /PCAMNEW eventually followed by your specific switches for execution.

### See also:

Configure Processors »Page 42



**Reset all**

This command resets all active transmission processes at once. This function is not supported when using the Windows API interface driver APICOMM.

**See also:**

Reset »Page 15

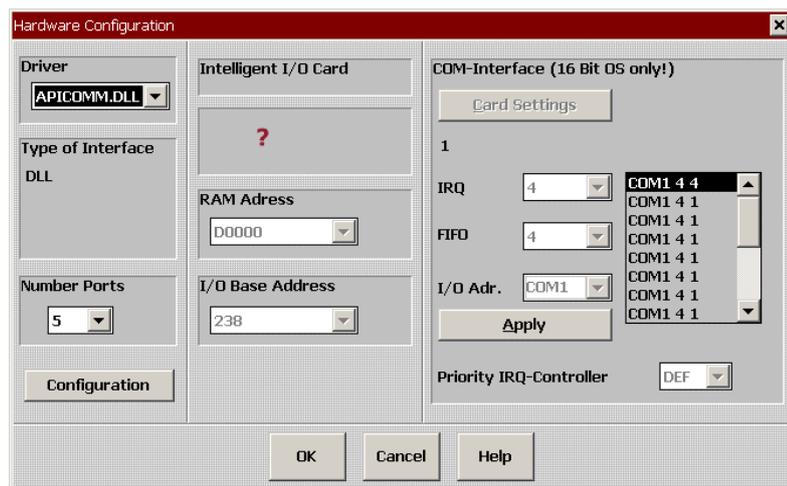


## Configuration of CNCnet DNC

### Configure Serial Port Hardware

Hardware in CNCnet DNC refers to your physical or virtual COM Ports on your computer. As you need the COM port numbers as assigned by the operating system for setup of CNCnet DNC you have to look for them by using Computer Management -> Device Manager -> Ports (COM and LPT). Make a note of the COM port numbers as shown in Device Manager.

For selection of the device driver model you'd like to use for the assignment of the computers COM Ports to Ports in CNCnet DNC you get this configuration window:



All parameters refer to the hardware settings of the COM ports. If you do not work with special interface boards or a very old OS select APICOMM.DLL as your device driver. Use the dropdown field "Number Ports" to tell CNCnet DNC how many ports you'd like to be used by this instance of CNCnet DNC. After a restart of the program you can assign the computers COM ports to ports in CNCnet DNC:

Configure serial interface cards »Page 21

Manufacturer specific COM server products from W&T can be integrated by the use of a specific device driver available from Inventcom. If you are using such devices here's a tutorial for the setup of the device driver:

Configure W&T COM servers »Page 22

Please note that within a program instance that is working with this special device driver standard COM ports cannot be used. In such case, you have to create one program instance for W&T devices and one for standard COM ports.

### After installation of the Serial Port Hardware you can continue with the configuration of the ports, the aliases and the system settings:

Configure Port »Page 23

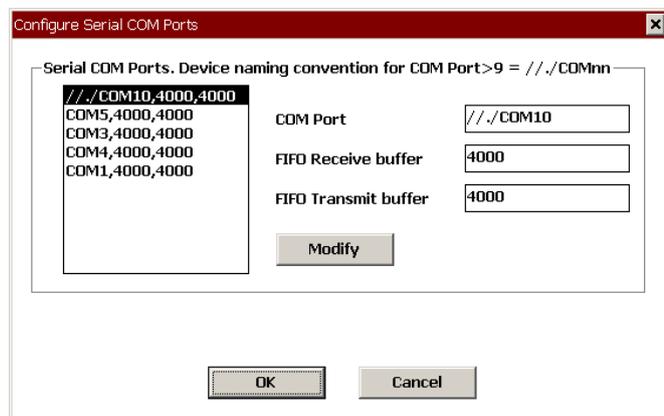
System Settings »Page 36

Configure Aliases »Page 39



## Configure serial interface cards

For setting up the parameters for serial interface cards the hardware configuration (command windows Configuration menu hardware) has to be set to driver APICOMM.DLL and the Number of Ports has to be defined. After restarting the program you can access the configuration dialog by pressing the Configuration button:



**COM Port:** Shows the currently selected port and its settings.

**FIFO\* Receive buffer:** Size of the serial buffer for data reception (should usually be set to 4000)

**FIFO\* Transmit buffer:** Size of the serial buffer for data transmission (should usually be set to 4000)

By clicking the button Modify you can store your settings for the currently selected port.

\* If your PC's serial port has a 16550 UART chip (CNC network adapters are compatible to this chip), you can use its FIFO" (First In, First Out) buffer to greatly improve the performance of the serial port - especially when the computer is receiving data. Without this buffer, the computer's OS receives an interrupt every time a single character comes in to the port. At higher baud rates, Windows may not be fast enough to service these interrupts, and may lose characters. With the FIFO buffer, Windows is only interrupted when the UART chip's FIFO buffer is full, which means that it can handle several characters at a time, resulting in a much higher speed.

**Tip:** Using FIFO buffering will give better performance, but may cause a Buffer overflow" alarm on some CNC's. If you get this alarm, set the FIFO Transmit" buffer to a lower setting.

**Tip:** Please note that due to the device naming convention of Windows COM Port Numbers higher than 9 have to be entered as //./COMnn where nn is the COM Port number (e.g. //./COM10 for COM10)

**Tip:** The order of COM Ports in the left pane is equal to the order of the machines in CNCnet DNC's main window.

## After installing the COM Port hardware you can continue with setting port I/Os and testing your COM ports:

Configure Port I/O »Page 25

Test COM Port »Page 48

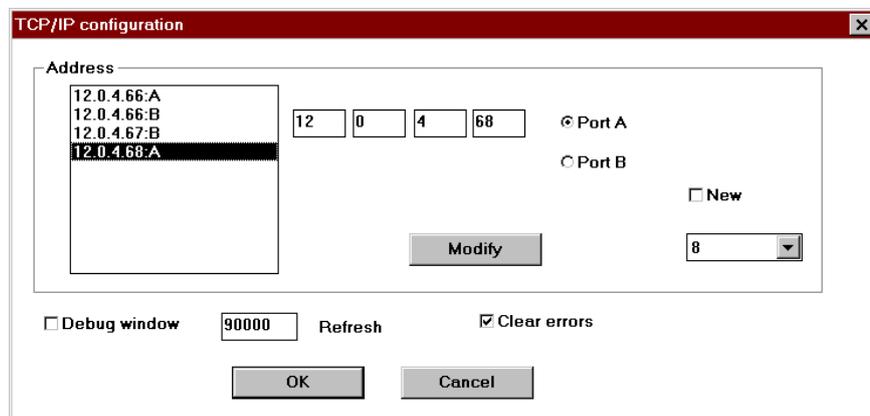
Analysis Monitor »Page 49

Analyzer »Page 50



### Configure W&T COM servers

For setting up the parameters for W&T COM servers the hardware configuration (command windows Configuration menu hardware) has to be set to driver DNCTCPIP.DLL and the Number of Ports has to be defined. After restarting the program you can access the configuration dialog by pressing the Configuration button:



**Address:** Shows the TCP/IP addresses of all currently installed devices together with the port that the machine uses (Port A, Port B). If no device is already installed default values from 1.1.1.0 to 1.1.1.n are set.

**Port A / B:** COM Port of the COM server Device that is used by the machine

**New:** For debug purposes only, can safely left OFF.

**Debug wind.:** Shows details about the communication activities between device driver and device on startup of CNCnet DNC. For debug purposes only. Can and should normally be left OFF.

**Refresh:** Refresh interval (milliseconds) between device driver and device. Used to refresh/rebuild socket communication between driver and device (Should be set to => 50000)

**Clear errors:** Clears display for error messages at the devices LCD automatically. (Should be turned ON by default)

By clicking the button Modify you can store your settings for the currently selected port.

**After installing the COMSERVER hardware you can continue with setting port I/Os and testing your COM ports:**

Configure Port I/O »Page 25

Analysis Monitor »Page 49

Analyzer »Page 50

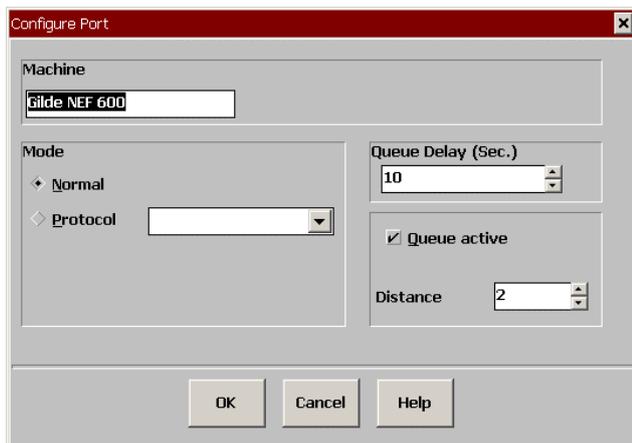


## Configure Port

You can launch CNCnet's Port configuration settings by either clicking with the right mouse key on the selected port or from the command windows Configuration menu (Configuration - Port - Parameters). The currently selected machine is shown by the red icon left to the machines / controls name

### Port/Parameters

Here, some general settings for the machine can be set:



Parameters:

- Machine: The name of the machine / control that is shown in the main menu
- Mode: DNC Currently selected transmission method. If you are working with a manufacturer specific transmission protocol like Mazatrol or Heidenhain you should switch to Protocol and select the desired protocol type:  
Configure Port Protocol »Page 27
- Queue Delay (Sec.): Delay between NC commands that are executed in a queue. This applies only when Queue active is switched on.
- Distance: Time delay between NC Files that are sent in a queue. This applies only when Queue active is switched on. This helps that multiple NC files do not get mixed up in the CNC (e.g. all stored in the same NC File).

Tip: If you are working with a machine specific protocol you can adjust the detail settings of the selected protocol by clicking with the right mouse key on the machine, select protocol and click on the protocol type. An additional window opens.

Automatically receive and name NC Files: Auto Code Recognition »Page 24

Configure serial I/O parameters: Configure Port I/O »Page 25

Filter, delete, replace and modify characters: Configure Character Handling »Page 30

Send and receive files using remote commands from the CNC: Configure Terminal Mode »Page 32

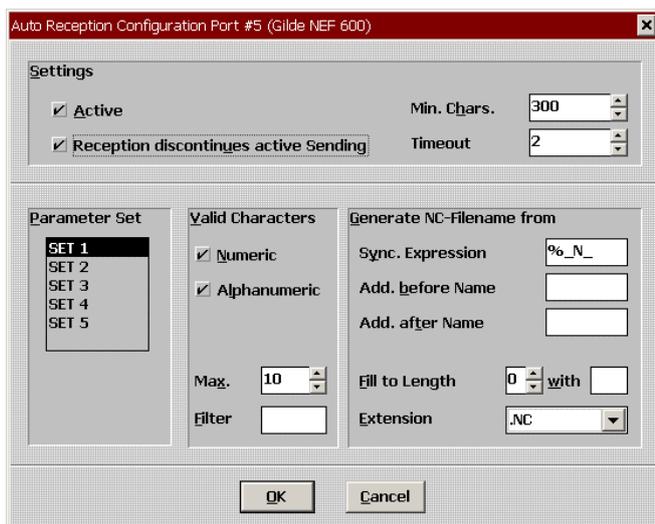
Setup of alias names for directories and extensions: Configure Port Aliases »Page 34

Load, save and lend port settings: Configure Port Options »Page 35



## Configure Auto Code Recognition

This option determines whether or not CNCnet DNC will use automatic code recognition when receiving data. This feature sets the name of the NC File received according to characters that follow a synchronization character and stores it on your hard disk. The settings here are also essential for working with remote commands (Terminal Mode) cause CNCnet DNC only reacts to specific names, which are built by the Auto Code Recognition function. The parameters for building these names out of the characters arriving are set here:



### Parameters:

- Settings - Active. If this option is set ON the port is waiting for commands from the CNC and the status display in the main window changes to waiting".
- Reception discontinues active sending. If data from the CNC is received a current active sending process is terminated. (Applies also if you have set long timeout values for sending)
- Min. Chars. / Timeout. If the number of characters (Min. Chars.) was received or the time (Timeout) expired and no synchronization character was found CNCnet DNC discontinues with auto code recognition.
- Parameter Set: 5 different sets for synchronization and building names from incoming data.
- Valid Characters: Numeric / Alphanumeric allows / disallows numbers or characters when building names. Max defines the maximum length of the filename built by auto code recognition.
- Filter: Filters out unwanted characters (e.g. If you filter the expression \_ from the incoming data %1233\_44 you get a 123344.nc if your synchronization expression is % and your extension is .nc)
- Generate NC-Filename from: Here you set the synchronization character (like %) or expression (like PGM) that should be used to find the characters for building the NC Files name. Any white space characters in incoming data are ignored (e.g. P G M = PGM)
- Add before Name / Add after Name: Fixed expression that is added to the NC Files name beginning / end. Add ARB before name creates ARB1233.NC out of 1233.
- Fill to Length: Length of NC Filename and character to use when filling. Setting of 10 with 0 creates 0000003443 out of 3443.
- Extension: Extension to use for saving the NC File to disk. The extension to use has to be already defined for the specific machine as an extension alias.

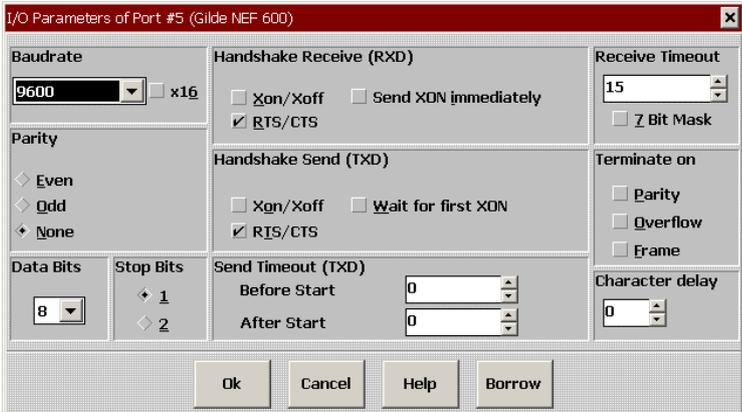
### Manually receive an NC File:

Receive NC File »Page 14



## Configure Port I/O

Serial port settings for the selected port:



Parameters:

- Baud rate: Standard baud rates are available from 110 to 115,200 baud. The baud rate setting for the port **MUST MATCH** the baud rate used by your CNC control. Please note that the x16 switch can only be used for controls that are able to deal with high speed transmission!
- Stop" bits: Can be set to send/receive data with a stop-bits setting of 1", or 2". The stop-bits settings **MUST MATCH** the settings of your CNC control, otherwise unreliable communications may occur.
- Data" bits: The Data Bits setting should normally be set to 7" for ASCII Even Parity and ASCII Odd parity tape codes. A setting of 8" is typical for all other tape codes.
- Handshaking: When CNCnet DNC sends or receives a file to or from the CNC, it can be set to handshake" with the CNC in 4 different ways. Xon/Xoff is the most common form of handshaking, and is used with most popular CNC controls. Xon/Xoff is also referred to as DC codes" or Device Control" codes by some CNC manufacturers.
- Xon/Xoff Handshaking  
When Xon/Xoff protocol is selected, CNCnet-DNC will halt transmission temporarily if a Xoff (also known as DC3") character is received. When a Xon character (DC1) is received, DNC will resume transmission. In any handshake mode, CNCnet DNC will time-out" if an Xoff control code halts transmission for more than the time values you set in Receive Timeout / Send timeout.
- RTS/CTS Handshaking  
When RTS/CTS handshaking is selected, CNCnet DNC will halt transmission if the CTS signal (pin #5 on a 25 pin plug or pin #8 on a 9-pin plug) goes low. When a file is requested remotely, CNCnet DNC will wait for the CTS signal to go high before transmitting. Once transmission begins, the CNC can momentarily halted by turning off CTS. By setting a higher value for Receive Timeout you can extend the time for the operator at the machine to switch from send NC-File to receive NC-File when working with remote commands.
- 7 Bit Mask: Deletes the 8th Bit when receiving data
- Send Timeout (TXD) Before Start: CNCnet stops with transmission after this amount of seconds before sending has begun (no characters transmitted)
- Send Timeout (TXD) After Start: CNCnet stops with transmission after this amount of seconds after sending already has begun.
- Terminate on: Sets specific error conditions where CNCnet should terminate the transmission. If these switches are turned off CNCnet DNC shows errors but still continues with transmission.
- Character delay: Time delay between characters (ms). In special situations, it may be necessary to have a slight time delay in between every character transmitted to the CNC. Normally, this feature IS NOT used to correct for buffer overflow" alarms on the CNC, because that usually indicates a



handshake problem or an improper FIFO buffer setting.

Tip: By using the button Borrow you can lend settings from another port and use / edit them here.

**Diagnostic Tools:**

Test COM Port »Page 48

Analysis Monitor »Page 49

Analyzer »Page 50



### **Configure Port Protocol**

Here you can adjust specific settings for manufacturer specific transmission protocols. Most of the protocols do not require additional settings or the parameters are self-explanatory. Settings for specific protocols can be found here:

Heidenhain Protocol Configuration »Page 28

Tape Reader Protocol Configuration »Page 29



### **Heidenhain Protocol Configuration**

Here you set specific parameters for communication when using Heidenhain protocol. As some of the parameters are fixed you adjust the controls parameters as follows:

**SOH** 01 Hex

**STX** 02 Hex

**EOT** 04 Hex

**ETX** 03 Hex

### **Extension for % Code:**

The extension to use for saving %nnnn NC Files at the computer.



### **Tape Reader Protocol Configuration**

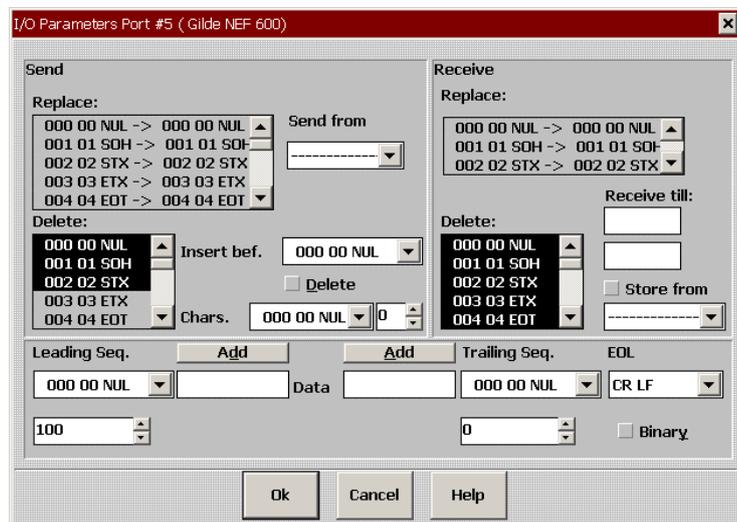
Parameters: Choose the appropriate setting of the 3 parameters (0 to 255) for the tape reader Simulator.

Output format: Select ISO or EIA code for character output.



## Configure Port Character Handling

These settings are used to define handling of characters and character sequences during transmission / reception of data from / to the machine control:



Parameters:

- Send / Receive Replace: Characters that should be replaced when transmitted, received (e.g. translate ISO to EIA). Double-click the character that should be replaced by another and select the desired character that should be used instead from the ASCII Table.
- Send from: Defines a character that should act as a synchronization character for sending data to the CNC. All characters before this character are not transmitted (e.g. header information's that lead to errors in the control)
- Send / Receive Delete: Characters that should be deleted when transmitted or received. Blacked out characters are deleted. You can select single characters by clicking them. To select multiple characters hold down the CTRL key and click on the characters.
- Receive till: Defines a character / sequence that should act as a synchronization character for receiving data from the CNC. All characters after this character are not received (e.g. if the end of the NC File contains useless characters after the programs code you can define M30 to cut of the reception of unwanted data)
- Store from: Defines a character that should act as a synchronization character for storing received data at the computer. All characters before this character are received but not stored in the NC File.
- Leading Sequence/ Trailing Sequence: When transmitting a file to the CNC, CNCnet DNC can automatically send a Leader" sequence before sending the file, or a Trailer" sequence at the end of the file. These leader and trailer sequences can be specified here. If left blank, your file will be sent as-is" with nothing added at the beginning or end of the file. Sending 000 00 NUL 500 times (the field below) before the NC File can be useful if the first lines of the NC File are not received by the control (older CNC's).

Sending 000 00 NUL 500 times after the NC File can be useful if the end of the NC Files content is not received by the control (older CNC's).



- With Add (leading and trailing) you can send a specific character or a sequence of characters before or after the NC Files content. This is very useful if your CNC requires a special character to accept incoming data (Add Leading) or your CNC requires a special character to stop reception (Add trailing) or to close the transmission window.
- EOL: An EOL (End Of Line) sequence is transmitted at the end of each line of your NC File. In most cases, an EOL sequence of CR/LF (Carriage Return + Line Feed) will work just fine. For most Japanese controls (i.e. Fanuc, Yasnac, etc.), only a Line-Feed (LF) is necessary. Some CNC controls require a CR, however. In fact, a few CNC's (Bridgeport) require both a CR and an LF, and may require it in a particular sequence. You may find that some CNC's require an EOL sequence of CR/LF, where others require an LF/CR instead. CNCnet DNC offers 5 choices: LF, CR, CR/LF, CR/CR/LF and LF /LF/CR.
- Binary: The file should be transmitted as is without looking at characters or EOL specifications. This is very useful when dealing with binary NC File formats s.a. MAZATROL or STUDER grinding machines.

**Tools for Analysis:**

Test COM Port »Page 48

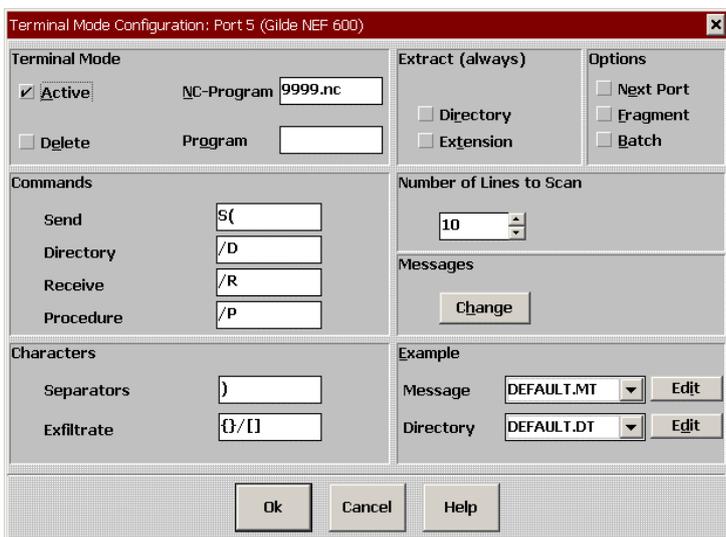
Analysis Monitor »Page 49

Analyzer »Page 50



## Configure Remote Commands (Terminal Mode)

Each CNC operator can send files to the CNCnet DNC system, or receive files from the CNCnet DNC system without touching the computer. A set of remote commands" can be defined for each DNC window. These remote commands can be tailored to suit the make & model of your CNC controls. When an operator sends a file from the CNC, CNCnet DNC will examine the incoming data for a program identifier". If a program identifier is found, CNCnet DNC will use the characters AFTER the program identifier as a file name. The incoming data will be stored, and the system will return to normal operation. If you want, CNCnet DNC can reply" to the CNC operator by sending back a brief received file confirmation" report then next time the CNC operator presses the READ button on the CNC. When a CNC operator wants to request a file from CNCnet DNC, he sends a short file from the CNC that contains a program request", followed by the file name. If CNCnet DNC sees this program request in the incoming data, it will queue up the requested file and wait for the CNC operator to download it by pressing the READ or INPUT button, or to run it in DNC mode by pressing Cycle Start":



### Parameters:

- Terminal Mode/Active: Switches on Remote Commands. Definition of the NC Program that should be seen as a file, which contains remote commands. If you enter 9999.nc here, automatic code recognition is turned on, your synchronization character is % and your extension is set to .nc whenever a %9999 arrives from the control CNCnet DNC assumes that remote commands are contained.
- Commands:
  - Send: If this sequence is found CNCnet DNC assumes that it should send the NC-Filename that follows this sequence to the control.
  - Directory: If this sequence is found CNCnet DNC assumes that it should send a list of the NC Filenames contained in the NC File folder (of this machine) to the control. The list comes in CNC friendly format (N01 filenameX, N02 filenameY a.s.o.)
  - Receive: If this sequence is found CNCnet DNC assumes that it should store the following data from the control under this filename (Very useful if you have long filenames and the control can only handle 4 digits)
  - Procedure: If this sequence is found CNCnet DNC assumes that it should execute the procedure following this sequence on the name of the file given after the command.
  - Separators: Characters used to separate parameters (multiple characters are possible)
  - Exfiltrate: Characters that should be filtered out of the incoming data (character) stream.



Extract (Always): Defines whether CNCnet DNC should take into account the directory alias and / or the extension alias (e.g. /S AXA 2331 sends 2331.nc from directory alias AXA to the CNC and /S 2331 DAT sends 2331.dat to the CNC)

Number of lines to scan: Maximum number of lines in the incoming file that should be scanned for command sequences.

Options: Next Port If switched on, CNCnet DNC assumes that it should perform the commands on the next port. This is helpful if you have a CNC that only accepts binary NC File format and you want to work with remote commands. You just add a thumb ASCII terminal to the control, connect it to CNCnet DNC and place it before the CNC that is also connected to CNCnet DNC. Whenever you enter a command on the ASCII terminal CNCnet DNC executes this command on the next port.

- Options: Fragment You have NC Files with long filenames and you cannot enter these names at the operator panel of the machine (e.g. A344 5F55 BB4556.NC). If you switch on Fragment and type in S 4556 you get back A344 5F55 BB4556.NC instead.
- Options: Batch In one remote control file multiple send commands are contained and should be executed sequentially.
- Messages: What should be sent to the CNC instead of the requested NC File if there are errors in the command file or the file was not found.
- Example: Message Defines how a message has to be formatted to make it readable for the control (You can edit and save different format definitions for every control)
- Example: Directory Defines how a list of files in a directory has to be formatted to make it readable for the control (You can edit and save different format definitions for every control)



Tip: The macro symbol \$MSG is replaced with the text of the message.

#### See also:

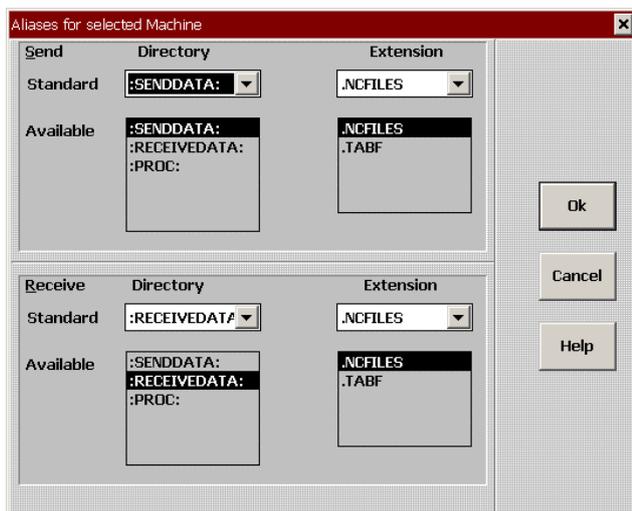
Send NC File »Page 13

Receive NC File »Page 14



## Configure Port Aliases

Every machine can have its own set of aliases taken from all globally defined directory and extension alias definitions. The aliases you select here are presented in all functions for this machine (like Send NC File a.s.o.). Multiple selections are possible but one selection for directory and one for extension have to be defined as standard alias for every machine. CNCnet DNC has to know where to look for NC Files and store NC Files that come without a specific alias command!



Parameters:

- Send/Receive/Directory: All valid aliases for directories. Aliases selected for the machine are blacked out; multiple selections can be made by holding down the CTRL Key while clicking the alias.
- Send/Receive/Extension: All valid aliases for extensions. Aliases selected for the machine are blacked out; multiple selections can be made by holding down the CTRL Key while clicking the alias.

**See also:**

Configure Aliases for Directories and Extensions »Page 39

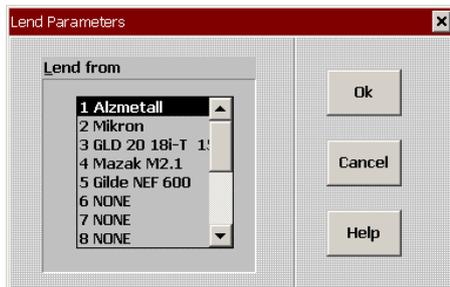


## Configure Port Options

Here you can lend, save and load settings for or from existent machines.

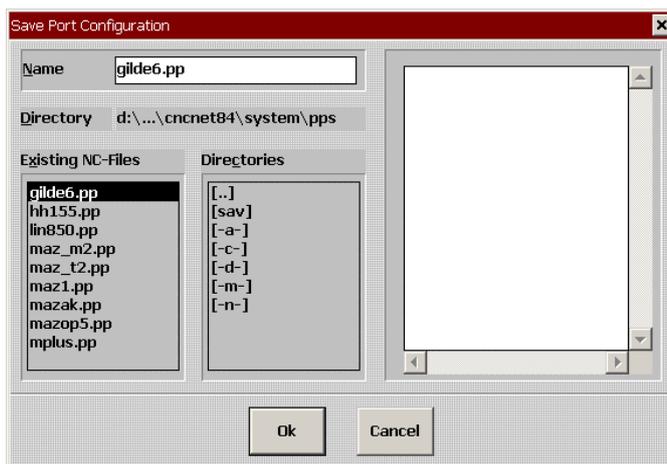
### Lend Options

Borrow options from another machine that is already set up:



### Store / Load Options

Store options for the current machine as an exchangeable parameter .pp file. Load options from a .pp file:



Tip: For compatibility reasons the length for naming .pp files is restricted to 8 digits.



## Configure System

### Configuration System

Global parameters concerning security and miscellaneous settings can be defined in this dialogs.

### System/Security

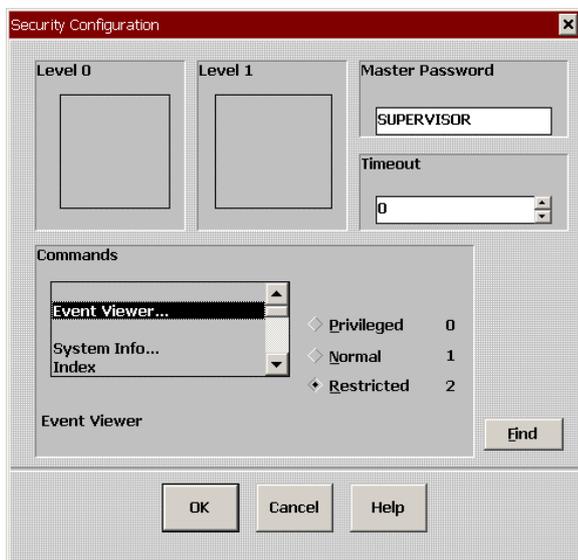
Security means all settings for general password protection, levels and available permissions. Password protection is built up as follows:

- 3 protection levels, 0-privileged (highest level), 1-normal (normal level), 2-restricted (without password lowest level)
- You can freely assign all functions of CNCnet DNC to specific password levels.
- Changing of levels can be made either in the main menus level window

0 Privileged	▼
1 Normal	▲
2 Restricted	▼

or by using the command windows **Levels** menu.

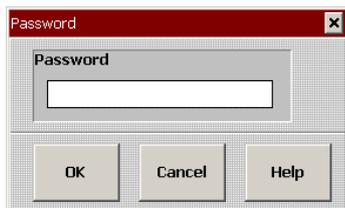
By entering the predefined password SUPERVISOR (please change this password and note the new one if you're working with password protected levels) you get to the configuration dialog window.



Parameters:

Field Level 0/1: Passwords that already are set up for level 0 or 1. To add a new password for a specific level double-click in the free space below the existing passwords and enter a new password for this level:





- Master Password: Can access this dialog and modify the password system (standard = SUPERVISOR)
- Timeout: Seconds to time out before CNCnet DNC automatically changes from the currently selected to the next level below (0 to 1 or 1 to 0)
- Commands: Here you can assign CNCnet DNC's functions to specific levels.
- Find: Opens a pseudo menu where you can find specific commands for level assignment.

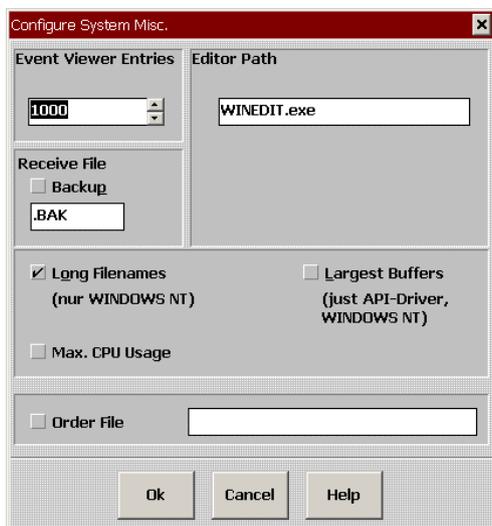
**See also:**

Configure System (Miscellaneous) »Page 38



## Configure System (Misc.)

Here you can define miscellaneous global settings for CNCnet DNC:



Parameters:

- Event Viewer Entries: Number of entries that are stored by the systems logbook storage. If the number of events exceeds this value the newer ones overwrite the oldest events.
- Editor Path: Directory and name of the editors executable that should be used by CNCnet DNC when functions like Edit NC File or NC File manager are used. If you'd like to use an own editor please fill in the directory AND the editors executable here.
- Receive File Backup: Defines whether an incoming NC file should overwrite the existent one having the same name or instead create a backup of this file with the selected extension (e.g. .BAK)
- Long Filenames: Defines whether long (> 8 digits) names for files AND directories can be used or not.
- Largest Buffers: Applies ONLY to OS WINDOWS NT with APICOMM.DLL as device driver for serial COM Port hardware.
- Max. CPU Usage: If set to ON CNCnet DNC reserves ALL available CPU resources for the application.
- Order File: Directory and command file for remote control of CNCnet DNC. The command file just contains commands that are executed by CNCnet DNC as the command file arrives and is read by CNCnet DNC. This allows automatic sending of NC files to specific controls out of another application (like a CAM program)

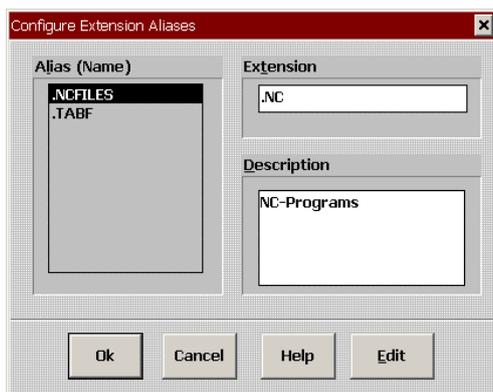


## Configure Aliases

An alias is just a translation of a long, maybe difficult to enter expression into a short name, for example N:\HWK003\99\NCPROG\AXA01\ is translated into AXA1. CNCnet DNC uses alias names for directories, file extensions, various storage media and mapped network drives. After you have defined a set of globally available aliases you can assign a subset of these aliases to single machines.

### **Aliases/Extensions**

Here you can define all available extensions for valid filenames:



Parameters:

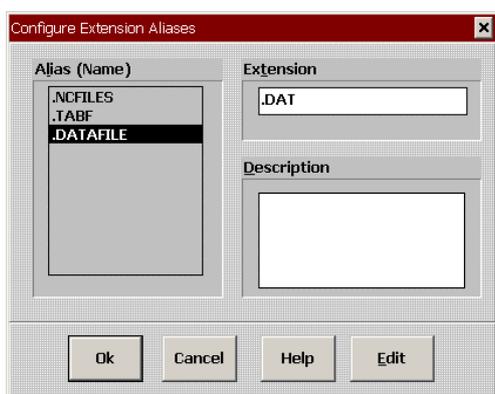
- Alias (Name): Already existent aliases
- Extension: The file extension assigned to the alias name
- Description: Description of the alias



To set up a new alias double-click into the **free** area below the existent aliases. An input window appears:



Enter the alias name and define its associated extension:



**See also:**

Configure Directory Aliases »Page 41

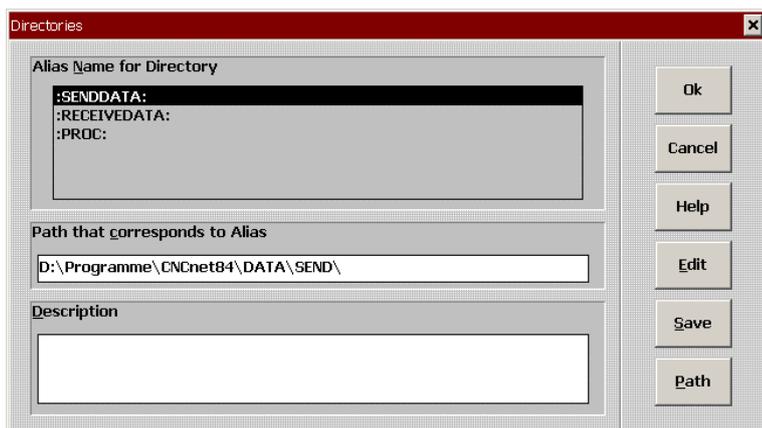


## Configure Directory Aliases

A directory alias is just a translation of a long directory name into a short name, for example N:\HWK003\99\NCPROG\AXA01\ is translated into AXA1. CNCnet DNC uses alias names for directories, file extensions, various storage media and mapped network drives. After you have defined a set of globally available aliases you can assign a subset of these aliases to single machines.

### Aliases/Directories

Here you can define all available directories for valid NC Files:



Parameters:

- Alias Name for Directory: Name of the Alias as shown in all functions of CNCnet DNC. To set up a new alias double-click into the **free** area below the existent aliases. An input window appears where you can enter the name of the alias:



Specify the directory by entering its name or search for it by clicking the Path button:

- Path that corresponds to Alias: Directory that belongs to the alias
- Description: Description of the alias for information purposes

**Tip:** You can also define Aliases for physical Drives (like A:...), mapped network drives (like N:...), or USB memory sticks.



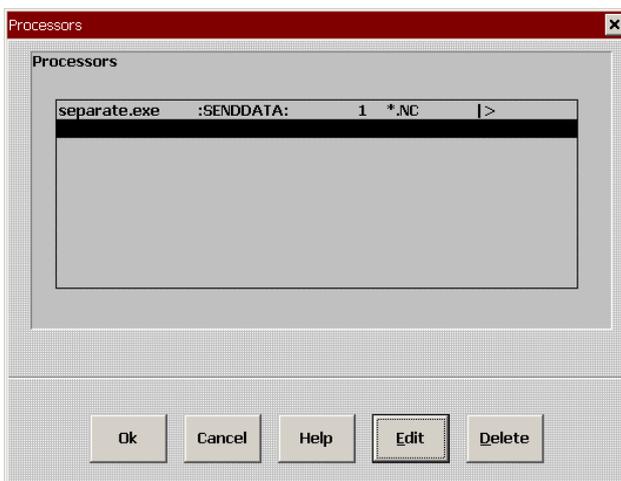
## Configure Processors

Processors are programs that process input data to produce output that is used as input to another program. The output is said to be a processed form of the input data, which is often used by some subsequent programs like CAM applications. The amount and kind of processing done depends on the nature of the processor, most processors are performing relatively simple textual substitutions and macro expansions.

A Preprocessor runs before the NC File is sent to the machine whereas a Postprocessor runs after reception of an NC File from the machine. Typical cases of applications are:

- Separation a NC File into pieces (main program sub program)
- Translation of the NC File format from one machine type to another (e.g. from Fanuc 4-axis wire EDM to AGIE 4-axis)

The processors configuration window can be launched from the command windows Configuration menu Processors. A window with active processors that are already configured is shown:



Click on the button Edit or double-click on a processor to change an existent processor definition.



Double-click into the free space below the existent processor definitions to add a new one:



Parameters:

- Processor: Name of the executable (Processors have to be stored in the \PROCS subdirectory of CNCnet DNC)
- Active on Port Number: Number and Name of the Machine for which the processor should be active
- Working Directory: Working directory (alias !) where the processor should look for NC Files to process
- File Mask: Definition of Files that should be modified by the processor (e.g. \*.NC = just modify .NC Files)
- Parameters: Additional command line parameters for the processor according to the processors purpose
- Processor Type: Should the processor get started before a NC File is transmit to the machine (=Pre) or should it process data received from the machine (=Post). CNC specific formatting of tool-preset data is a Preprocessor task whereas division of one NC-File into several NC Files is a Postprocessor task.

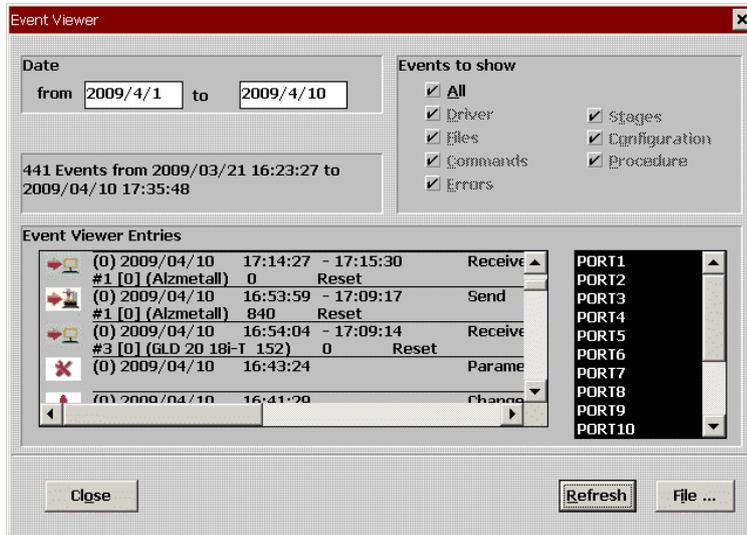
**Tip:** Processors compiled with a 32-bit compiler can be simply started by the auxiliary program START32.EXE. As processor select START32.EXE and fill in a /P in the Command Line Parameters field followed by the name of your processor without any white space characters between /P and your processor. Is your processors name CAMNEW.EXE you just have to enter /PCAMNEW eventually followed by your specific switches for execution.



## Tools

### Event Viewer

The event viewer stores and shows all activities performed by CNCnet DNC:



Parameters:

- Date: Filter events by a range of dates
- Events to show: Filter specific events to be shown by the viewer
- Refresh: Refresh current view
- File: Store current view as an ASCII text file

**Tip:** Press the button Refresh or ALT+R to update the current view after changing the range of dates or filtering out specific events to show.



## Lock

Completely locks CNCnet DNC for all users input. When locking CNCnet DNC you're asked for a temporary password:

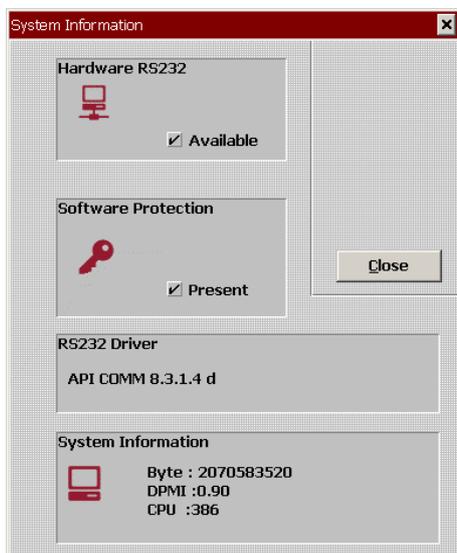


To unlock CNCnet DNC the same password has to be entered again, so do not forget your temporary password!



## System Info

Shows system information's about the current configuration of CNCnet DNC:



Contents:

- Hardware RS232: Shows if any serial RS232 ports are available on the computer
- Software Protection: Detects the presence of CNCnet DNC's software protection (if no software protection can be found CNCnet DNC runs in limited DEMO mode)
- RS232-Treiber: Name and version of the port driver currently used
- System: Various information's about the computers capabilities



## **Diagnostic Tools**

For visualization and diagnosis of transmission processes CNCnet DNC contains a comprehensive set of diagnostic tools:

Test of COM Port: Test COM Port »Page 48

Show and manipulate traffic between this computer and a CNC machine: Analysis Monitor »Page 49

Show and manipulate traffic between another computer and a CNC machine (wiretapping): Analyzer  
»Page 50

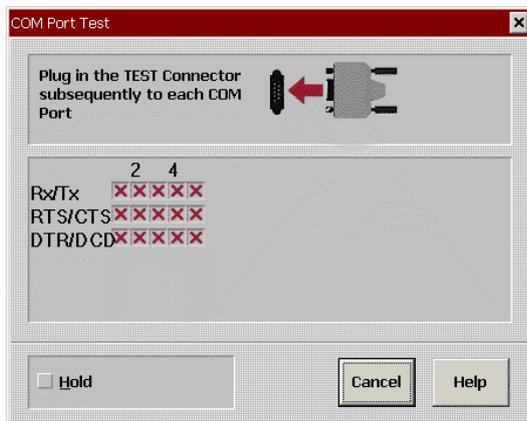
Show protocol specific message flow: Status Indicator »Page 51

Simulation of NC File transmission without a machine: Simulate Terminal Mode »Page 52



## Test COM Port

By performing a COM port test you can ensure that your COM ports are working properly:



To perform the test you need a loop back connector (soldered bridge between TXD/RXD, RTS/CTS and DTR/DSR). Plug in this connector to the serial port you'd like to test. If the port is working properly the red crosses disappear and a green hook appears.

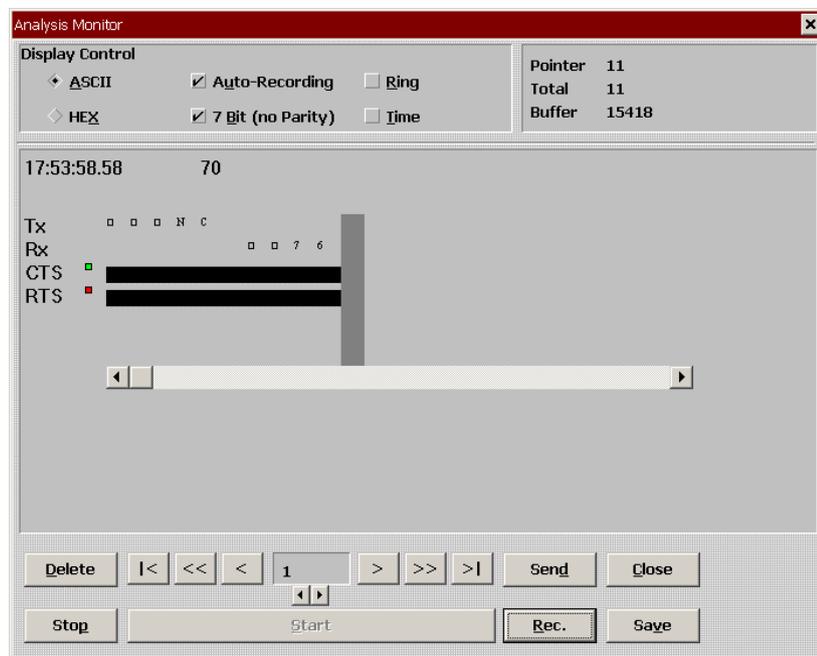
Parameters:

- Hold: If switched on the status of the currently selected port does not change after you plug in the loop back connector into the next port.



## Analysis Monitor

By using the analysis monitor you're able to visualize and store all characters that are sent and received during transmission. The analysis monitor also shows the status of the handshake lines RTS and CTS. The analysis monitor is active for the machine that was selected before turning on the monitor tool.



Possible parameters are:

**ASCII** or **HEX** (Displays characters in ASCII or hexadecimal format)

**Auto-Recording** Continuous recording of transmitted characters

**Ring** Working mode of the monitor. If Ring is turned on the oldest events are overwritten by newer events as the buffer of the monitor reaches its limit.

**Time** Displays seconds with the symbol "

**7 Bit** Removes the 8th bit in the current view

By using the buttons in the lower pane you can start or stop the monitor or as well delete the contents of the current view. By clicking the button Save you can store all recorded events in an ASCII file. The buttons Send and Rec. allow manual sending and reception of characters and character sequences.

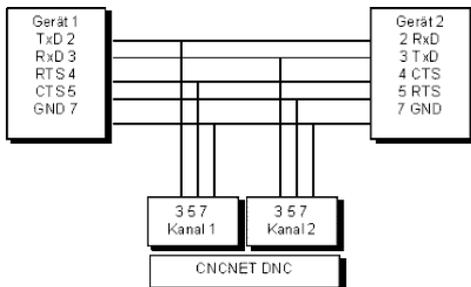
**Tip:** By using the button send you can quickly test the reaction of the control on reception of specific control characters. If the control requires for example a 008 08 BS to stop reception you can send this character by using the monitors send function.

**Tip:** By using the button Rec. you can quickly simulate the reaction of CNCnet DNC on incoming control characters or sequences of them (e.g. useful for setup of automatic code recognition)



## Analyzer

The functionality of the analyzer is equal to the functionality of the monitor. The only difference is, that the analyzer allows wiretapping of all transmission activities between another computer and a CNC machine. To use the analyzer you have to build up a special cable that allows catching of characters:

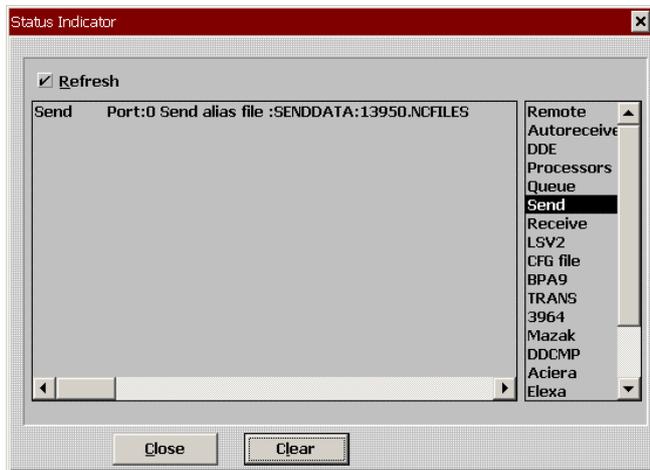


A description of the monitors functions can be found here: Analysis Monitor »Page 49



## Status Indicator

The status indicator shows all internal messages of CNCnet DNC. The status indicator tool can be used simultaneously with other tools, it can even be left active during normal operation of CNCnet DNC:



In the right pane you can select instances to be shown or hidden by the tool. Blacked out instances are active.

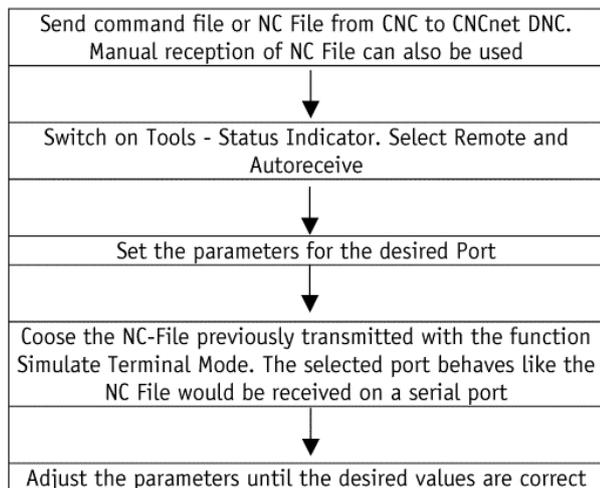
Setting the switch Refresh to on forces CNCnet DNC to refresh the viewer

Use the Clear button to remove the displayed messages from the viewer.



### Simulate Terminal Mode

Sometimes its better to simulate a connection between CNCnet DNC and the machine instead of to and froing between computer and machine:



Tip: If CNCnet DNC is working in DEMO mode port 1 and port 2 are taken for the simulation of terminal mode.

#### See also:

Configure Terminal Mode »Page 32



## Examples

### Examples

This example shows the setup of a typical connection between CNCnet DNC and a CNC machine.

Set the parameters and activate a connection (normal mode):

#### **Procedure**

- Set the parameters at the control and write them down
- Set the parameters in CNCnet DNC according to the ones in the control
- Activate the port
- Test the port
- Transmit an NC File from the control to CNCnet DNC

#### **Basic state of CNCnet DNC**

The port is switched off and no settings are made for this port:

5  NONE **switched off**

#### **Set the parameters at the CNC**

When setting up CNCnet DNC you always begin by setting of the CNC's parameters. Please read the manual of the control, set the desired parameters for speed and handshake and write them down. (Hardware handshake = RTS/CTS, software handshake = XON/XOFF). In this example we have:

- Machine: Gildemeister NEF 600 Control: Sinumerik 840 D
- Communication settings: 9600 baud, 8 data bits, no parity, 1 stop bit
- Handshake: Hardware (5 wire cabling incl. ground)

Continue with: Set Parameters in CNCnet DNC »Page 54



## Set Parameters in CNCnet DNC

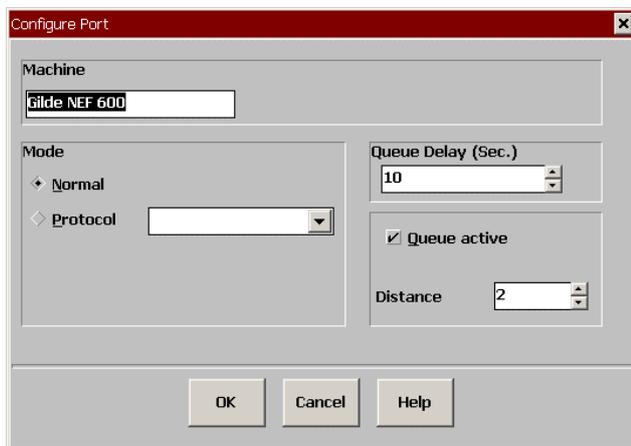
Change the operation level to 0 privileged to allow changes of parameters

0 Privileged	▼
1 Normal	▲
2 Restricted	▼

Select the port to operate on, click on port with left mouse button

5	NONE	switched off
---	------	--------------

Select **Configuration Port Parameters**



Configure Port

Machine  
Gilde NEF 600

Mode  
Normal  
Protocol

Queue Delay (Sec.)  
10

Queue active

Distance  
2

OK Cancel Help

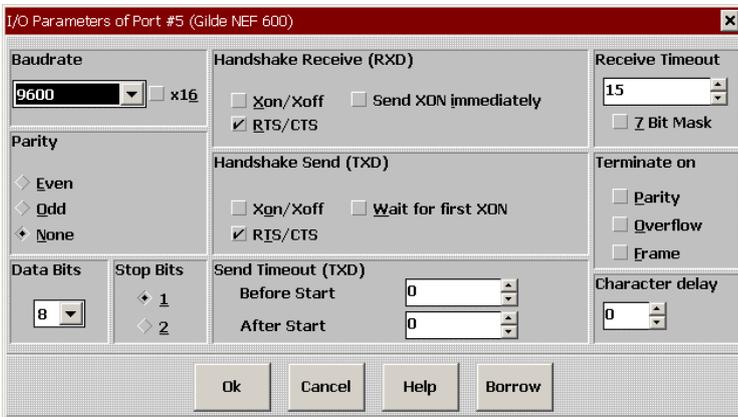
- Set the name of the machine
- Set mode to Normal
- Click on OK to leave this dialog window

Machine and State have changed in the main window:

5	Gilde NEF 600	switched off
---	---------------	--------------



Select **Configuration Port I/O**



- Set the parameters according to the parameters of the control
- Click on OK to leave this dialog window

Continue with: Activate and Test Port »Page 56



### Activate and Test Port

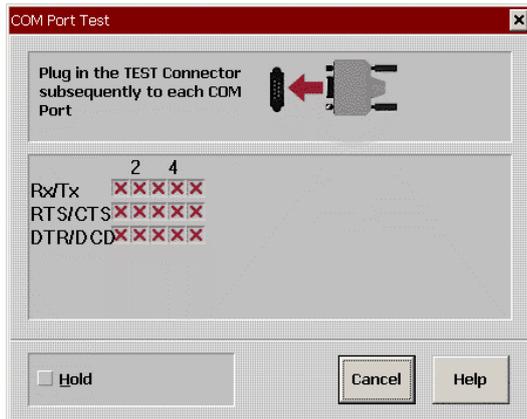
Select **Command Enable Port**

The state of the port changes as follows:

5  Gilde NEF 600 ready

### Test COM Port

Select **Tool Diagnosis Test Port**



- Plug the test connector into the COM Port
- The selected Port has to show green hooks at the Rx/Tx, RTS/CTS and DTR/DCD fields.

Continue with: Transmit a NC File from CNC »Page 57

### Tools for analysis:

Analysis Monitor »Page 49

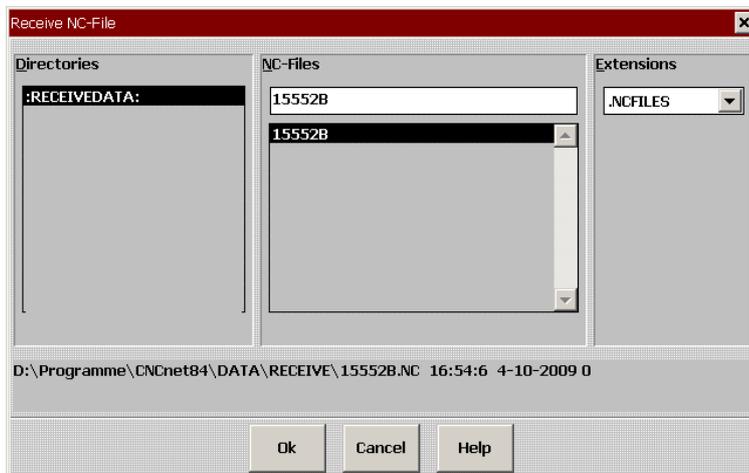
Analyzer »Page 50

Status Indicator »Page 51



## Transmit a NC File from CNC

Select **Command Receive NC-File**



- Enter a name for the NC File
- Confirm by clicking OK

The state of the port changes:

```
5 5 Gilde NEF 600 receiving ...EIVEDATA:15552B.NCFILES(.NC) 18:19:02
```

- Start transmission of the NC File at the CNC machine.

During active transmission the main window of CNCnet DNC shows the received bytes. When transmission is complete the state of the port returns to its previous state:

```
5 5 Gilde NEF 600 ready
```

Continue with: Send NC File »Page 13



---

## Appendix

### Cable Construction

Serial cable construction from a computer to the control

#### Pin assignment at the computer

Serial plugs at the computer are always 9-pin or 25-pin male D-SUB connectors. CNC network adapters have a 9-pin male D-SUB connector.

#### Pin assignment at the control

Pin assignments at the CNC may vary from manufacturer to manufacturer. In most cases the correct pin assignment can be found in the manual of the control. Fortunately most common controls have the same pin assignment as the computer. Sometimes the pins of the plug at the control are pre-crossed, means in practice that the pins RXD and TXD as well as RTS and CTS plug at the control are interchanged (this is not serial RS232 standard!)

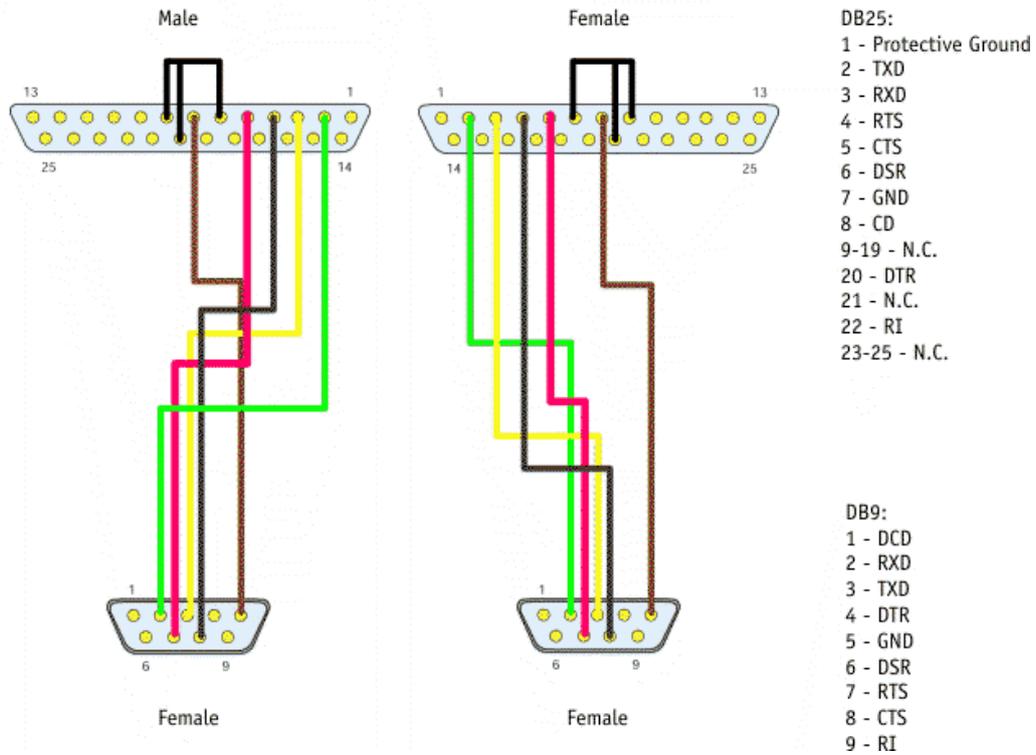
To find out the correct pin assignment of the control you have to use a RS232 inline breakout box with LEDs on top:

- LEDs 2 and 4 are active: The cable has to use crossover wiring, means that pin TXD at the control is connected to pin RXD at the computer and pin RTS at the control is connected to pin CTS at the computers port. Pin RXD at the control is connected with pin TXD at the computer and pin CTS at the control is connected to pin RTS at the computers port. (See crossover wiring)
- LEDs 3 and 5 are active: The cable has to use straight wiring, means that pin TXD at the control is connected to pin TXD at the computer and pin RTS at the control is connected to pin RTS at the computers port. Pin RXD at the control is connected with pin RXD at the computer and pin CTS at the control is connected to pin CTS at the computers port. (See straight wiring)
- If LEDs 4 or 5 are not active then it is very likely that the control has no hardware handshake available (see Software Handshake wiring)
- If LEDs 6,8,15 are active it is very likely that the controls port is a RS-422 connector that cannot be used for data transfer.
- Your cable is wired correctly if the first 4 LEDs are active in case you're using a control that supports hardware handshake and the computer is also connected to the cable.



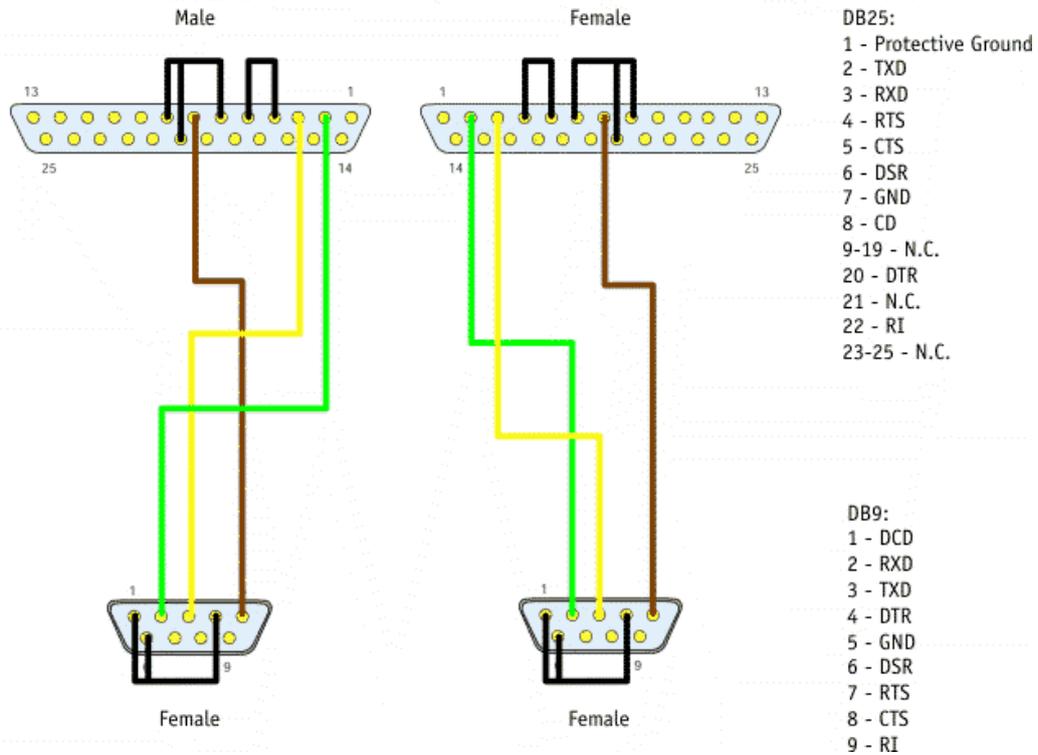
# Serial Cable, Female Connector DB9 -> DB25

**Crossover Wiring** Male and Female Connectors, View of Soldering Side



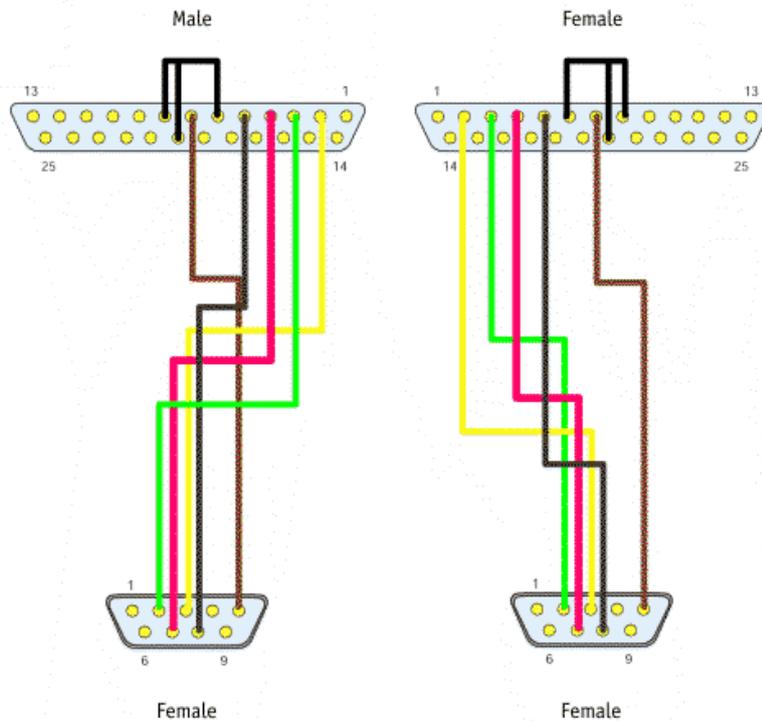
# Serial Cable, Female Connector DB9 -> DB25

Software Handshake Wiring (e.g. Fanuc) Male and Female Connectors, View of Soldering Side



# Serial Cable, Female Connector DB9 -> DB25

**Straight Wiring** Male and Female Connectors, View of Soldering Side



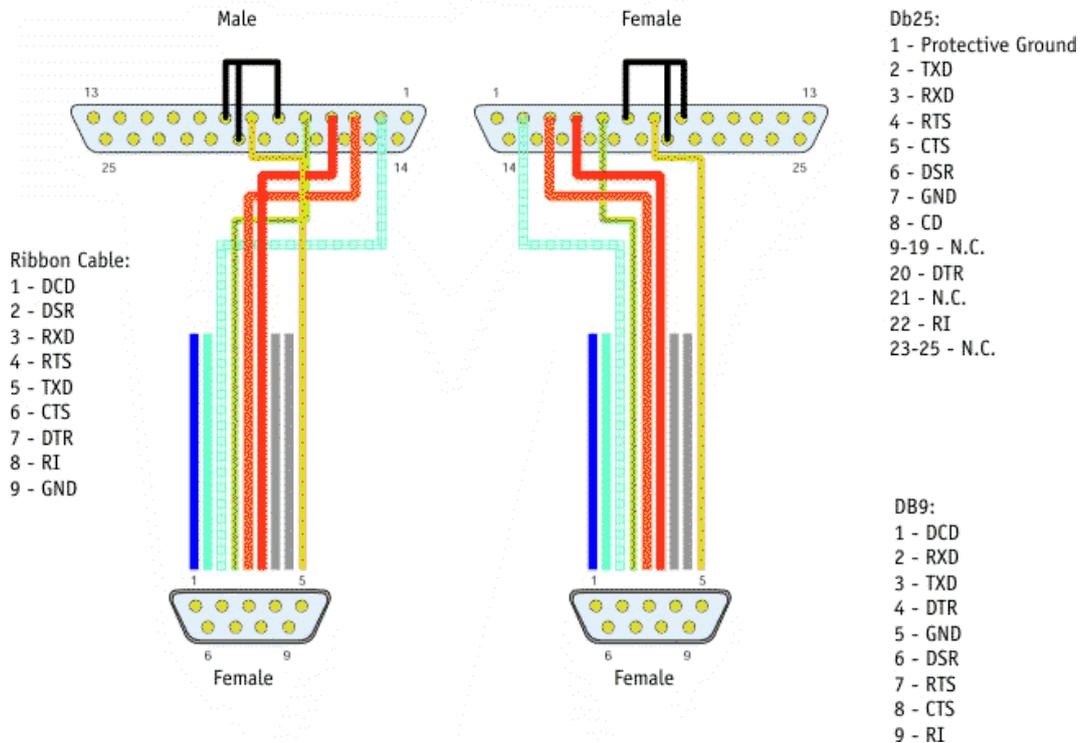
- DB25:**
- 1 - Protective Ground
  - 2 - RXD (Non Standard)
  - 3 - TXD (Non Standard)
  - 4 - CTS (Non Standard)
  - 5 - RTS (Non Standard)
  - 6 - DSR
  - 7 - GND
  - 8 - CD
  - 9-19 - N.C.
  - 20 - DTR
  - 21 - N.C.
  - 22 - RI
  - 23-25 - N.C.

- DB9:**
- 1 - DCD
  - 2 - RXD
  - 3 - TXD
  - 4 - DTR
  - 5 - GND
  - 6 - DSR
  - 7 - RTS
  - 8 - CTS
  - 9 - RI



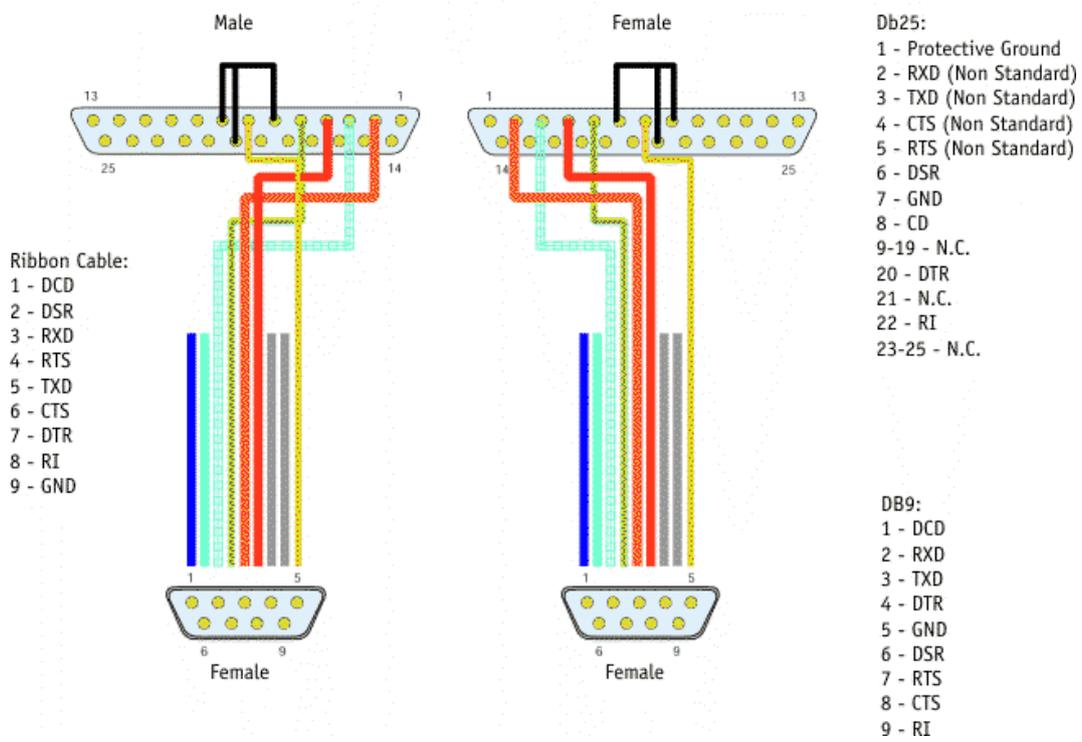
# Serial Cable, Female Connector DB9 -> DB25

**Crossover Wiring** Male and Female Connectors, View of Soldering Side, IDC Ribbon Cable (Crimp)



# Serial Cable, Female Connector DB9 -> DB25

**Straight wiring** Male and Female Connectors, View of Soldering Side, IDC Ribbon Cable (Crimp)



## ASCII Table

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	00	Null	32	20	Space	64	40	@	96	60	`
1	01	Start of heading	33	21	!	65	41	A	97	61	a
2	02	Start of text	34	22	"	66	42	B	98	62	b
3	03	End of text	35	23	#	67	43	C	99	63	c
4	04	End of transmit	36	24	\$	68	44	D	100	64	d
5	05	Enquiry	37	25	%	69	45	E	101	65	e
6	06	Acknowledge	38	26	&	70	46	F	102	66	f
7	07	Audible bell	39	27	'	71	47	G	103	67	g
8	08	Backspace	40	28	(	72	48	H	104	68	h
9	09	Horizontal tab	41	29	)	73	49	I	105	69	i
10	0A	Line feed	42	2A	*	74	4A	J	106	6A	j
11	0B	Vertical tab	43	2B	+	75	4B	K	107	6B	k
12	0C	Form feed	44	2C	,	76	4C	L	108	6C	l
13	0D	Carriage return	45	2D	-	77	4D	M	109	6D	m
14	0E	Shift out	46	2E	.	78	4E	N	110	6E	n
15	0F	Shift in	47	2F	/	79	4F	O	111	6F	o
16	10	Data link escape	48	30	0	80	50	P	112	70	p
17	11	Device control 1	49	31	1	81	51	Q	113	71	q
18	12	Device control 2	50	32	2	82	52	R	114	72	r
19	13	Device control 3	51	33	3	83	53	S	115	73	s
20	14	Device control 4	52	34	4	84	54	T	116	74	t
21	15	Neg. acknowledge	53	35	5	85	55	U	117	75	u
22	16	Synchronous idle	54	36	6	86	56	V	118	76	v
23	17	End trans. block	55	37	7	87	57	W	119	77	w
24	18	Cancel	56	38	8	88	58	X	120	78	x
25	19	End of medium	57	39	9	89	59	Y	121	79	y
26	1A	Substitution	58	3A	:	90	5A	Z	122	7A	z
27	1B	Escape	59	3B	;	91	5B	[	123	7B	{
28	1C	File separator	60	3C	<	92	5C	\	124	7C	
29	1D	Group separator	61	3D	=	93	5D	]	125	7D	}
30	1E	Record separator	62	3E	>	94	5E	^	126	7E	~
31	1F	Unit separator	63	3F	?	95	5F	_	127	7F	□



Dec	Hex	Char									
128	80	Ç	160	A0	á	192	C0	Ł	224	E0	α
129	81	ù	161	A1	í	193	C1	ł	225	E1	β
130	82	é	162	A2	ó	194	C2	Ť	226	E2	Γ
131	83	â	163	A3	ú	195	C3	ł	227	E3	π
132	84	à	164	A4	ñ	196	C4	—	228	E4	Σ
133	85	à	165	A5	Ñ	197	C5	†	229	E5	σ
134	86	ã	166	A6	*	198	C6	‡	230	E6	μ
135	87	ç	167	A7	°	199	C7	‡	231	E7	ι
136	88	è	168	A8	¿	200	C8	Ł	232	E8	Φ
137	89	ë	169	A9	ƒ	201	C9	Ŧ	233	E9	Θ
138	8A	è	170	AA	ƒ	202	CA	Ł	234	EA	Ω
139	8B	ì	171	AB	½	203	CB	Ŧ	235	EB	ϑ
140	8C	î	172	AC	¼	204	CC	‡	236	EC	∞
141	8D	ì	173	AD	;	205	CD	=	237	ED	∞
142	8E	À	174	AE	«	206	CE	‡	238	EE	ε
143	8F	Á	175	AF	»	207	CF	Ł	239	EF	∩
144	90	É	176	B0	☼	208	DO	Ł	240	FO	≡
145	91	æ	177	B1	☼	209	D1	Ŧ	241	F1	±
146	92	Æ	178	B2	☼	210	D2	Ŧ	242	F2	≥
147	93	ô	179	B3		211	D3	Ł	243	F3	≤
148	94	ö	180	B4	†	212	D4	Ł	244	F4	[
149	95	ò	181	B5	†	213	D5	ƒ	245	F5	]
150	96	û	182	B6	‡	214	D6	Ŧ	246	F6	÷
151	97	ù	183	B7	Ŧ	215	D7	‡	247	F7	≈
152	98	ÿ	184	B8	Ŧ	216	D8	‡	248	F8	°
153	99	Ö	185	B9	‡	217	D9	∟	249	F9	•
154	9A	Û	186	BA		218	DA	ƒ	250	FA	·
155	9B	◊	187	BB	Ŧ	219	DB	■	251	FB	√
156	9C	£	188	BC	Ŧ	220	DC	■	252	FC	∂
157	9D	¥	189	BD	Ŧ	221	DD	■	253	FD	z
158	9E	ℳ	190	BE	Ŧ	222	DE	■	254	FE	■
159	9F	f	191	BF	Ŧ	223	DF	■	255	FF	□

