

Suburban Machinery
Software, Inc.

PC-DNC Editor for Windows

Operator's manual

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**Suburban Machinery Software, Inc.
37777 Harlow Drive
Willoughby, Ohio 44094
(440) 951-8974**

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PC-DNC Editor installation

PC-DNC Editor for Windows is written for the 32-bit API used by Windows 95/98/ME, and Windows NT 4.0/2000/XP. This program is NOT designed to run under earlier 16-bit versions of Windows. While every effort will be made to make PC-DNC Editor compatible with future versions of Windows, we cannot predict how our current software will run under all future versions of Windows.

Installing the software

PC-DNC Editor can be downloaded from www.sub-soft.com or www.rym.com. The downloaded file is an InstallShield .EXE program, which performs the complete installation. If you're installing from a CD-ROM distributed by Refresh Your Memory Inc., just follow the simple menu instructions provided on the CD. A special "**bundled**" version of PC-DNC Editor is automatically installed when you install our PC-DNC Plus software. Please note that the bundled PC-DNC Editor is slightly different from the "stand-alone" PC-DNC Editor. The stand-alone version is a separately licensed program, while the bundled version is licensed as a component of PC-DNC Plus Server or PC-DNC Plus Client.

Directory assignments

When the PC-DNC Plus installation program runs, it will automatically install PC-DNC Editor in "C:\Program files\RYM\PC-DNC Editor" or "C:\Program files\Suburban Machinery Software\PC-DNC Editor". After PC-DNC Editor is installed, you can use Windows Explorer to create a desktop icon. Simply locate the file EDITOR.EXE in the PC-DNC Editor directory, right-click the mouse and select "Create shortcut". Once a shortcut is created, you can then "drag & drop" the shortcut to your desktop. The Refresh Your Memory distribution CD automatically places a shortcut icon on your desktop.

Licensing copies of PC-DNC Editor

When PC-DNC Editor is installed, it will run in "30-day demo" mode until the proper licensing password is entered. To license your software, you must obtain your PC's unique 9-digit "security number" from the Editor's "About/Purchasing information" menu and contact us for a matching password. To enter your password, open the "About/Purchasing information" menu, press the Ctrl + Alt + "L" keys, and enter your company name, city/state, and the password.

Updating your software

You can update your PC-DNC Editor software at any time by downloading the latest version from www.sub-soft.com or www.rym.com. A web page is available with instructions on how to update your software without losing your old Editor's screen, font, and COM port settings.

Launching PC-DNC Editor

You can launch the stand-alone version of PC-DNC Editor in several ways:

- 1) You can double-click on your PC-DNC Editor's desktop icon
- 2) You can click the Windows START button, then select PROGRAMS, then PC-DNC Editor
- 3) You can use the Windows Explorer's Tools/Folder options/File types menu to associate a file extension with PC-DNC Editor. Once this association has been established, you can simply double-click on any file with that extension to automatically launch the PC-DNC Editor and load the file.

PC-DNC Editor main window

The PC-DNC Editor has been especially designed for NC programming. Since it is an MDI (Multiple Document Interface) editor, you can display several NC files at one time. With 2 or more files displayed on the screen, you can use the mouse to “highlight” text in one file, then cut, copy or paste this text to another file. You can also easily compare files, or modify files with one of the PC-DNC Editor’s MODIFY functions. Figure 1 (below) shows the main PC-DNC Editor main window, with one text box open.

In this manual, we will refer to certain elements of the PC-DNC Editor’s main window by name. When we refer to a “text box” or a “pull-down menu”, here’s what we mean:

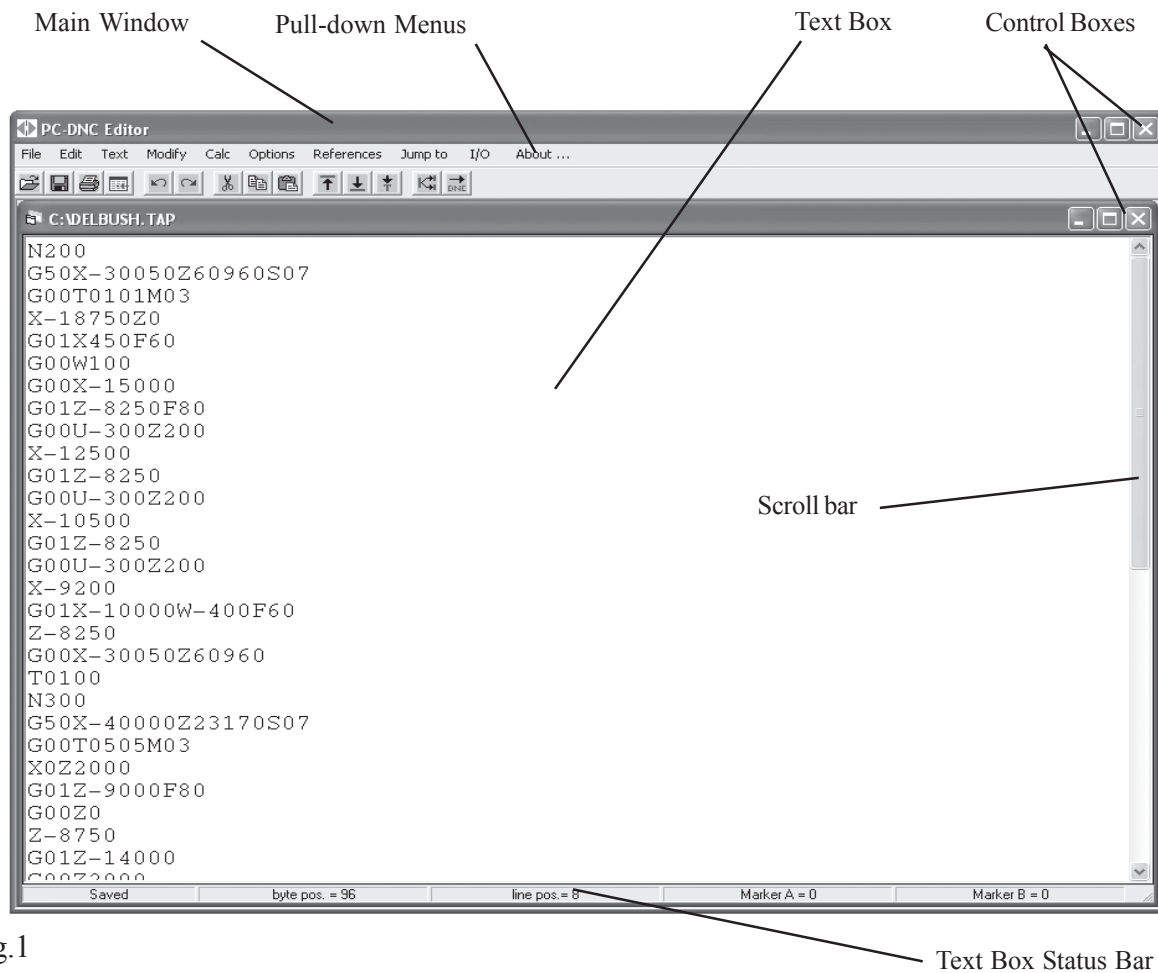
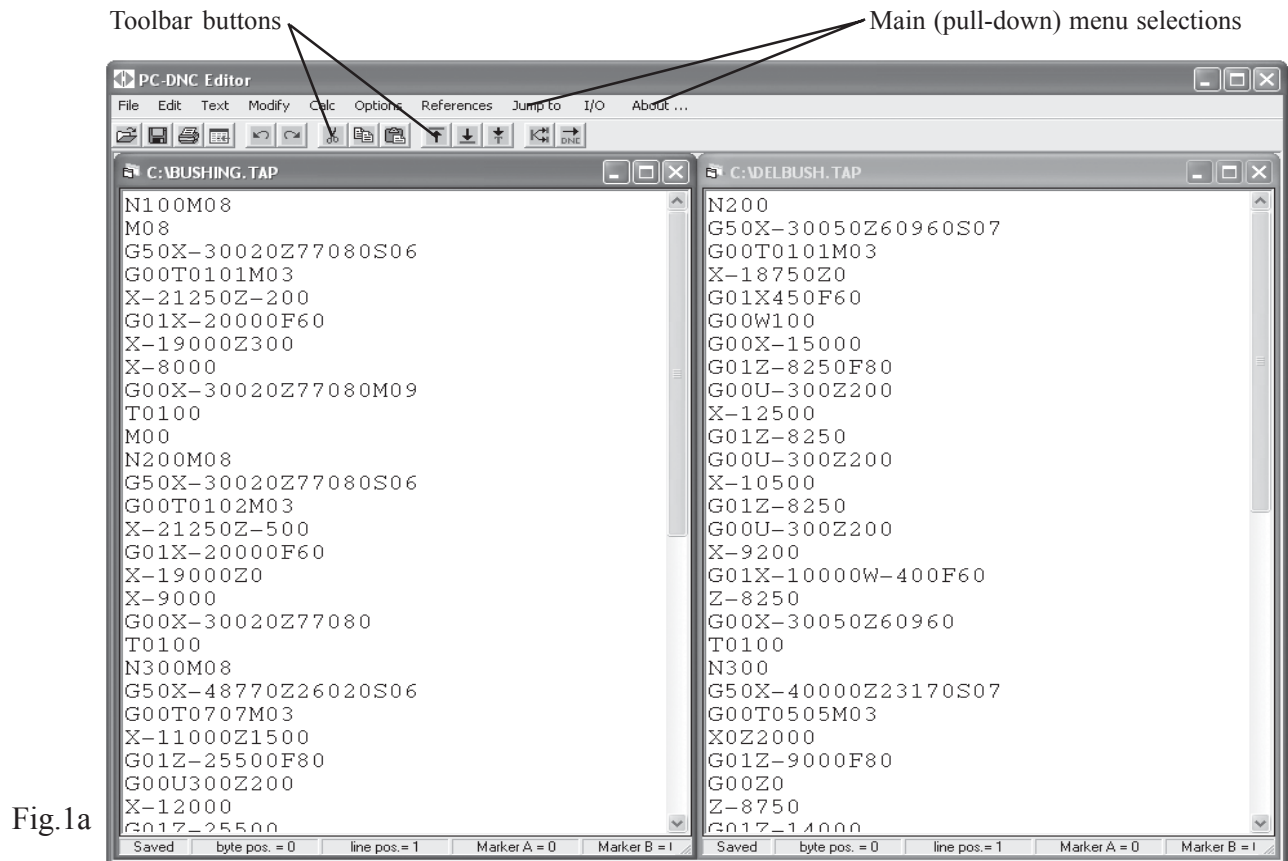


Fig.1

Later in this manual, we will discuss each of the PC-DNC Editor’s functions. When we describe a sequence of menu selections, we might use terminology like: “Text/Foreground/Blue”. This means: move the mouse pointer to the pull-down menu “Text”, and select the menu choice “Foreground”, then chose “Blue”.

PC-DNC Editor main menus

Each function of the PC-DNC Editor begins with a “Main Menu” selection or a “Toolbar” selection. Each main menu selection leads to at least one “sub-menu” selection. Toolbar buttons are shortcuts to the most commonly used editing functions.



Each main menu selection refers to a **category** of functions. The 10 major categories are listed below:

| | |
|-----------|--|
| FILE | Selections pertaining to files (open, close, save, save as, compare, print, etc.) |
| EDIT | Selections for manipulating text (cut, copy, paste, search, replace) |
| TEXT | Selection for text colors and font size |
| MODIFY | Selections to modify files (format, offset, scale, mirror, resequence, etc.) |
| CALC | Calculator functions for solving common math problems |
| OPTIONS | Text editor options (filter files, auto save, set default directories, etc.) |
| REFERENCE | Selections of reference files that can be quick-opened as text files (i.e. G-code lists) |
| JUMP | Jump to the beginning or end of a file |
| I/O | Selections to send or receive files by any available COM port |
| ABOUT... | Brief messages about Suburban Machinery, the author, and our policy |

PC-DNC Editor function list

Here is a list of each of the PC-DNC Editor's functions, along with a very brief description. Each function is described in more detail later in this manual.

| Menu | Sub-menu | Sub-Sub menu | Description |
|-------------|-----------------------|---------------------|--|
| FILE | NEW | | Creates a new text box (untitled) |
| | OPEN | | Opens an existing file in a new text box |
| | SAVE | | Saves the active text box to disk with old name |
| | SAVE AS | ASCII FILE | Saves active text box under a new file name |
| | | PCNC FILE | Saves active text as PCNC format file |
| | | BINARY FILE | Saves active text as a binary file |
| | | CODE CLIP | Saves active text as a "Code Clip" file (.CLP) |
| | INSERT | | Reads a file from disk & inserts it in active file |
| | DELETE | | Deletes a file from disk |
| | PRINT | ACTIVE FILE | Prints active file to default printer |
| | | ALL OPEN FILES | Print all opened files to default printer |
| | | SELECTED TEXT | Print only text you have highlighted. |
| | | BETWEEN MARKERS | Prints text between Marker A & B (active file) |
| | | FIRST PAGE ONLY | Prints only the first page of the selected file |
| | | SET DEFAULT PRINTER | Lets you choose any installed printer device |
| | | SET PAGE LAYOUT | Lets you set page options when printing |
| | | HALT PRINTING | Lets you stop a printing process |
| | COMPARE | | Compares 2 text boxes & highlights changes |
| | ARRANGE | CASCADE | Arranges text boxes in "cascade" style |
| | | TILE | Arranges text boxes so they don't overlap |
| | NEWCON UTILITY | | Generates new CONTENTS file (PCNC format) |
| | RUN (utility program) | | Runs any program you want to jump to |
| | CLOSE | | Closes the active text box (does NOT save) |
| | EXIT | | Exits the PC-DNC text editor |
| | (Recent files list) | | (A list of the 5 most recently opened files) |
| EDIT | UNDO EDIT | | Backs up 1 step in the editing process |
| | REDO EDIT | | Advances 1 step (after UNDO is used) |
| | PASTE DATE | | Pastes the date into the text box |
| | CUT | | Erases selected text in the active text box |
| | COPY | | Copies selected text to the Windows clipboard |
| | PASTE | | Inserts text in Windows clipboard to active text |
| | SEARCH | | Searched for text within active text box |
| | REPLACE | | Replaces text in active text box with new text |
| | STOP REPLACE | | Halts an ongoing replace process |

PC-DNC Editor function list (cont.)

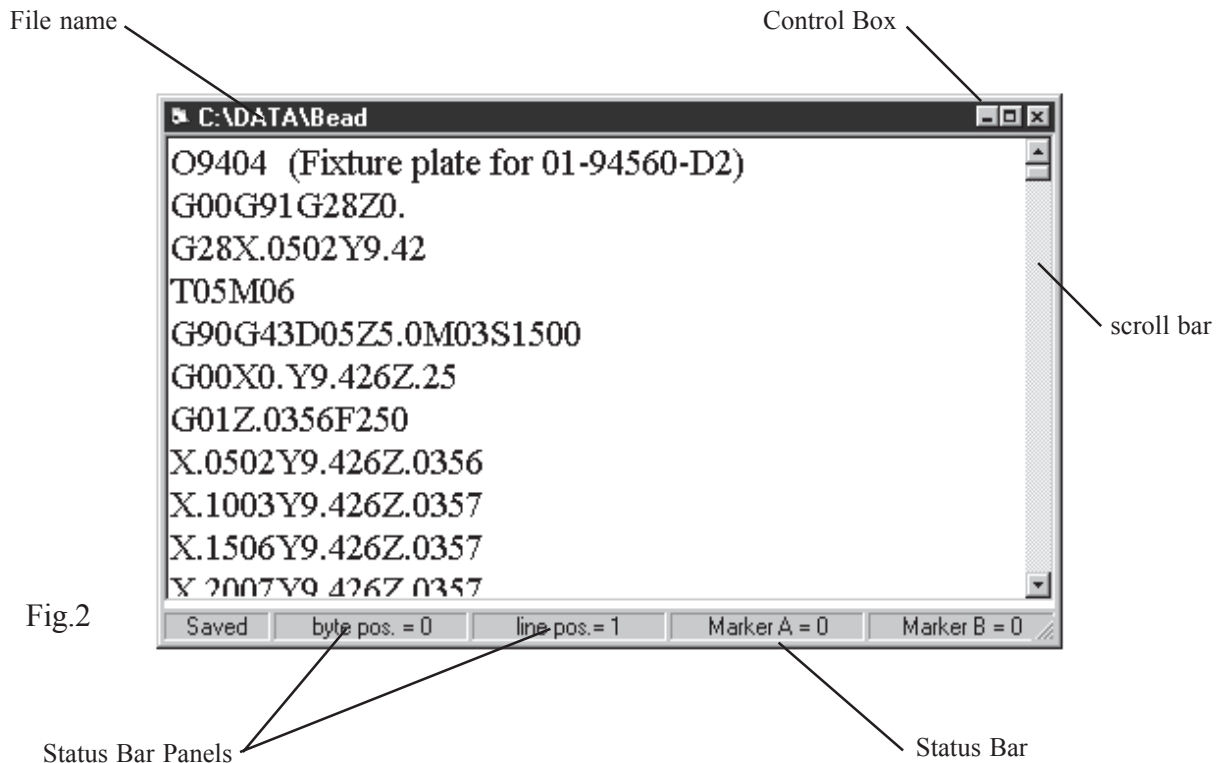
| Menu | Sub menu | Description |
|---------------|--------------------|--|
| TEXT | | |
| | BACKGROUND | Selects colors of black, white, or blue |
| | FOREGROUND | Selects colors of red, green, blue, white, black |
| | ACCENT COLOR | Selects colors used for accented text |
| | SCREEN FONT SIZE | Selects font sizes of 10, 12, 15, and 19 point |
| | SCREEN FONTS | Selects from any available Windows text font |
| | ADDRESS COLORS | Lets you specify a color for each letter address |
| | COLORIZE | Applies address colors to entire text file |
| | HIGHLIGHT LINES | Highlights line containing selected commands |
| | SCROLL ALL | Scroll all open text boxes with special scroll bar |
| MODIFY | | |
| | FORMAT | Reformats numbers within the active text box |
| | OFFSET | Adds or subtracts from any values within the active text box |
| | SCALE | Scales any axis coordinates around a "scale center" point |
| | ROTATE | Rotates coordinates in XY, YZ, or XZ planes (including IJKs) |
| | MIRROR | Mirrors any axis coordinate around a "mirror center" point |
| | SWAP | Swaps any 2 commands (swaps G02 & G03 for example) |
| | REPLACE TEXT | Search & replace all occurrences of one command with another |
| | RESEQUENCE | Deletes old N-numbers and inserts new ones |
| | COMPRESS | Reduces the size of a file by removing spaces, N-numbers, etc. |
| | ADD SPACES | Inserts spaces before each letter address (for readability) |
| | SEGMENT FILE | Breaks a large file into several smaller ones (you set size limit) |
| | SPLINE FIT | Fits a cubic spline to your data points to make a smooth curve |
| | CONVERT FILE | A programmable, mass-editing function for converting files |
| | ABS/INC CONVERT | Converts absolute files to Incremental and vice-versa |
| | INCH/METRIC | Converts commands from inch-to-metric and metric-to-inch |
| | MAX/MIN ANALYSIS | Scans a file for maximum & minimum values of any axis |
| | CHANGE CASE | Changes text from upper case to lower case and vice-versa |
| | INSERT TEXT | Lets you insert text before or after selected text |
| | UNDO MOD. | Restores old data to text box if you don't like the modification |
| CALC | | |
| | SFM/RPM | Displays a dynamic conversion box for SFM/RPM calculations |
| | IPM/IPR | Displays a dynamic conversion box for IPM/IPR conversions |
| | DEGREES | Displays a conversion box for Deg./Min/Sec. to Decimal/Rad. |
| | TRIANGLES | Displays a dynamic conversion box for solving Right Triangles |
| | TOOL RADIUS OFFSET | Calculates common radius/angle offset problems |
| | DRILL POINT | Calculates drill point and center drill point depths |
| | CIRCLE/LINE | Calculates common circle/angle offsets |
| | MS CALCULATOR | Displays the Microsoft Windows calculator |
| | BOLT HOLE CIR. | Generates a Bolt-hole pattern in a separate text box |
| | ROW OF HOLES | Calculates XY positions of a series of holes along a straight line |

PC-DNC Editor function list (cont.)

| Menu | Sub menu | Description |
|------------------|--|--|
| OPTIONS | | |
| | FILTER FILES | Removes nulls, control codes, etc. when loading a file from disk |
| | USE ADDRESS COLORS | Automatically apply address colors to text files |
| | ARRANGE FILES.. | Rearranges all text boxes whenever you close a text box |
| | SAVE SETTINGS | Saves “options” settings and screen colors on disk for later use |
| | OPEN CONTENTS FILE | Auto-opens CONTENTS file in PCNC file mode |
| | USE CONTENTS.DOS | Searches directory and creates CONTENTS.DOS file |
| | AUTO SAVE (2min) | Saves the contents of ALL text boxes every 2 minutes |
| | AUTO SAVE (10min) | “ “ “ 10 minutes |
| | SET SAVE/AS TO ASCII ONLY | |
| | SHOW “FIND TEXT” TOOLBAR BUTTON | |
| | ACCENT TEXT BETWEEN MARKERS | Accents text when makers are changed |
| | CREATE .BAK FILES | Create .BAK files whenever an old file is overwritten |
| | USE FUNCTION KEYS | Enables function keys F1-F10 for editing shortcuts |
| | RESET TO TOP-OF-FILE AFTER FILE/MODIFY | Sets cursor to top of file |
| | PERMIT MULTIPLE INSTANCES | Lets you run multiple PC-DNC Editor sessions |
| | SHOW DRILL POINT CALCULATOR IN METRIC | |
| | DISABLE SPLASH SCREEN | |
| | SET DIRECTORIES | Lets you set a default path for files, and for MS Calculator |
| REFERENCE | | |
| | G-CODES | Opens a text box and displays a G-code list from your library |
| | M-CODES | Opens a text box and displays a M-code list from your library |
| | SPEEDS & FEEDS | Displays a Speed & Feed table from your library |
| | EIA CODES | Displays a chart of EIA RS244B tape codes |
| | ISO CODES | Displays a chart of ISO 840 tape codes |
| | CNC CONTROL INFORMATION | |
| JUMP | | |
| | BEGINNING | Moves cursor to the beginning of the active text box |
| | END | Moves cursor to the end of the active text box |
| | NEXT T-CODE | Moves cursor to the next T-code in the file |
| | MARKER A | Moves the cursor to the Marker A position |
| | MARKER B | Moves the cursor to the Marker B position |
| I/O | | |
| | ADD FILE TO QUEUE | Adds the active file to a PC-DNC Plus machine’s queue |
| | SELECT IO DEVICE | Selects which DNC window queue the file is added to |
| ABOUT | | |
| | PC-DNC EDITOR | ...about your version of PC-DNC EDITOR |
| | SUBURBAN | ...about Suburban Machinery, Software Division |
| | REFRESH YOUR MEMORY INC. | |
| | THE AUTHOR | ...about Dan Fritz, author of PC-DNC Editor |
| | SUPPORT IN AUSTRALIA | ...about Shera Bonnet & Associates PTY, Ltd |
| | PURCHASING INFORMATION. | |

The PC-DNC Editor's text box

Each time you open a text box within the PC-DNC Editor's main window, a new box like the one shown below is displayed. Each text box is a totally independent text editor, which displays the file name in the upper-left corner.



Each text box can be MINIMIZED, MAXIMIZED, WINDOWED or CLOSED using the Control Box in the upper right corner. Do not confuse the control box of the individual text boxes with the (similar) control box in the PC-DNC Editor Main Window. (Refer to Fig.1a)

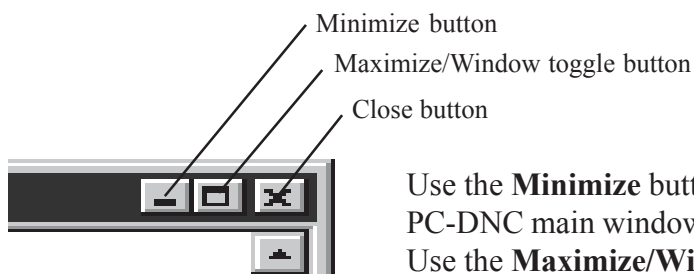
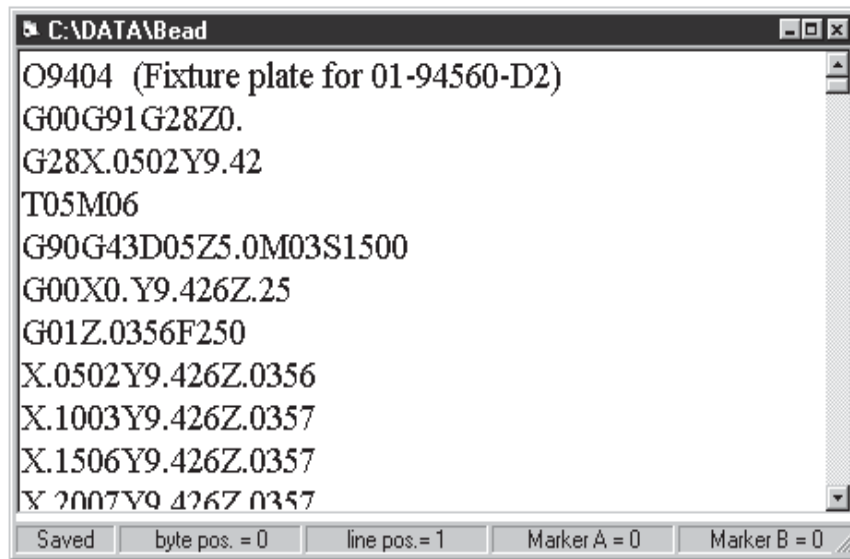


Fig.3

Use the **Minimize** button when you need to clear space on the PC-DNC main window, but don't want to close the file entirely. Use the **Maximize/Window** toggle button to display the text box in "full-screen" mode or "Windowed mode". The **Close** button closes the text box, just like FILE/CLOSE.

The PC-DNC Editor's text box (cont.)

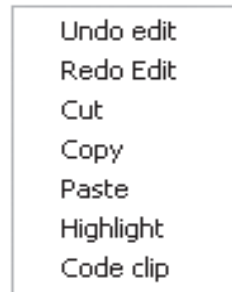
At the bottom of each text box is a “status bar” which consists of 5 panels. Each status bar displays information about the text box.



| | | |
|----------|--------------------------|--|
| Panel #1 | Saved / Not Saved | If a file has been saved since it was last changed, the word “Saved” appears. If a file has been changed, the words “Not saved” appear, and you will receive a warning message if you try to close it. |
| Panel #2 | Byte position | The current position of your cursor within the text box (in bytes). A position of zero refers to the “top” of a file. |
| Panel #3 | Line position | The current line position of your cursor. |
| Panel #4 | Marker A | A marker that you can set. When you click on panel #4, Marker A remembers the position (in bytes) of the cursor. |
| Panel #5 | Marker B | A marker that you can set. When you click on panel #5, Marker B remembers the position (in bytes) of the cursor. |

The Right-Click Menu

When editing files, you can use a convenient pop-up menu that appears whenever you click the right-mouse button. These are the most commonly used editing functions.



Undo Edit

When editing, the edit operations in each text box are saved in a 1000 command buffer. The Undo Edit function will delete characters that have been inserted, or insert characters that have been deleted. All single and multiple character edit operations (but NOT the functions in the MODIFY menu) are included in the UNDO EDIT function. For convenience, you can also use the shortcut of Ctrl+U to undo an edit function. Hold the “Ctrl” key while pressing “U” to undo an edit.

Redo Edit

After the UNDO EDIT function is used, you can REDO the edit (or UnDo the Undo) by selecting the REDO EDIT function. Only character editing that has been “Un-done” can be “Re-done” with the REDO EDIT function. For convenience, you can also use the shortcut of Ctrl+R to redo an edit function. Hold the “Ctrl” key while pressing “R” to redo an edit.

Cut

Removes highlighted text from your file, and simultaneously copies the text to the Windows clipboard. Data in the clipboard can then be “pasted” elsewhere with the Paste function.

Copy

Copies the highlighted text to the Windows clipboard. Data in the clipboard can then be “pasted” elsewhere with the Paste function.

Paste

Inserts any text that is currently in the Windows clipboard at the location of your cursor.

Highlight

Applies the currently selected “highlight color” to the selected text. A highlight color can be selected under the “Text” menu

Code Clip

Lets you select from any Code Clip file that you have saved. Any text can be saved as a Code Clip file (using a .CLP extension) using the PC-DNC Editor’s File/Save As/Code Clip function. When a .CLP file is selected, it is automatically copied to the Windows clipboard, which you can then “Paste” anywhere you like.

Arranging your text boxes

When you open several files at once, you can use the File/Arrange menu selection to display them in either a “Tiled” or “Cascaded” style. The default configuration for the PC-DNC Editor is “Tiled”, shown here:

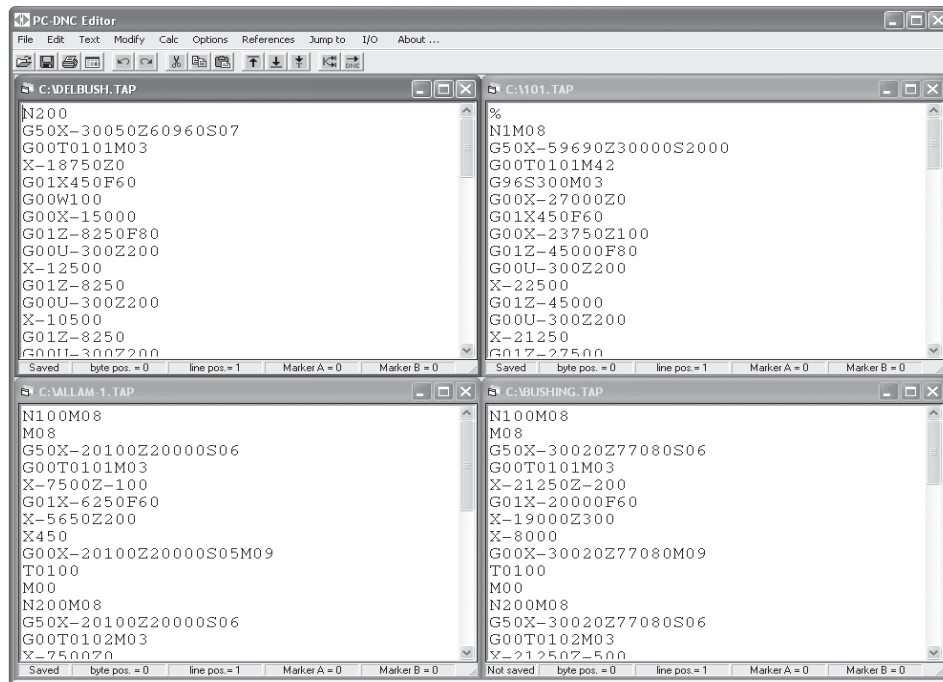


Fig.5

Here is an example of a “Cascaded” file arrangement:

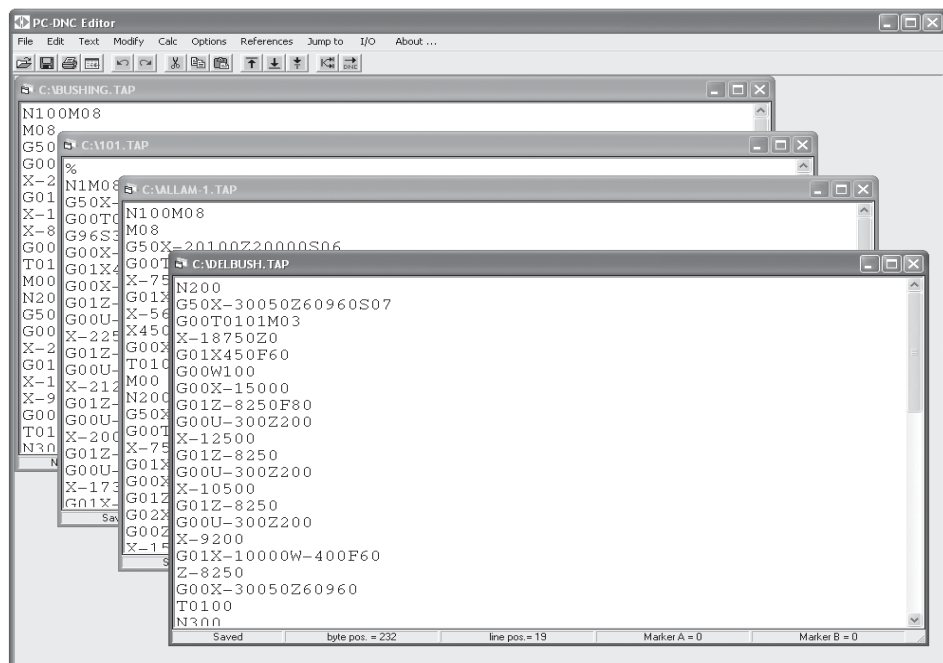


Fig. 6

Selecting an “active” text box

When several text boxes are open at one time, only one box can be the “active” box. To select an active text box, move the mouse pointer over that box and click on it. When a text box is active, the bar across the top of the text box will be darker color than the other text boxes. Also, if you have arranged your text boxes in a “cascade” style, the active box will be in the foreground, and all the other boxes will appear to be behind it.

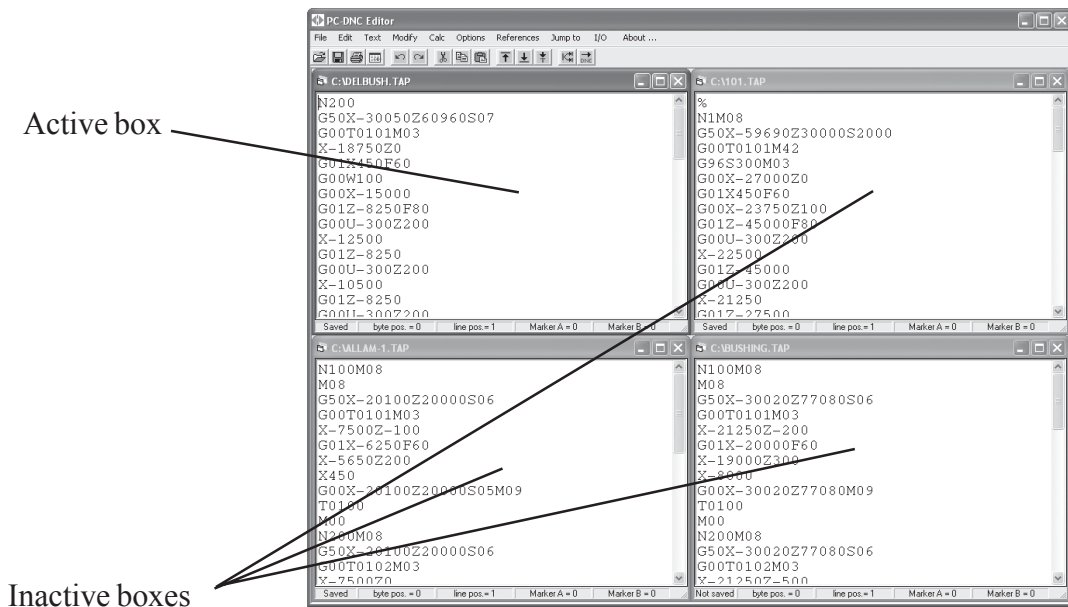


Fig.5

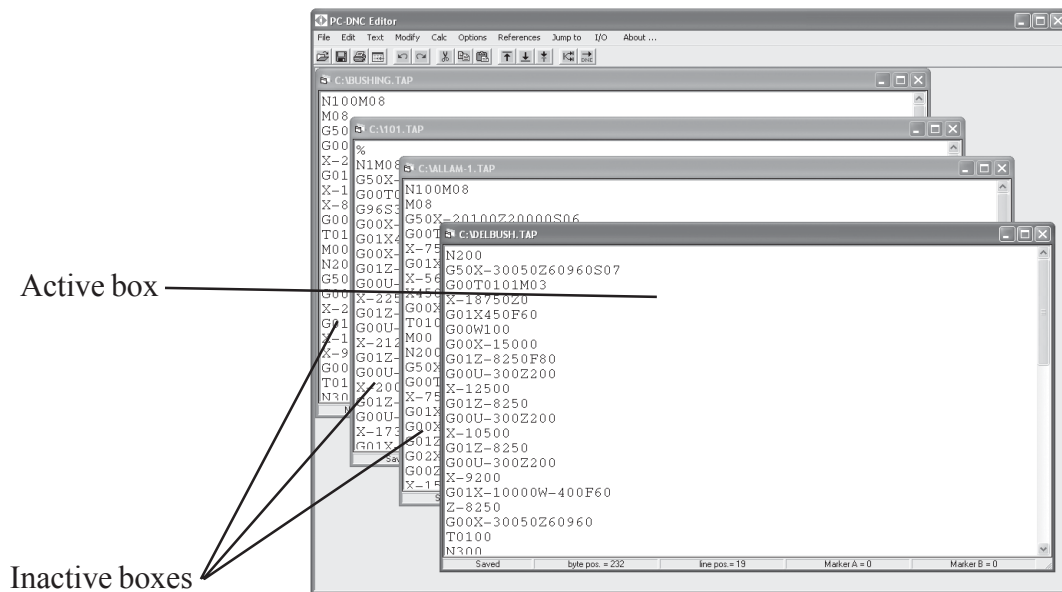


Fig.7

Creating a new file

Use the File/New menu selection to create a new text box. When the new box appears, it will automatically become the active text box. Simply begin entering text, using the ENTER key to start each new line. As you type, your cursor position is displayed on the status bar at the bottom of the text box. When you select File/New, the PC-DNC Editor searches your current directory for the first available “Untitled-number”. The caption in the upper-left corner of the new text box will become: “Untitled-n”. This untitled file number can be used to SAVE the file, or you can use File/Save As to store your data under a different name.

Opening an existing file

When you use the File/Open menu selection, a Windows dialog box will appear which lets you select a file, select a drive/directory, or select a file extension. Once you have located the file you wish to open, you can double-click on the file name, or you can single-click on the file (highlighting it), and then click on the “Open” button. If you have a CONTENTS file (PCNC format) or a CONTENTS.DOS file (ASCII file format) open, you can also “quick-open” any file in the list by highlighting a line of the CONTENTS file, and clicking “File/Open”. See page 30 for information on the CONTENTS and CONTENTS.DOS files.

You can also “Drag and Drop” files from the Windows Explorer onto any part of the PC-DNC Editor form. PC-DNC Editor will automatically open any files “dropped” onto it.

Saving the contents of your text box

When an existing text box needs to be saved, you can select File/Save. This save method uses the file name shown in the upper left of the text box to store the data. If this was the file originally read-into the text box, it will be overwritten with the new data. In all cases, if the PC-DNC Editor is instructed to overwrite an existing file, you will be warned before the file is actually overwritten. If the file does not already exist, no warning will occur.

Saving under a new file name

To save the information in a text box under a NEW file name, use the File/Save As selection. This selection opens the file dialog box, lets you enter a new file name, and (optionally) lets you select a different drive/directory path, and/or a new file extension. The contents of your text box is then written to this new disk file, leaving the original disk file unchanged. You can save files in normal ASCII format, our own PCNC/PC-DNC format, in Binary format, or as a “Code Clip” file. ASCII files typically use 8 + 3 digit MS-DOS format file names, or 255 character (Windows) file names. PCNC format files use a 4-digit program number (PROGxxxx) and a 32-character program name stored in a separate CONTENTS file. Binary files are saved without formatting of any kind, and “Code Clip” files are saved in the PC-DNC Editor directory with a “.CLP” extension.

When storing PCNC format files, a menu will appear that will let you search any drive/directory for the first unused 4-digit PCNC file number. You can then save using this new number, or manually enter any 4-digit number and 32-character name you want before saving. The 4-digit number and the 32-character names are automatically cross-referenced in the CONTENTS file.

Inserting a file into a text box

The File/Insert selection is different from the File/Open selection. File/Open places the contents of your file into a new text box, where File/Insert reads in a new file, ***inserting it into an existing text box at the cursor position***. The File/Insert function is useful for merging two existing files, or if you have a subroutine you want to merge into a file that you are editing. File/Insert does not affect the file you are inserting, but simply reads in that data, and inserts it in the existing text box.

Deleting files

The File/Delete menu selection lets you select any file on disk and delete it. You can even delete a file that is currently loaded into an open text box. If you do this, you can then save the file without an overwrite warning, since the file on disk no longer exists. CAUTION! This is a real file DELETE function. Your deleted files are NOT transferred to the Windows “Recycle bin”.

Printing files

The File/Print menu has a variety of options for printing your files. You can print the currently active file, all the files currently opened, just the selected text within the active file, just the text within markers, or just the first page of the currently active file.

With any of these selections, PC-DNC editor will format the text for printing, and pass it off to your printer driver for transmission to your printer. PC-DNC Editor does not actually transmit or spool the data to the printer, so other settings under Windows may affect how your printer gets its data. To make changes to the way data is “spooled” to your printer, use the Windows “Start/Settings/Printers” menu.

Under the “File/Print” menu you can also select the default printer with a standard Windows dialog box, or determine the page layout with a special menu shown below:

The Page Layout menu lets you determine how PC-DNC Editor formats your file for output to the printer. Using checkboxes, you can select whether or not the file description, line numbers, or page numbers are sent to the printer.

The number of lines per page can be set to any number your printer can fit on one page at the selected font. The number of characters per line is the number of characters that PC-DNC Editor outputs on each line. Lines longer than this number are “word wrapped” to the next line (and indented). The left margin setting is the number of spaces printed to the left of each line.

A “Printer Fonts” button shows a standard Windows dialog box that lets you set any font or font size available on your system. Hint: Set the printer font and font size first, since this will affect how many lines per page and characters per line you need to set.

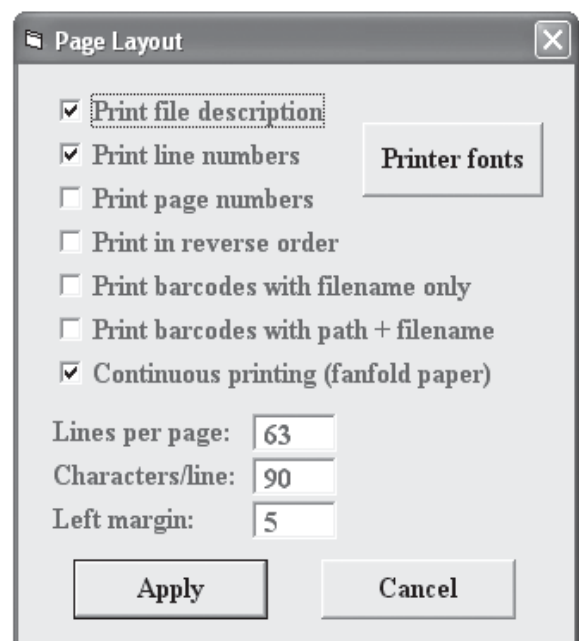


Fig. 7a

Comparing files

The contents of two text boxes can be compared using the File/Compare function. To use this function, you must have two (and ONLY two) text boxes open. When comparing files, be aware that there are limits to what this software can do. If you load two totally different files, and then start the File/Compare function, you may have to wait a long time for the process to finish. If your two files are similar, with only a few changes, PC-DNC Editor should finish quickly.

The File/Compare algorithm is fairly complex. When you begin the process, PC-DNC Editor begins a line-by-line comparison of the two files. When it finds a difference, it marks that line, and begins a forward and reverse “pattern matching” routine to detect if one of these lines was simply edited, or if a line has been inserted and/or deleted. The pattern matching algorithm is normally limited to 10 lines of text, so the File/Compare function may fail if you have inserted or deleted more than 10 lines from either file. This pattern matching limit can be changed if necessary. After PC-DNC Editor has identified the “changed” lines (as opposed to “inserted” or “deleted” lines) it compares the characters within each changed line to determine the difference.

When two files are compared, you can display 3 types of File/Compare reports. The default display shows a “side-by-side” file comparison (shown below). When the side-by-side compare method is used, a universal scroll bar is displayed to the right of the main editor window. This scroll bar permits simultaneous scrolling of the two text boxes for easy side-by-side viewing.

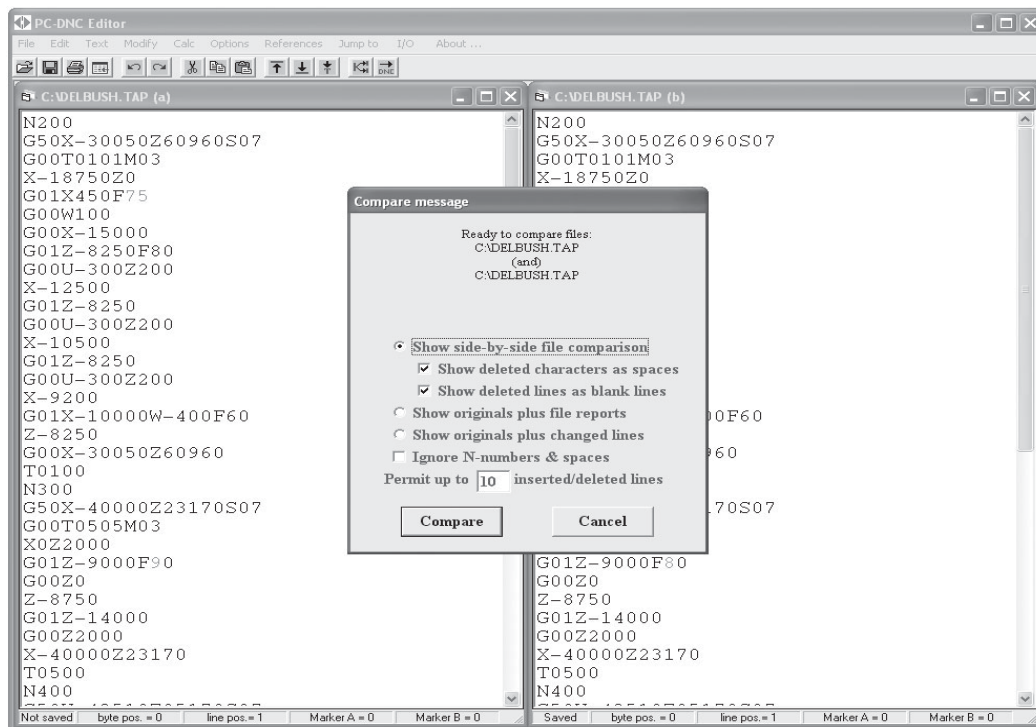


Fig.8

In addition to the “side-by-side” report format shown here, a “Complete Changes-to” report shows a copy of each file, in which inserted lines are UNDERLINED, deleted lines printed in ~~STRIKETHRU~~, and changed characters shown in *ITALICS*. An abbreviated “Changes-to” report lists only the changed lines within each file. When closing these “Changes-to” text boxes, NO WARNING WILL BE ISSUED if you try to close without saving.

Arranging files

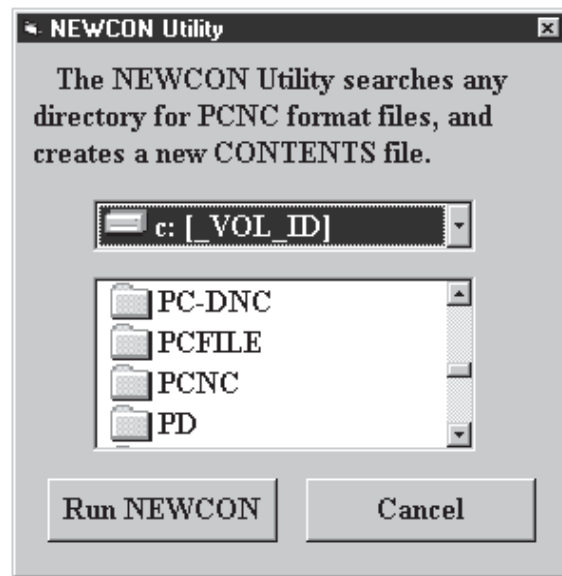
When several files are displayed in different text boxes, you can arrange them in either “Tile” or “Cascade” fashion by using the File/Arrange function. Refer to page 9 of this manual for a description of each of these methods. You can manually rearrange your text boxes at any time. You can also check the option “Arrange files when closing” under the “Options” menu. When this option is checked, the open text boxes will automatically be rearranged whenever a text box is closes.

NEWCON Utility

This is a familiar feature to those customers who have used our earlier PCNC or PC-DNC systems for MS-DOS. If you are using our PCNC/PC-DNC file format, all NC files are named with a 4-digit number (i.e. “PROG1234” or “PROG5678”), and a separate file called “CONTENTS” is maintained, which contains a list of 4-digit numbers and an optional 32-character program name. If your CONTENTS file should become lost, damaged, or become inaccurate, you can create a new one with this NEWCON utility. When you select the “File/NEWCON Utility” function, a dialog box will appear to let you select a drive and directory:

Once a path is selected, you can click on the “Run NEWCON” button to begin creating a new CONTENTS file. PC-DNC Editor will search for all PROGxxxx files within that directory, and extract the program name from each file’s “title” line. Then it creates a new CONTENTS file automatically.

The NEWCON utility is basically the equivalent of the NEWCON Batch File Utility program supplied with our earlier versions of PC-DNC and PCNC for MS-DOS.



Running a utility program

When the name of a “Utility program” is entered under the “Options/Set Directories” menu, an additional menu selection will appear in the “File” menu (File/Run ----), which permits you to run this utility program. Refer to page 30 for a full description of the Run Utility program function.

Closing files

To Close a text box, you can use the File/Close menu selection, or you can use the “close” selection in the control box (upper right corner of the text box). In either case, PC-DNC Editor will check whether the file is “Saved” or “Not saved”. If the file has not been saved, a warning is given.

Exiting the editor

To exit the PC-DNC text editor, you can use the File/Exit menu selection, or you can use the “close” selection in the PC-DNC Editor’s control box (upper right corner). If you attempt to exit the PC-DNC Editor before all the text boxes have been saved, you will be warned for EACH unsaved text box. Exiting the Editor is not permitted while a file I/O is in progress from within the Editor. Use the “Abort I/O” selection first, then exit the Editor normally.

Recent files list

At the bottom of the FILE pull-down menu, there is a list of the 5 most recently opened files. You can “quick-open” any of these files by clicking on the file name, or by typing the number that appears with the file name. This list is updated whenever you CLOSE a file, or exit the Editor.

UnDo Edit function

When editing, the edit operations in each text box are saved in a 1000 command buffer. The UNDO EDIT function will delete characters that have been inserted, or insert characters that have been deleted. All single and multiple character edit operations (but NOT the functions in the MODIFY menu) are included in the UNDO EDIT function. For convenience, you can also use the shortcut of Ctrl+U to undo an edit function. Hold the “Ctrl” key while pressing “U” to undo an edit.

ReDo Edit function

After the UNDO EDIT function is used, you can REDO the edit (or UnDo the Undo) by selecting the REDO EDIT function. Only character editing that has been “Un-done” can be “Re-done” with the REDO EDIT function. For convenience, you can also use the shortcut of Ctrl+R to redo an edit function. Hold the “Ctrl” key while pressing “R” to redo an edit.

Cutting selected text

The Edit/Cut selection can be used to remove a section of text from any text box. You can cut text in two ways: First, you can “select” the text by dragging the mouse pointer over the desired text, and then use Edit/Cut/Selected Text to remove it. You can also use Marker A and Marker B to define the text you want to cut, and use the Edit/Cut/Between Markers selection. To use the Marker method, click on the first character, then click on the “Marker A” panel at the bottom of the text box. Next, click on the last character, then on the Marker B panel. When the markers have been set, the Edit/Cut/Between Markers selection will work.

Copying text

The Edit/Copy function can be used to copy a section of text from one text box, and move it to another with the “paste” function. Unlike the Edit/Cut selection, Edit/Copy does not remove the text, but simply copies it to the Windows clipboard. You can copy text in two ways: First, you can “select” the text by dragging the mouse pointer over the desired text, and then use Edit/Cut/Selected Text to remove it. You can also use Marker A and Marker B to define the text you want to cut, and use the Edit/Copy/Between Markers selection. To select text, click the mouse pointer on the first character of the desired text, then HOLD the mouse button while you move it to the last character you want to select. When you let up on the mouse button, the text area will appear highlighted, or “selected”. You can now use Edit/Copy/Selected Text. To use the Marker method, click on the first character, then click on the “Marker A” panel at the bottom of the text box. Next, click on the last character, then on the Marker B panel. When the markers have been set, the Edit/Copy/Between Markers selection will work.

Pasting text

Once text has been cut or copied onto the Windows clipboard, it can be “pasted” to any text box with the Edit/Paste function. Simply click on the spot where you want the text to be inserted, and choose Edit/Paste. Text can be copy & pasted between text boxes, between applications (such as between MS Word or MS Notepad and PC-DNC Editor). You can also copy and paste numbers from the MS calculator to the PC-DNC Editor and vice-versa.

Searching for text

To find text within a text box, you can use the Edit/Search function. When you choose Search, a dialog box is opened which lets you enter the text you are searching for. The search will take place within the active text box only, and will not involve any inactive text boxes that you may have open. There are some options available for searching text, which can be individually selected with “check boxes” within the Search dialog box. The default search method requires that the *CASE* of the text (i.e. upper/lower case) match, and that the search begin at the current cursor position. You can choose to ignore case, and you can start the search from the beginning of the file, or you can limit the search to the area between marker A and marker B. In addition, you can do a “quick-search” for S-codes or T-codes within your file.

Replacing text

To replace text within a text box, you can use the Edit/Replace function. When you choose Replace, a dialog box is opened which lets you enter the text you are searching for, and the text you want to replace it with. The search will take place within the active text box only, and will not involve any inactive text boxes that you may have open. There are some options available for replacing text, which can be individually selected with “check boxes” within the Replace dialog box.

We recommend that Edit/Replace be used if you want to *selectively* replace something within a file. To replace *all* occurrences of something within a file, its much faster to use the Modify/Replace function instead.

Halting a replace function

Once a “Replace All” process has been started, you can stop it with the Edit/Stop Replace function. This halts the process wherever it happens to be, and can be resumed if you select Edit/Replace again.

Text colors

The TEXT pull-down menu has three selections for changing text colors, and one for changing the font size. Foreground, background, and “accent” colors are individually selectable from a menu of colors. Since there is no restriction on choosing colors, it IS possible to set the foreground color and the background color to be the same. This would result in “invisible” text. If this should happen, all you need to do is choose another foreground or background color. The actual text in your text box will not be affected. When you choose a new color, the active text box is changed to the new color, but any inactive ones are not. In addition, any text boxes you open after that will take on the new colors.

Screen font sizes

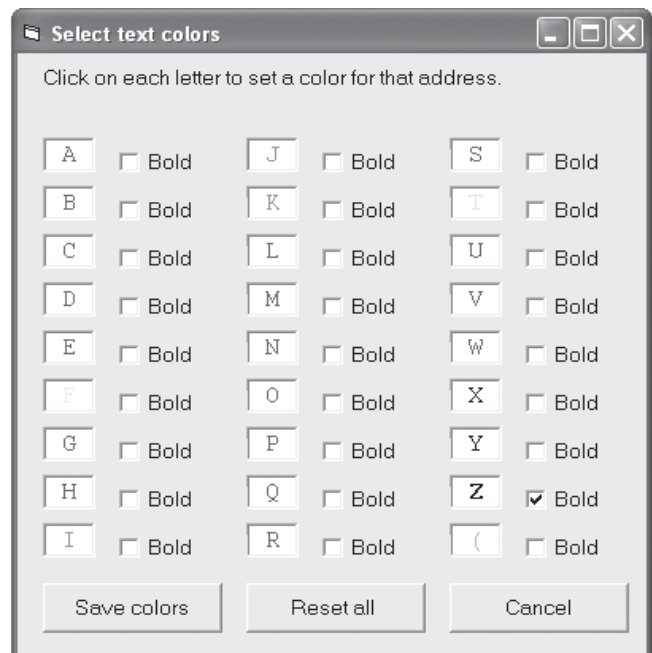
You can select from several text sizes with the Text/Font Size menu selection. When you change the font size, the active text box is changed to the new size, but any inactive ones are not. In addition, any text boxes you open after that will take on the new font size.

Screen fonts

Any text font that is currently installed on your computer can be selected from the Text/Screen Fonts menu. A Windows Font Dialog is displayed, from which you can select any font. Since some fonts use “proportional spacing”, where some characters (like “i” and “l”) are narrower than others (like “w”), we recommend that you use the Courier font, which is much easier to read in typical G-code files.

Address colors

The Text/Address colors menu lets you apply a color to any letter address. This feature lets you display all “X” values in one color, “M-codes” in another color, etc. You can select from any font color available on your PC. Notice that color selections may be different from PC to PC, depending on monitor type and Windows settings for color depth. These colors are applied to an open file when you click the Text/Colorize menu. You can also apply these colors automatically as the file is opened by checking the option “Use Address colors when opening” under the “Options” menu



Colorize text

The Text/Colorize selection lets apply the colors you've selected in the Text/Address colors menu to any open file. Caution: This selection should only be used with files of modest size. Since colorizing a file may take some time, do not attempt to apply individual address colors to multi-megabyte size files.

Highlighting lines of text

You selectively highlight lines of text within any text box. The selected "accent" color is used for this purpose. The Text/Highlight lines function lets you quickly highlight lines containing T-codes, S-codes, G92 or G50 commands. An "other" selection also lets you highlight lines containing any text you choose.

Scroll All

The Text/Scroll All selection lets you vertically scroll all the open text boxes together (synchronously). When you select "Scroll All", a universal scroll bar will be displayed to the right of the main editor window. This scroll bar will vertically scroll all the text boxes that are open at the time the Scroll All selection is made.

Modify menu

The Modify pull-down menu contains functions that perform extensive modifications on the active text box. For convenience, there is also an UNDO function, which lets you put the original data back into your text box if you do not want to keep the modified data. Each of the Modify selections work in a similar way. First, a scratchpad data file is opened on your hard drive and the text in the active text box is stored. Next, the modify function reads-in this file and creates a new (modified) scratchpad file. When it's finished modifying, the active text box is loaded with the new, modified data from the scratchpad file. The Modify/Undo function simply replaces that modified data with the data in the original scratchpad file. In addition, you can Undo the Undo command as well, putting the modified data back into your text box.

Number formatting

The Modify/Format selection lets you reformat numbers within your text box. When you choose Modify/Format, a dialog box appears that lets you enter the letter addresses you want to affect, and several options for reformatting the numbers.

Before you reformat the numbers within the active text box, you can test the parameters by entering a sample number in a “test” box. The reformatted version of your test number is shown next to it.

When you have chosen the number format that you want to use, click on the FORMAT button to begin the file modification. Wherever any of the chosen addresses appear within your active text box, the number will be reformatted to the style you choose.

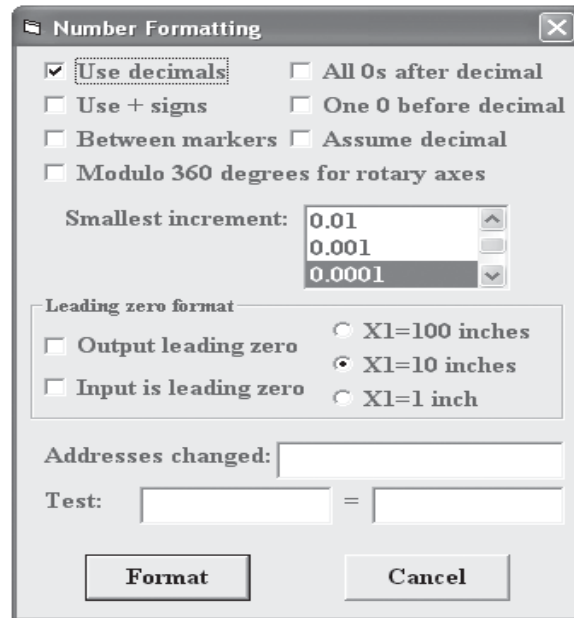


Fig.9

Axis offsetting

The Modify/Offset function is used to “shift” an axis within your NC program. If you need to make an X, Y, or Z axis shift, this function will give you several options to choose from. For programs that are in absolute (G90), the shift function will add or subtract to all the axis values within the range you’ve selected. If your program is in G91, it will shift the first occurrence of an axis value after your coordinate system setting (G92/G50). It will also shift a G91 value on the first occurrence of a G91 move AFTER a G90 move.

The Offset function also lets you offset and repeat a pattern multiple times. For example, if you want to machine 10 identical parts in a row along the X axis, you can program the first part, then use the “Offset & add to existing data” option to offset & add to the program 9 times. Each pattern will be offset (by the offset value) from the previous pattern. A text box is also provided so you can enter text that you want to insert between each pattern.

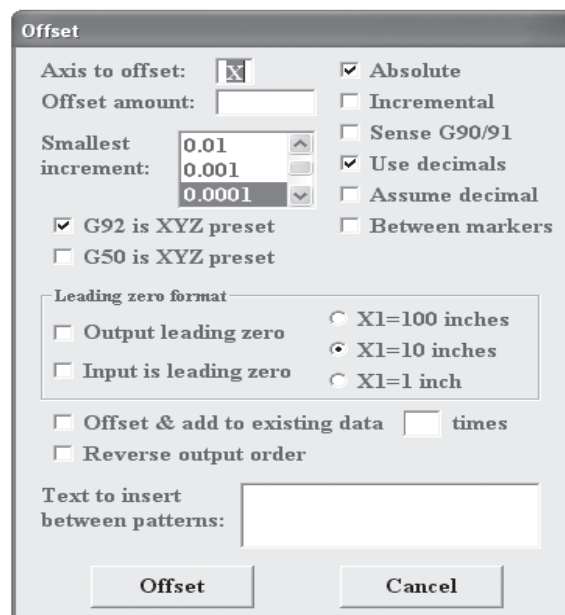


Fig.10

Axis scaling

The axis scaling function (Modify/Scale) is used to multiply any axis values by a scale factor. In addition, you can enter a “scale center”, or point around which all scaling takes place. If, for instance you have an XY work area 10 inches (in X) by 5 inches (in Y), you can scale the X axis by 1.5 times, making the work area 15 inches by 5 inches. If the scale center is Zero, then the X axis values are all scaled around X0, which means that your 0, 0, point on the part has not moved, but all other X values have been moved. If you scale around X5.0, then the old position of X5.0 remains stationary, and all values higher than 5.0 become larger, while values below 5.0 become smaller. Scaling also takes into consideration the G90/G91 status of your program. The ABSOLUTE coordinates are scaled, even if you are programming in incremental (G91) The scaling function can be used to scale any address (such as F-codes, S-codes, etc.) and not just axis addresses. When scaling F or S codes, however, turn off the automatic G90/G91 sensing option, and select the “Absolute” check box.

The Scale dialog box contains the following fields and options:

- Axis to scale:** A dropdown menu with 'X' selected.
- Scale factor:** A text input field with '100' and a '%' symbol.
- Scale center:** A text input field with '0'.
- Options:**
 - ☒ Absolute
 - ☐ Incremental
 - ☐ Sense G90/91
 - ☐ Assume decimal
 - ☐ Between markers
- Smallest increment:** A dropdown menu with '0.01' selected, and a 'Use decimals' checkbox.
- Leading zero format:**
 - ☐ Output leading zero
 - ☐ Input is leading zero
 - ☐ X1=100 inches
 - ☒ X1=10 inches
 - ☐ X1=1 inch
- Buttons:** 'Scale' and 'Cancel'.

Fig.11

Program rotation

The Program Rotation function can be used to rotate all the coordinates in your file around a particular center point. Rotation can occur in any plane (XY, XZ, or YZ) and can automatically sense the status of G90 and G91 in your program. The I, J, and K values for G02 and G03 motions are also rotated. Your I, J, and K values can be incremental or absolute. PC-DNC Editor assumes that all IJK

The Rotate dialog box contains the following fields and options:

- Axes to rotate:** A dropdown menu with 'XY' selected.
- Degrees:** A text input field with '0'.
- Center of rotation (X):** A text input field with '0'.
- Center of rotation (Y):** A text input field with '0'.
- Options:**
 - ☒ Absolute
 - ☐ Incremental
 - ☐ Sense G90/91
 - ☐ Rotate & add to existing data
 - ☐ Between markers
 - ☐ IJKs are absolute
 - ☐ Assume decimal
 - ☐ Use decimals
 - ☒ G92 is XYZ preset
 - ☐ G50 is XYZ preset
 - ☐ Ignore G28 lines
- Increment:** A dropdown menu with '0.1' selected.
- Leading zero format:**
 - ☐ Output leading zero
 - ☐ Input is leading zero
 - ☐ X1=100 inches
 - ☒ X1=10 inches
 - ☐ X1=1 inch
- Buttons:** 'Rotate' and 'Cancel'.

Fig.11a

values are incremental, unless you check the box marked “IJKs are absolute”. When rotating in the XY plane, the X, Y, I and J values are rotated, and the Z and K values are not affected. Similarly, when rotating in the XZ plane, the X, Z, I, and K values are rotated, and the Y and J values are not, (etc.). The program rotation function does not work for 3-axis circular moves (spherical interpolation) where all 3 axes are programmed in the same block. In this case, only the two axes selected are rotated, and the 3rd axis is not affected. Wherever an “R” command replaces the I-J-K commands in a G02 or G03 block, it is passed through without change, since its value does not require rotation.

Axis mirroring

To mirror an axis, use the Modify/Mirror function. Unlike mirroring on your CNC, which always mirrors around X0, Y0, Z0, the PC-DNC Editor's mirror function can mirror around any

point. To mirror any axis, select the axis and enter a value around which to mirror. If you mirror around a center point of zero, there is no need to sense the status of G90/G91. If you are mirroring around some other coordinate, however, you can select G90, G91, or automatic sensing of G90/91.

Another difference between mirroring on your CNC and using the Axis Mirror function is that you may also need to "swap" certain other commands to make the mirror image complete. If you use G02 and G03 in your program, you may need to swap the G02 and G03 commands with the Modify/Swap menu selection. If cutter radius compensation is used, you may also need to swap G41 and G42 as well. On most CNCs, mirroring of one axis usually reverses the effect of G02/G03 and G41/G42 automatically. This Modify/Mirror function DOES NOT change these other commands automatically.

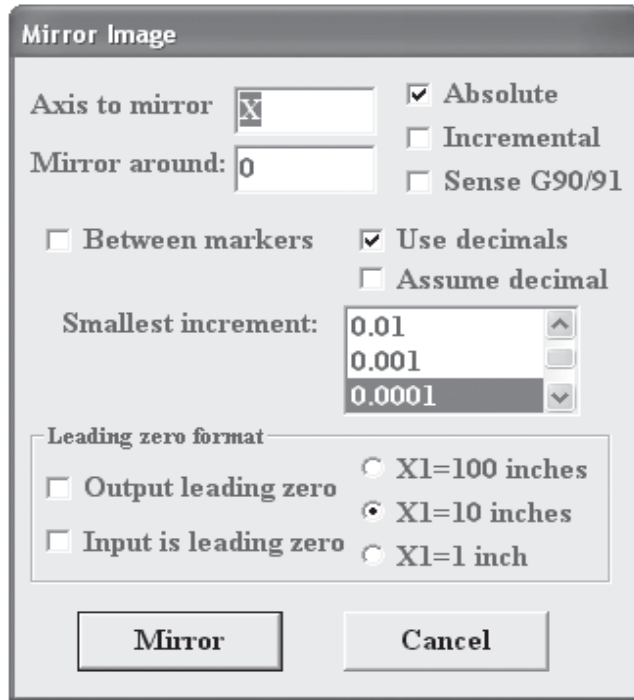


Fig.12

Swapping text

To swap two commands within your program, some text editors require that you use a search & replace function. This is not easy, because you must take one command and replace it with a "dummy" command, then take the second command and replace it with the first. Finally, you have to replace the "dummy" command with the second. The Modify/Swap function does this automatically by letting you enter two commands. Every occurrence of the first command is replaced by the second, and vice-versa. By using the "between markers" option, you can limit the scope of the swapping function to any area of your program.

The swap function will also perform a global "delete" by replacing any string with (nothing).

A wildcard character can also be used to replace any LINE that contains a string with a new line. Enter the string to search for, followed by an asterisk (*), then enter the data to replace the line with.

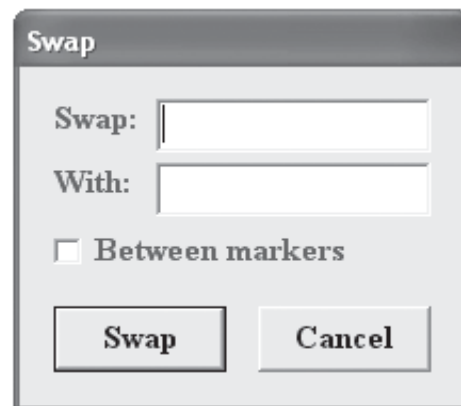


Fig.13

Replacing text

To replace one command with another, you can use the Edit/Replace function, or the Modify/Replace function. Both selections will replace one command with another. Where the Edit/Replace function lets you step through your file, selecting “replace” or “skip” for each item, the Modify/Replace function does not. The Modify/Replace function is much faster when replacing all the selected commands within a file. If you are sure you want to replace ALL the selected commands within a file, use the Modify/Replace function.

A wildcard character can also be used. For example, to replace all feedrates within a file to “F25.0”, you can replace “F*” with “F25.0”.

Notice that the Modify/Replace function is different from the Modify/Swap function. The replace menu shown here will replace all “G03” commands with “G02”, and will not affect any “G02” commands in the file. Swap, however will replace “G03” commands with “G02” AND ALSO replace all “G03” commands with “G02”.

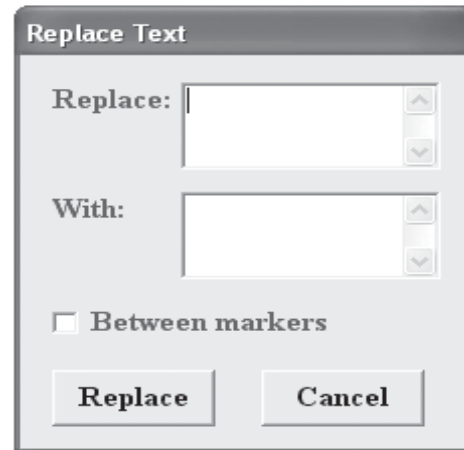
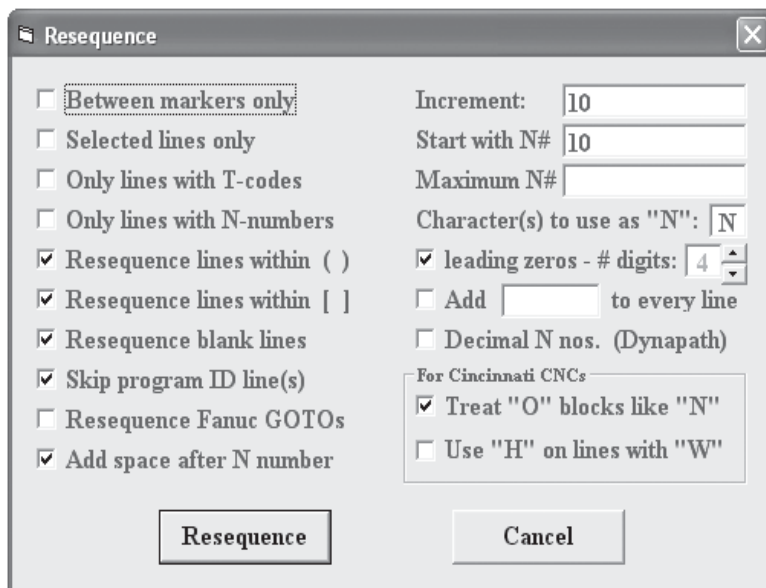


Fig.13a

Resequencing

The Modify/Resequence selection is used to replace all the existing N-numbers in your file with new N-numbers. Several options have been provided to let you select the N-number increment,



as well as the starting N-number. You can resequence the entire file, or limit the scope of the resequencing to the area between marker A and marker B. If you want to only resequence blocks that contain T-codes, or if you want to skip the program ID (first) line of the file, or your comment lines (within parentheses), there is a check box available to set each of these options. For leading-zero N-numbers, the number of digits can be specified with the “digits” box in the upper right corner of the menu. Also, if you want a space character

after each new sequence number, or if you are resequencing a Fanuc macro with GOTO statements, you can check the option boxes for those functions as well.

Two additional options are provided for Cincinnati CNCs. One option treats any block beginning with the letter “O” as if it were an N-number. Another option uses the letter “H” instead of an “N”, whenever resequencing lines that have a W-command in them.

Compressing files

When a program becomes too large to fit in your CNC's memory, or if you just want to reduce the number of characters for faster DNC operation, you can remove the unnecessary parts of the text with the Modify/Compress menu selection, which will frequently make the difference between a program that will fit in memory, and one that won't.

The Modify/Compress function performs some basic file compression methods. It can remove N-numbers, blank lines, comments (within parentheses) and spaces. The "Remove redundant" option also let you remove axis commands that are repeated in each block when they are not needed.

For maximum file compression, you can also use the "Modify/Abs/Inc convert" function to make absolute (G90) files into Incremental (G91), or you can reformat your numbers with Modify/Format to minimize your file size.

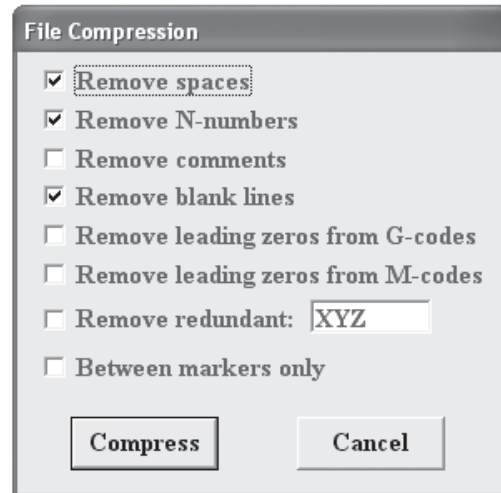


Fig.15

Inserting spaces

When many (i.e. Fanuc) controls send data back to the DNC system, they remove all space characters that may have originally been in the file. This makes the NC programs difficult to read. The Modify/Insert Spaces function will insert a space character after every number that is preceded by a letter. No dialog box appears when you use this function.

Segmenting files

If a file is too long to fit in a CNC's memory, you may need to "break it down" into several smaller files. The Modify/Segment File selection is designed to do this automatically. Suppose you were cutting a mold on a CNC machining center. At the beginning of the file, you have a tool change, spindle on, offset commands, etc.. Next, you have several thousand blocks of X-Y-Z data, followed by a spindle off command, a Z-retract, and a zero-return.

If you use marker A to identify the end of the program "header" (spindle on, etc.) and marker B to identify the beginning of the "trailer" (spindle off, go home, etc.), the Modify/Segment function will create several smaller files from your one large one. Each file will have the same "header" and "trailer", but the main body of the file will be broken down into as many segments as necessary. PC-DNC Editor calculates how many files to create by using a "maximum file size" number that you specify.

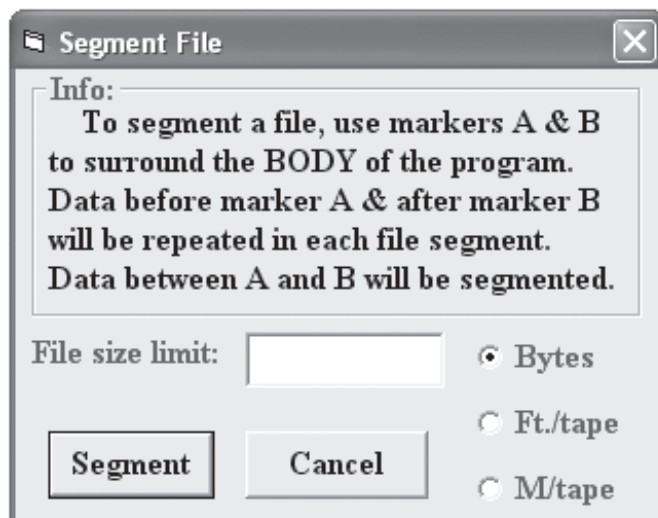


Fig.16

Spline fitting

A spline curve is a smooth curve which intersects several “control” points that you define. The menu selection Modify/Spline Fit lets you define a series of coordinates in your file, and also specify a number of points to generate along the same curved path. Once PC-DNC Editor calculates the spline curve, it can generate any number of points that you want along that spline. For example, if you want to mill a “cam” on a CNC machining center, you can program just a few, known control points along the surface of the cam. Before fitting a spline curve, a G01 point-to-point cutting path would create a series of straight cuts from one control point to the next, creating flat spots on your cam.. If you first spline-fit those control

points, you can generate lots of points very close together, which can greatly reduce the flat-spotting effect. Spline fitting increases the size of your file. Also, a series of points VERY close together could limit the feedrate your CNC can produce.

To create a spline with PC-DNC Editor, set marker A at the beginning of the series of control points, and set marker B at the end of the series of control points. Next, choose Modify/Spline Fit, and specify the number of points you want to generate. Also, if you are producing a “closed loop” spline, select the closed loop option.

This will insure a smooth overlap where the first control point meets the last control point in the spline. In a closed-loop spline, the FIRST few control points are used again (automatically) as control points at the END of the spline. This assures a smooth joining of the beginning and the end of your spline-fitted cutting path. When you choose a “closed loop” spline, the first point of the spline will be at the same XYZ location as the first control point, but the LAST point of the spline will be at the same XYZ location as the THIRD control point, making a 2 control point “overlap”. The Modify/Spline Fit selection will remove the control points from your active text box, and replace them with the new, spline-fitted cutting path. You must specify at least 4 control points for this function to work. Also, you must specify that the Spline function generate at least 3 points. The points generated by this algorithm are equally spaced along the entire length of the spline.

Note: A spline can be generated from XYZ data (a 3-D B-spline) or with XY, XZ, or YZ data (as a 2-D cubic spline). In all cases, each block must contain an XY, XZ, YZ or XYZ coordinate.

Note: When specifying control points, make sure you don’t have 2 adjacent points with the same coordinates. This would create a curve of zero-radius, causing a divide-by-zero error.

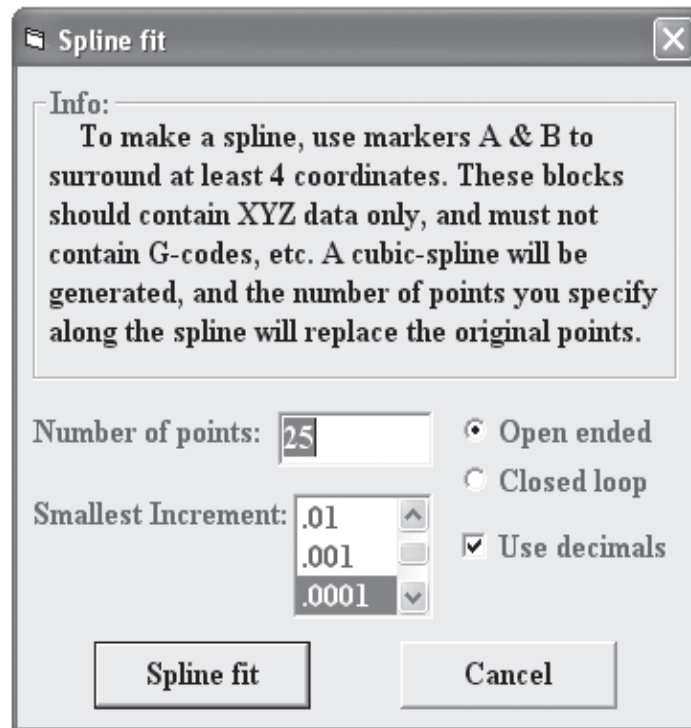


Fig.17

Converting Files

File conversions can be performed with the Modify/Convert File function. To convert a file from an Okuma lathe to a Mori-Seiki lathe, for example, you might need to mirror all the X axis commands, swap all M03s and M04s, swap all G03s and G02s, G41s and G42s and (possibly) scale the X axis to compensate for differences in “radius” or “diameter” values. Also, you may need to reformat your F-codes, and delete certain lines with unnecessary information or incompatible commands.

The PC-DNC Editor lets you program a multistep file conversion profile, and assign it a name (i.e. “Okuma to Mori”). You can later recall and use this conversion profile by name. Up to 20 steps (each) of 5 basic mass editing functions are available. Each conversion profile lets you program up to 20 “search & replace” functions, 20 “swap” functions, 20 “mirror” functions, 20 “scale” functions, and 20 “format” functions. When you convert a file, all the search & replace functions are performed first, then the swap functions, mirror functions, scale functions, and format functions in order. Any steps left empty, or with insufficient data are not performed. Once a file conversion is finished, you can restore the original data with the Modify/Undo command.

Convert file

Convert: (default) Mori to Okuma Mazak to Okuma

Add to list: Delete

Step: 1 Replace: N11 With: n11 n12 Save

Step: 1 Swap: With: Clear

Step: 1 Mirror: Around:

Step: 1 Scale: Factor: %

Step: 1 Format: Increment: .001 .0001 Use decimals

Convert Cancel

Fig. 17a

When a conversion profile has been programmed, click on the “Save” button so that you can recall this profile later by name. The “Clear” button clears all the steps in the current profile, but does not save these changes to disk until you click the “Save” button. When you click on the “Convert” button, the program in the active text box is converted by each step defined in the current profile.

NOTE: Be aware that a “search & replace” function is *different* from a “swap” function. Swapping “G02” with “G03” will replace all G02s in your file with G03 *and* will replace all G03s with G02s. A search & replace function will replace all G02s with G03s while leaving the existing G03s unchanged.

Absolute/Incremental Conversion

To convert the contents of a text box from absolute (G90) to incremental (G91) and vice-versa, use the Modify/Abs-Inc Convert function. When this function is used, all G90/G91 commands are swapped where needed, and all XYZ axis commands are recalculated and reformatted. IJK commands can also be converted, but their values are calculated differently from XYZ axis moves. When converting IJK values, the incremental IJKs are calculated relative to the XYZ start point of the arc, while absolute IJKs are calculated in the same coordinate system as the XYZ values.

When cutting complex 3-D surfaces with small point-to-point moves, it is frequently possible to greatly reduce the size of the file by converting to incremental (G91). If file compression is desired, first remove all unnecessary N-numbers, comments, and spaces with the Modify/Compress function, then convert the file to incremental with the Modify/Abs-Inc Convert function. In addition, if point-to-point moves are small, you can further reduce the file size by using a non-decimal format for all XYZ numbers, and removing all incremental moves of “zero” with the Swap function. Using all of these methods, it’s not unusual to achieve a file size reduction of up to 50% or more. For example, the following file is shown, along with the compressed and converted equivalent:

| | |
|--------------------------------------|-----------------------------|
| N001 G92 X10.0000 Y5.0000 Z10.0000 | G92X100000Y50000Z100000 |
| N002 G90 G00 X1.2345 Y2.3456 Z6.5000 | G91G00X-87655Y-26544Z-35000 |
| N003 G01 F5.0 | G01F500 |
| N004 X1.2345 Y2.3456 Z5.6789 | Z-8211 |
| N005 X1.2355 Y2.3456 Z5.6779 | X10Z-10 |
| N006 X1.2365 Y2.3456 Z5.6783 | X10Z4 |
| N007 X1.2375 Y2.3456 Z5.6776 | X10Z-7 |
| N008 X1.2385 Y2.3456 Z5.6762 | X10Z-14 |

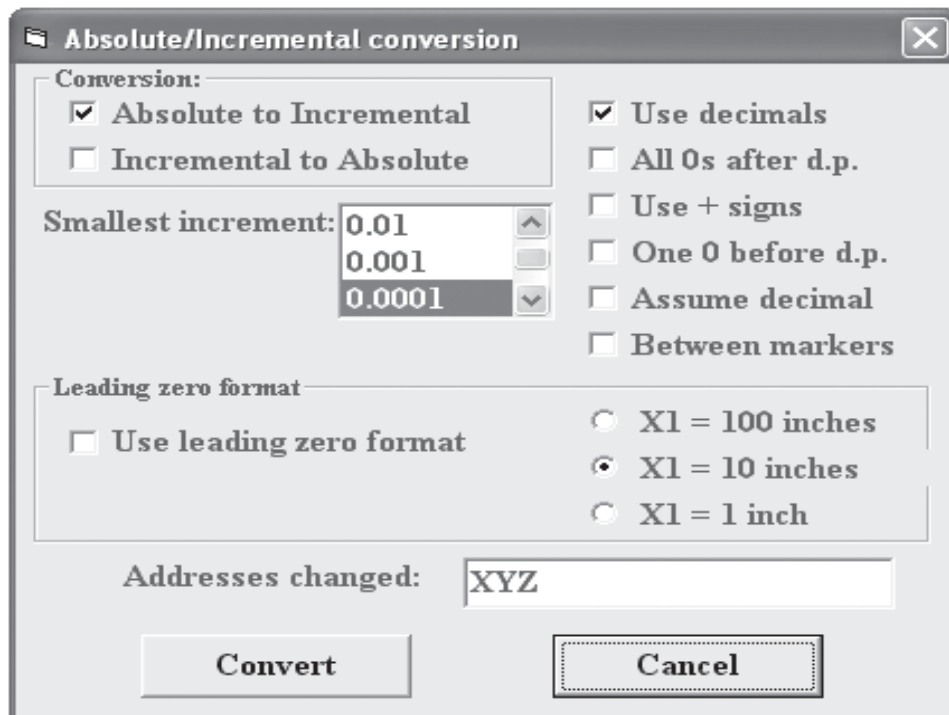


Fig. 17b

Inch/Metric Conversion

To convert the contents of a text box from inch to metric (or metric to inch), use the Modify/Inch/Metric Convert function. This function assumes that all values within a file are either metric or inch, depending on the conversion selected. For example, if you select “Convert Inch to Metric”, the values within the file are *assumed* to be “inch” values. Consequently, this function cannot be used if your program switches back and forth between inch and metric using G-codes.

You can also select the output resolution for decimal numbers, and the output number format. Be sure you select the output resolution for metric if you are converting to metric, or inch if you are converting to inch.

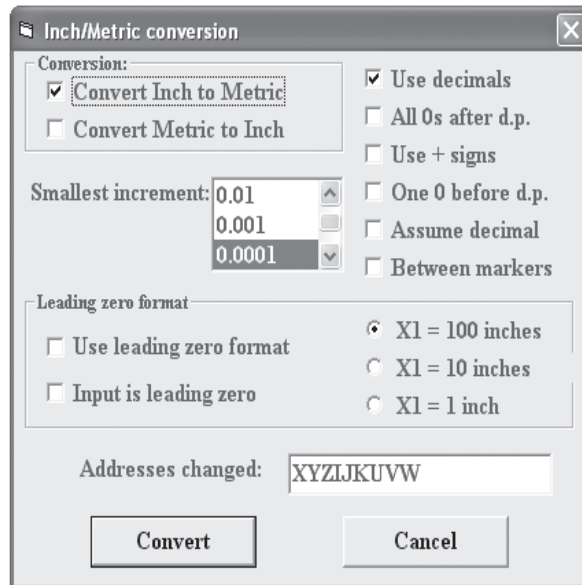


Fig. 17c

Max/Min Analysis

The Modify/Max/Min Analysis function will scan your program for the maximum and minimum values for each axis. This function does not change the contents of your text box, but only displays its maximum and minimum values.

In addition to axis motions, such as X,Y, and Z, you can also scan for Max/Min values of T-codes, S-codes, or any other command within your programs.

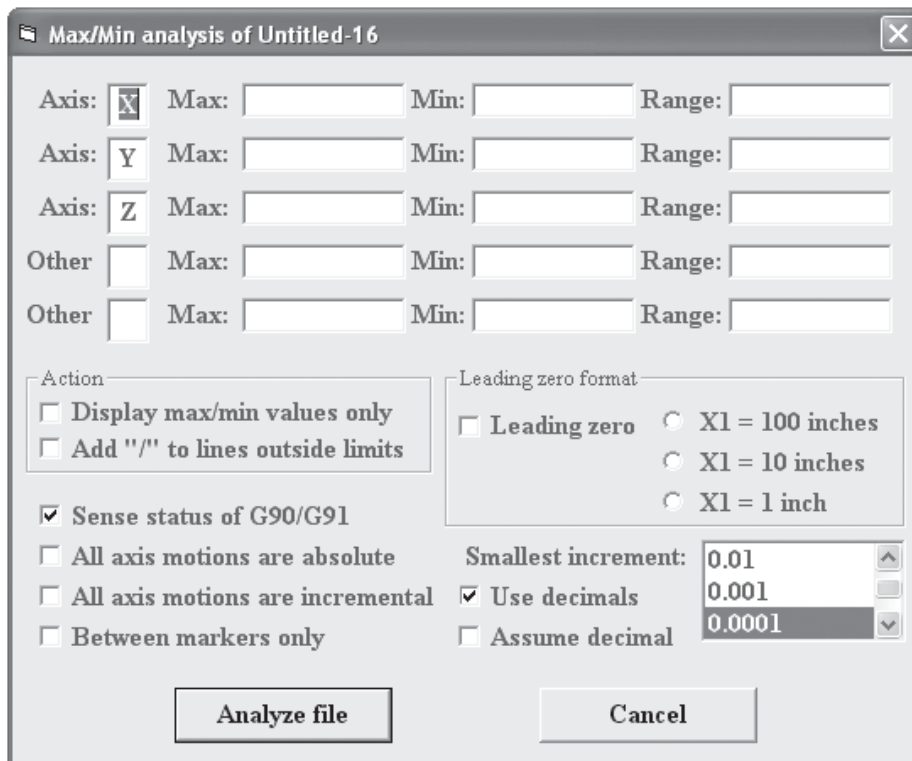


Fig. 17d

Changing Case

The Modify/Change Case menu is used to change text from upper case to lower case (and vice versa). Text can be modified between markers, and comments, or text within parentheses can be omitted if desired.

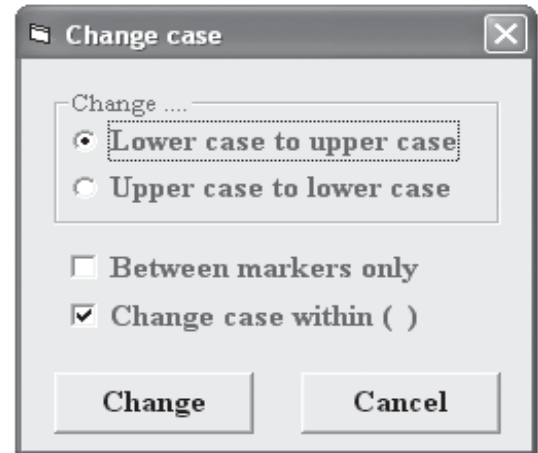


Fig. 17e

Inserting Text

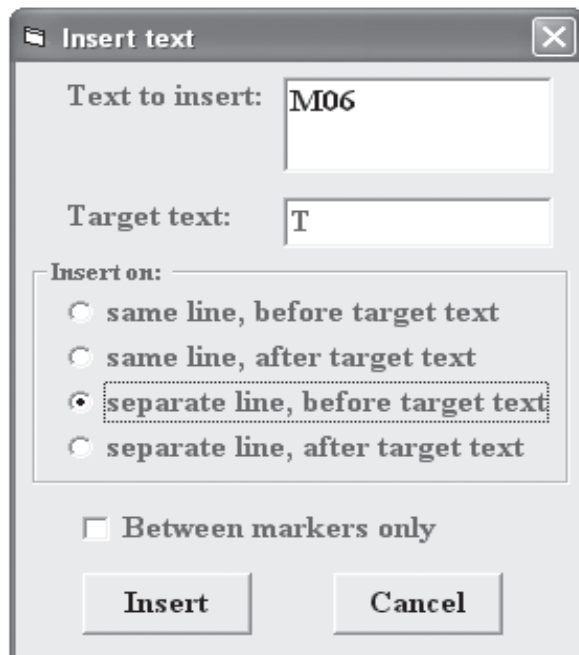


Fig. 17f

Text can be inserted within a program using the Modify/Insert Text function. The example show here inserts the text “M06” after every occurrence of a T-command within the program. The letter “T” is given as a “target”, and the M06 will be added on a separate line immediately after the line with the T-code.

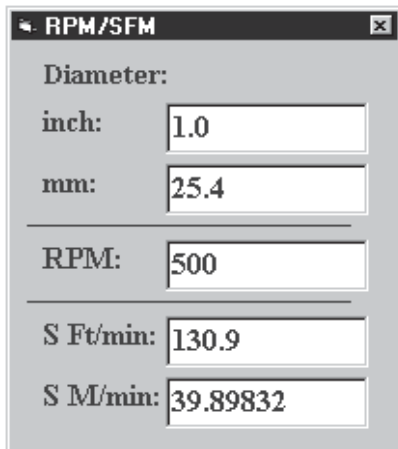
Another use for this function is to add comments at strategic places within your program. For example, you can add a comment on a separate line after every occurrence of a specified command.

Undoing a file modification

The Modify pull-down menu has an UNDO function (Modify/UNDO Mod.), which lets you put the original data back into your text box if you don't want to keep the modified data. Each of the Modify selections work in a similar way. First, a scratchpad data file is opened on your hard drive and the text in the active text box is stored. Next, the modify function reads-in this file and creates a new (modified) scratchpad file. When it's finished modifying, the active text box is loaded with the new, modified data from the scratchpad file. The UNDO function simply replaces the modified data with the data in the original scratchpad file. In addition, you can UNDO the UNDO command as well.

The CALC menu

PC-DNC Editor provides several easy ways to make common calculations. The CALC pull-down menu contains seven selections: A SFM/RPM calculator converts RPM and Surface-Feet / Diameter relationships. An IPM/RPM calculator converts Inches per Minute into Revolutions per Minute, and vice-versa. A Degrees calculator converts Deg./Min./Sec. angles to decimal degrees and Radians (and vice-versa). A triangle solver is also provided for common right-triangle calculations, and the Microsoft Calculator program (CALC.EXE) can be started from the CALC menu.

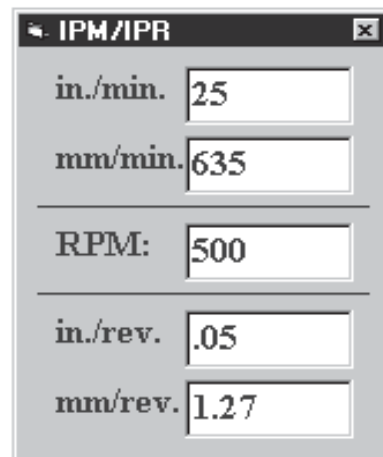


The screenshot shows a dialog box titled "RPM/SFM". It contains several input fields with the following values: Diameter (inch: 1.0, mm: 25.4), RPM: 500, S Ft/min: 130.9, and S M/min: 39.89832.

| RPM/SFM | |
|-----------|----------|
| Diameter: | |
| inch: | 1.0 |
| mm: | 25.4 |
| RPM: | 500 |
| S Ft/min: | 130.9 |
| S M/min: | 39.89832 |

Fig.18

The SFM calculator makes it easy to determine the surface-feet/min. at any diameter or RPM. You can enter any 2 values, and the calculator will determine the third. This calculator also functions as a convenient Inch/Metric converter

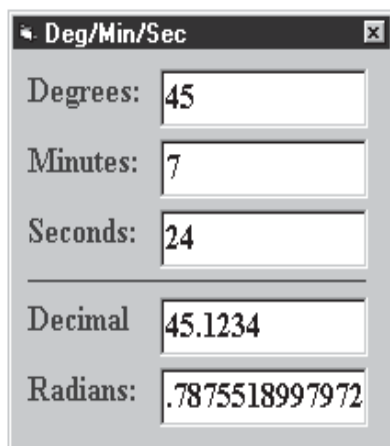


The screenshot shows a dialog box titled "IPM/IPR". It contains several input fields with the following values: in./min: 25, mm/min: 635, RPM: 500, in./rev: .05, and mm/rev: 1.27.

| IPM/IPR | |
|----------|------|
| in./min. | 25 |
| mm/min. | 635 |
| RPM: | 500 |
| in./rev. | .05 |
| mm/rev. | 1.27 |

Fig.19

An Inches-per-Minute calculator will help you determine the relationships between IPM and IPR at any given RPM. This calculator will also convert between inches/min. and mm/min. as well.



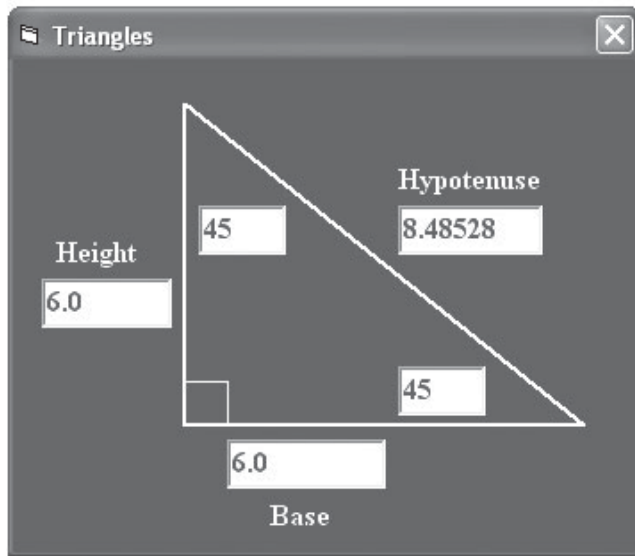
The screenshot shows a dialog box titled "Deg/Min/Sec". It contains several input fields with the following values: Degrees: 45, Minutes: 7, Seconds: 24, Decimal: 45.1234, and Radians: .7875518997972.

| Deg/Min/Sec | |
|-------------|----------------|
| Degrees: | 45 |
| Minutes: | 7 |
| Seconds: | 24 |
| Decimal | 45.1234 |
| Radians: | .7875518997972 |

Fig.19a

The Degrees calculator converts angles in Deg./Min./Sec. format to decimal format and vice-versa. You can also enter a value in Radians for polar/rectangular coordinate conversions.

The CALC menu (cont.)



An Easy-to-use triangle solver lets you enter known information, and will dynamically calculate all the unknown sides and angles for you. The triangle calculator can be used for quick calculations that NC programmers frequently encounter. Use menu choice CALC/Triangles to display the PC-DNC Editor triangle solver.

Fig.20

A tool radius offset calculator solves the common corner offset problem shown here. By entering the tool radius and the angle value, the calculator will solve for both offset values at the lower right of the diagram.

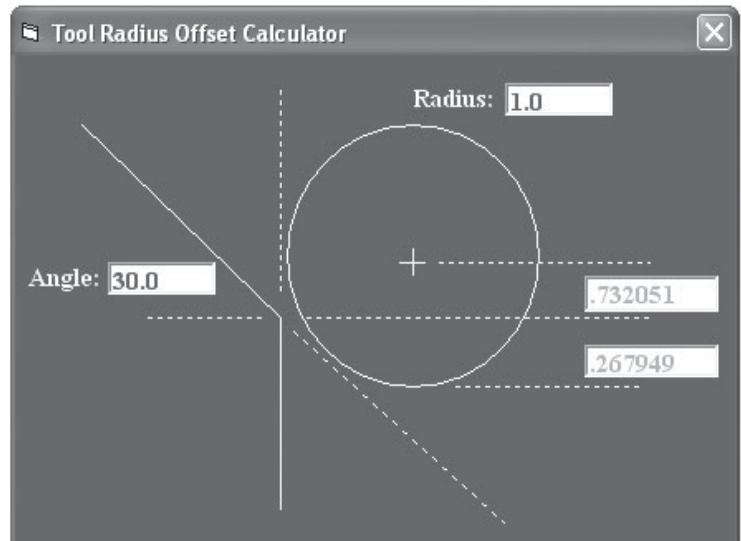


Fig.20a

The drill point calculator will display the depth required to drill to the full diameter of a standard twist drill. For standard center drills, the depth required to obtain the desired chamfer diameter is also displayed..

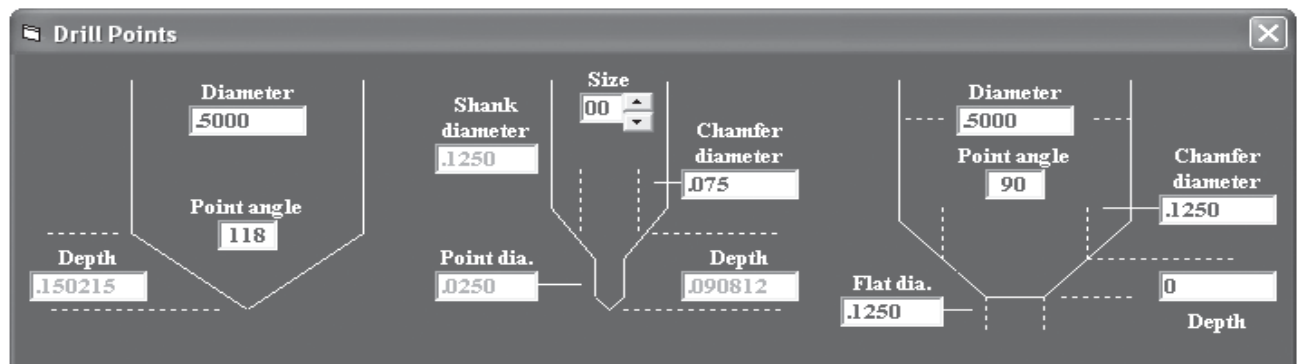
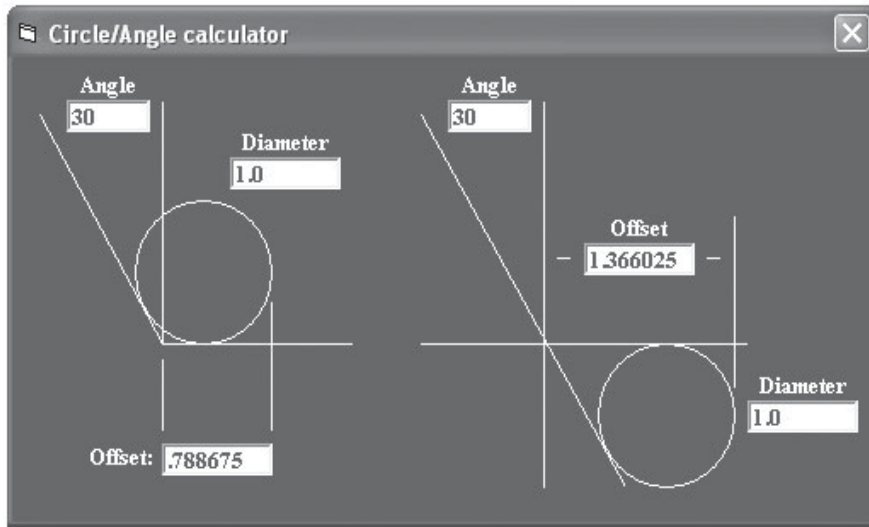


Fig.20b

The CALC menu (cont.)

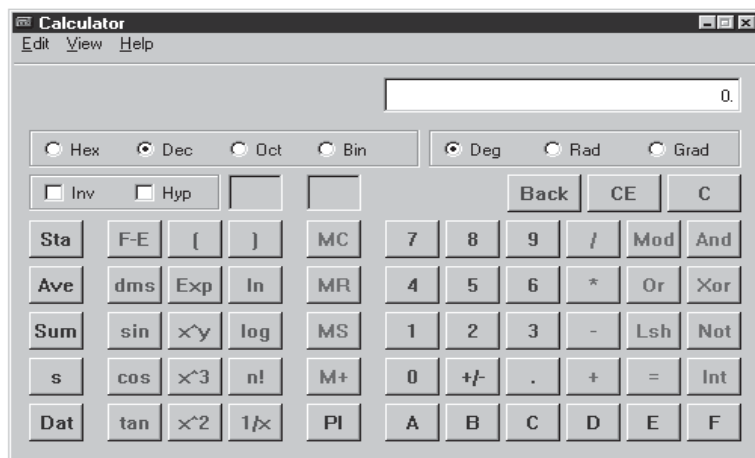
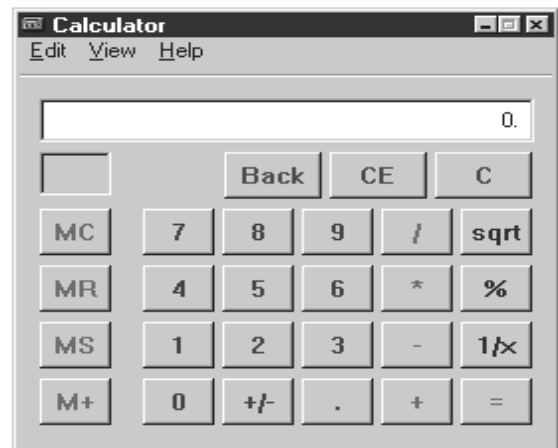


The circle/angle calculator can be used to solve the common problems illustrated here. For each circle/angle situation, you can enter any two values, and the calculator will solve for the third variable.

Fig. 20c

The Microsoft Calculator program (CALC.EXE) is a program supplied by Microsoft with most all versions of Windows. The menu selection Calc/MS Calculator will load the MS Calculator. The MS Calculator's COPY menu lets you copy a number, which can be PASTED into your PC-DNC Editor's text box.

Fig.21



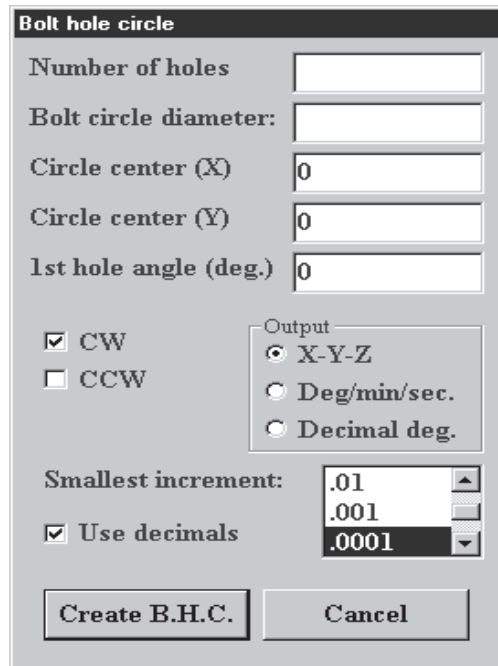
By using the VIEW menu of the MS Calculator, you can also use it in "scientific" mode for more complex calculations.

Fig.22

The CALC menu (cont.)

PC-DNC Editor's Bolt Hole Circle routine generates a series of X-Y coordinates that you can easily merge into your programs. When you create a bolt hole circle pattern, PC-DNC Editor stores the coordinates in a new (untitled) text box. You can then insert these coordinates into your NC programs with the Edit/Copy + Edit/Paste functions, or you can save this untitled text box to disk with the File/Save or File/Save As functions. Once the bolt-hole pattern is saved as a separate file, you can use File/Insert to insert this same set of coordinates into many areas of your NC file (for drilling, tapping & countersinking the same holes, for example). To create a bolt-hole pattern, select

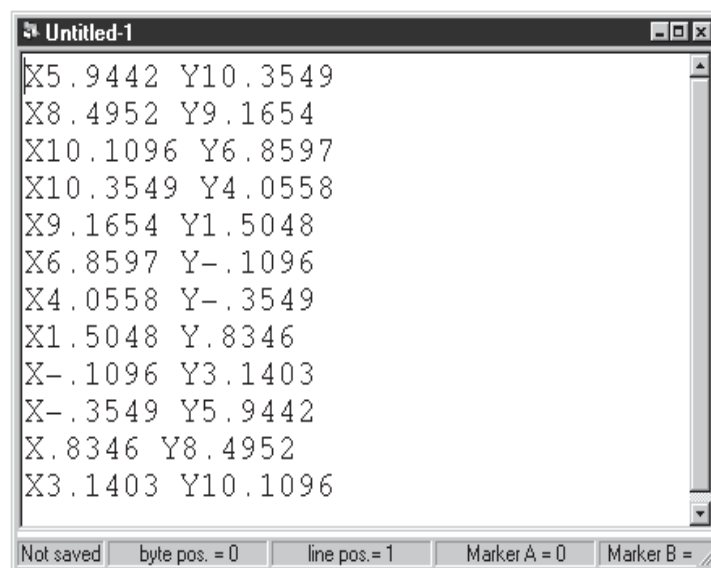
CALC/Bolt Hole Circle and enter the number of holes, circle diameter, the X and Y center of the pattern, and the angle of the first hole in the pattern (in degrees clockwise, from 12 o'clock). The CW and CCW options determine the direction of the bolt hole circle sequence, NOT the direction of the first hole from 12 o'clock, which is *always* CW. The bolt hole pattern routine assumes that you are generating a *complete* bolt hole pattern. If you need to generate a partial pattern, simply generate a complete pattern, and delete the coordinates that you don't need from the untitled text box. The dialog box shown here will generate the X-Y coordinates data shown in the text box below.



The dialog box is titled "Bolt hole circle". It contains the following fields and options:

- Number of holes: []
- Bolt circle diameter: []
- Circle center (X): [0]
- Circle center (Y): [0]
- 1st hole angle (deg.): [0]
- ☒ CW
- ☐ CCW
- Output:
 - ☒ X-Y-Z
 - ☐ Deg/min/sec.
 - ☐ Decimal deg.
- Smallest increment: [0.01] (with up/down arrows)
- ☒ Use decimals
- Buttons: "Create B.H.C." and "Cancel"

Fig.22a



The text box shows the following X-Y coordinates:

```
X5.9442 Y10.3549
X8.4952 Y9.1654
X10.1096 Y6.8597
X10.3549 Y4.0558
X9.1654 Y1.5048
X6.8597 Y-.1096
X4.0558 Y-.3549
X1.5048 Y.8346
X-.1096 Y3.1403
X-.3549 Y5.9442
X.8346 Y8.4952
X3.1403 Y10.1096
```

At the bottom, there is a status bar with the following information: "Not saved", "byte pos. = 0", "line pos. = 1", "Marker A = 0", and "Marker B = 0".

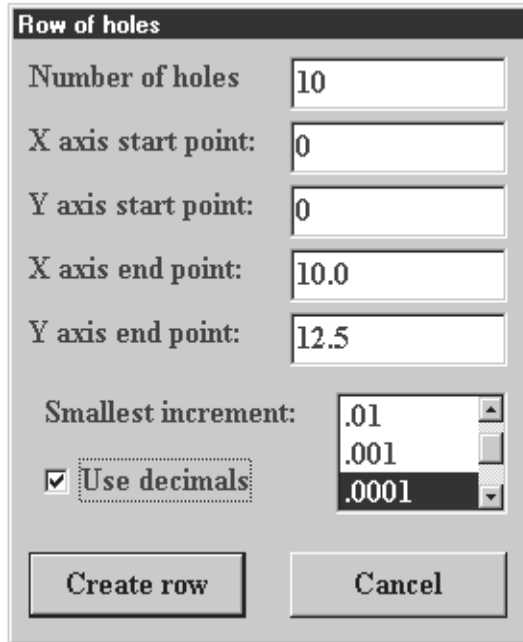
Fig.22b

The CALC menu (cont.)

PC-DNC Editor's Row-of-Holes routine generates a series of X-Y coordinates that you can easily merge into your programs. When you create a row-of-holes pattern, PC-DNC Editor stores the coordinates in a new (untitled) text box. You can then insert these coordinates into your NC programs with the Edit/Copy + Edit/Paste functions, or you can save this untitled text box to disk with the File/Save or File/Save As functions. Once the hole pattern is saved as a separate file, you can use File/Insert to insert this same set of coordinates into many areas of your NC file (for drilling, tapping & countersinking the same holes, for example). To create a row-of-holes pattern, select the function

CALC/Row of Holes and enter the number of holes, the X and Y start point of the pattern, and the X and Y end point of the pattern. The Row-of-Holes calculator will calculate the X-Y coordinates of each hole, with the first hole located at the X-Y start point, the last hole at the X-Y end point, and all holes equally spaced along a straight line.

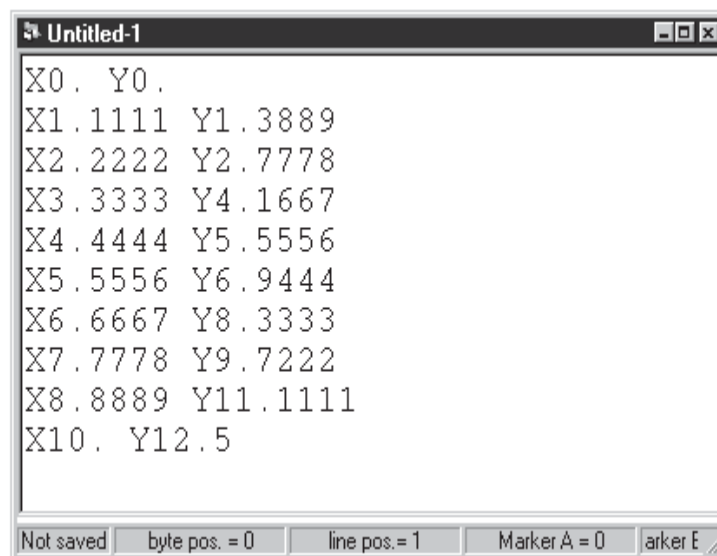
If you need to generate a partial pattern, simply generate a complete pattern, and delete the coordinates that you don't need from the untitled text box. The dialog box shown here will generate the X-Y coordinates data shown in the text box below.



The 'Row of holes' dialog box contains the following fields and controls:

- Number of holes: 10
- X axis start point: 0
- Y axis start point: 0
- X axis end point: 10.0
- Y axis end point: 12.5
- Smallest increment: .01 (with a dropdown menu showing .001 and .0001)
- ☒ Use decimals
- Create row button
- Cancel button

Fig.22c



The 'Untitled-1' text box displays the following X-Y coordinates:

```
X0 . Y0 .  
X1 .1111 Y1 .3889  
X2 .2222 Y2 .7778  
X3 .3333 Y4 .1667  
X4 .4444 Y5 .5556  
X5 .5556 Y6 .9444  
X6 .6667 Y8 .3333  
X7 .7778 Y9 .7222  
X8 .8889 Y11.1111  
X10 . Y12.5
```

At the bottom of the window, there is a status bar with the following information: Not saved, byte pos. = 0, line pos. = 1, Marker A = 0, marker E.

Fig.22d

Options menu

The Options pull-down menu contains several modal settings for the PC-DNC Editor. These settings are turned ON or OFF by clicking on the sub-menu selection. A small check-mark next to the menu selection indicates whether it is ON or OFF.

Filter files when opening

When a file is loaded from disk memory into a PC-DNC Editor text box, you can “filter out” unwanted control codes, null characters, etc. with the Filter Files selection. The loading process takes a bit longer if this function is turned on, but you may need to use this function for some nonstandard disk files. Most files will fast-load without this option if they are stored in normal ASCII format, but files without carriage-returns must use this option or many of the Editor’s “Modify” functions will not work properly.

Use Address colors when opening

This selection lets you apply individual address colors to your files automatically *as they are opened*. This is the same function that is performed manually with the Text/Colorize menu. To use this feature, you must also select individual colors for each letter address with the Text/Address colors menu.

Arrange files when closing

Whenever you close a text box, the remaining text boxes can be automatically arranged within the PC-DNC Editor main window by making this selection. You can manually arrange the text boxes in either “tile” or “cascade” fashion using the File/Arrange function. This auto-arrange feature rearranges the text boxes whenever you close one.

Save Settings on Exit

When you exit the PC-DNC Editor, you can elect to save certain items for future use. Each of the items in the Options menu is stored on disk if this item is selected.

Open CONTENTS file

If you’re using the PCNC/PC-DNC file format, you may want the Editor to automatically load the CONTENTS file into a text box whenever the Editor is loaded. Normally, when normal ASCII files are being edited, this option is not used. When the CONTENTS file is loaded into a text box, PC-DNC Editor uses it as a file index, and you can “quick-open” any file in the CONTENTS list by highlighting a line, then clicking “File/Open”.

Use DOS CONTENTS files

When using standard MS-DOS file names (or 255-character Windows file names), PC-DNC Editor can optionally create a special cross-reference file called CONTENTS.DOS, making it much easier find the file you want. With this option checked, whenever you select “File/Open”, PC-DNC Editor will display a dialog box to select a drive and directory path. PC-DNC Editor will then search for all the files in this directory (excluding files with .EXE, .COM, .BAT, and .SYS extensions), and compile a list of these files. Next, it will open each file, looking for anything within parentheses (). Then a CONTENTS.DOS file is created, which contains a list of these file names, followed by the first comment line (within parentheses) from each file. With the CONTENTS.DOS file displayed, you can “fast-open” any file in the list by highlighting a line of the CONTENTS.DOS list, and clicking on “File/Open”.

Options menu (cont.)

Auto Save 2 min (or) Auto Save 10 min

While editing files you may want PC-DNC Editor to automatically save the contents of each text box periodically. The Auto Save functions will automatically write-back all unsaved text boxes to disk at predefined intervals. **CAUTION!** : If you are editing a file that you DON'T want to save under its original file name, be sure to *turn off the Auto Save function before editing* or perform a File/Save As first.

Set Save/As function to ASCII only

Normally, the File/Save As function has several “sub-menus” for saving files in ASCII, PCNC format, Binary, and as a Code Clip. With this option checked, these sub-menus are eliminated, and all Save As functions are performed in normal ASCII format. Also, when used, this option creates a new main File menu for the Save As Code Clip function.

Show “Find Text” toolbar button

If checked, an additional toolbar button will appear as a shortcut to the Edit/Search menu. This toolbar button will perform the same function as the Ctrl + F shortcut.

Accent text between markers

If checked, any text between markers will be set to the accent color automatically whenever a marker is changed. If not checked, all text between markers will remain at the foreground color.

Create .BAK files when overwriting

When this option is checked, PC-DNC Editor will automatically create a backup file using a “.BAK” extension whenever a file is about to be overwritten by a File/Save or File/Save As function. Previous backup files are overwritten by the new .BAK file.

Use Function keys

At the request of some of our customers who desired compatibility with other (brand “x”) editors, we’ve added a few (optional) function key shortcuts:

| | | | |
|-----------|--------------------------------------|------------|---------------------------------|
| F4 | Delete from cursor to end of block | F9 | Undo edit (same as ^U shortcut) |
| F5 | Delete entire block | F10 | Redo edit (same as ^R shortcut) |
| F6 | Insert new line prior to cursor line | | |

Reset to top-of-file after File/Modify

This option determines whether or not the cursor returns to the top of the file after any Modify function is executed.

Permit Multiple Instances

If checked, this option lets you run the PC-DNC Editor in multiple sessions simultaneously

Options menu (cont.)

Show Drill Point values in Metric

The drill point calculator under the “Calc” menu normally shows inch values. If checked, these same values are shown in metric instead.

Disable Splash Screen

If checked, no splash screen will be displayed when starting PC-DNC Editor. This saves a bit of time on start-up.

Set Directories

The Set Directories menu contains several selections for setting the default file path, calculator path, scratchpad file directory, etc. Each of these functions are described below.

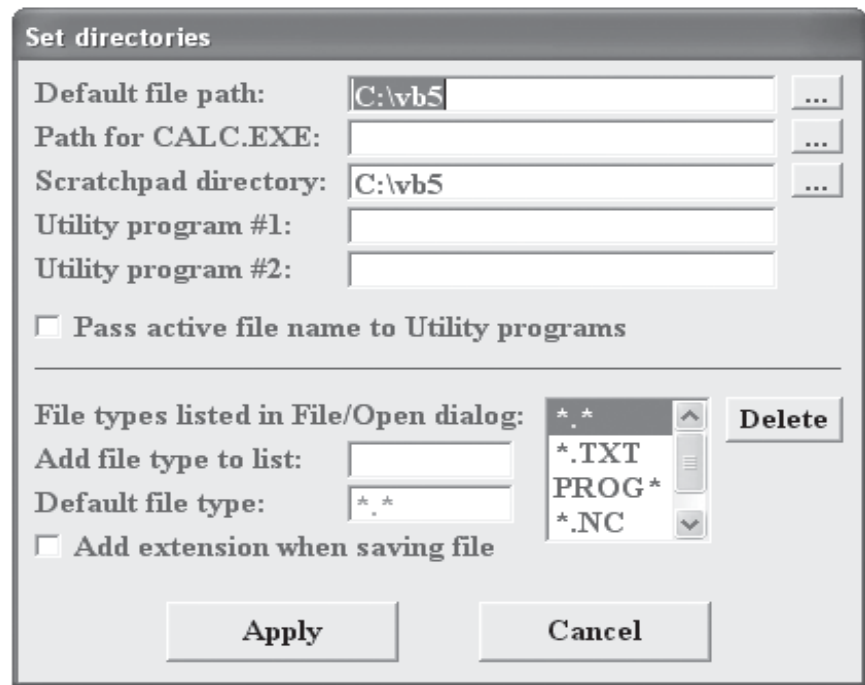


Fig.23b

Default file path

When using the File/Open or File/Save As selection, PC-DNC Editor normally defaults to its own directory (usually C:\Program Files\PC-DNC Editor). To set a different default file directory, use the Options/Set Directories menu selection, and enter the desired directory as a default file path.

Path for CALC.EXE

In most cases, the MS Calculator program will load and run without making a setting here. If it doesn't, you may need to “point” to the directory where the CALC.EXE program resides.

Scratchpad directory

PC-DNC Editor frequently creates temporary “Scratchpad” data files when processing your files. By default, these files are kept in the PC-DNC Editor directory. For certain network applications, it may be desirable to keep these files in another location so that multiple users don't overwrite each others files. You can specify any local or network directory for this purpose.

Options menu (cont.)

Utility Program #1 (and) Utility Program #2

You can specify two executable programs, which will appear in the PC-DNC Editor “File” menu. This feature can be used to create a convenient shortcut to another application. For example, if you want to launch a backplotting program from the Editor’s File menu, just enter the name of that .EXE file (including the complete path) in either of these two boxes. A new menu selection will then appear in the PC-DNC Editor’s File menu to run this application.

Pass Active File Name to Utility Programs

If the Utility programs named (above) are designed to perform further processing of your files, this checkbox will let PC-DNC Editor automatically pass the name of your current active file to the utility program when it is started. The file name is passed as a normal command line parameter.

File types listed in File/Open dialog

PC-DNC Editor’s File/Open dialog box contains a filter to display only certain desired file types. You can enter as many file extensions here as you wish, and these filters will be added to the dialog box filter list automatically. The “Default file type” lets you choose the filter that is selected when the dialog opens.

Add Extension when Saving File (checkbox)

If a default file extension is selected, it can automatically be added to the file name when performing a File/Save or File/Save As function. This function does not work with the global “*.*” entry, since this can only be used as a file filter.

Reference menu

The References pull-down menu contains several selections to let you quick-open files in a reference library. You can create and store as many reference files as you like under six different categories. Some reference files containing lists of common G-codes, M-codes and Tape-codes are included with the PC-DNC Editor. A reference file is simply an ASCII text file with the information you want stored in it. The FILE NAME of this list is kept in an index file called “G-code files” or “M-code files” these index files are stored in the PC-DNC Editor’s INSTALL directory. You can add files to any index by using the ADD LIST selection. Simply create your new reference file with any standard ASCII text editor, and store it in the PC-DNC Editor’s directory (usually C:\Program Files\PC-DNC Editor), then select References/G-codes and click on the ADD LIST button. Enter the file name of your new reference file in the file name box, and your new reference file can be quick-opened from the G-code file list.

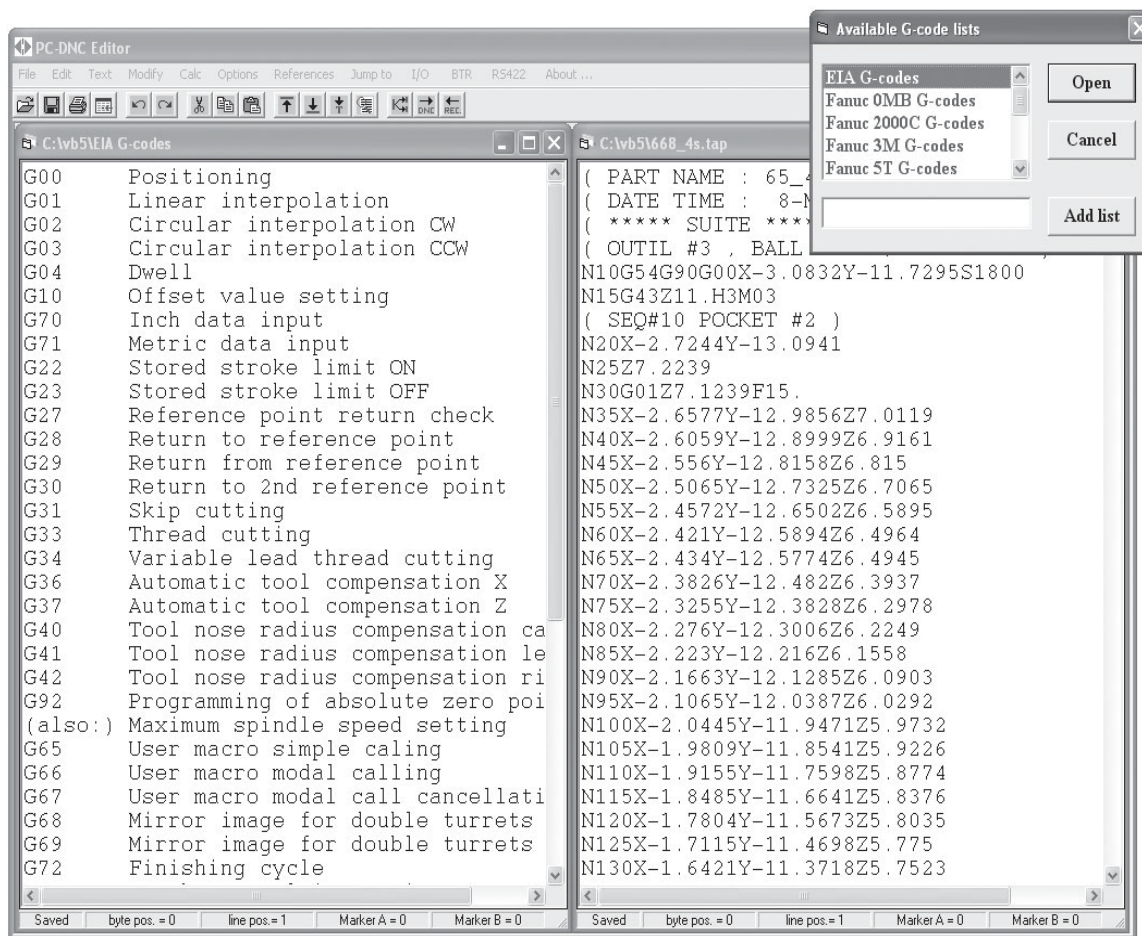


Fig.24

When a reference file is opened, it appears in a text box just like a NC file. In fact, it IS just like a NC file, because you can edit it to add G-codes, or any reference information you would like. To close a reference file text box, click on the “Close” icon at the upper-right corner of the text box, or click on the text box (making it “active”) and then selecting File/Close.

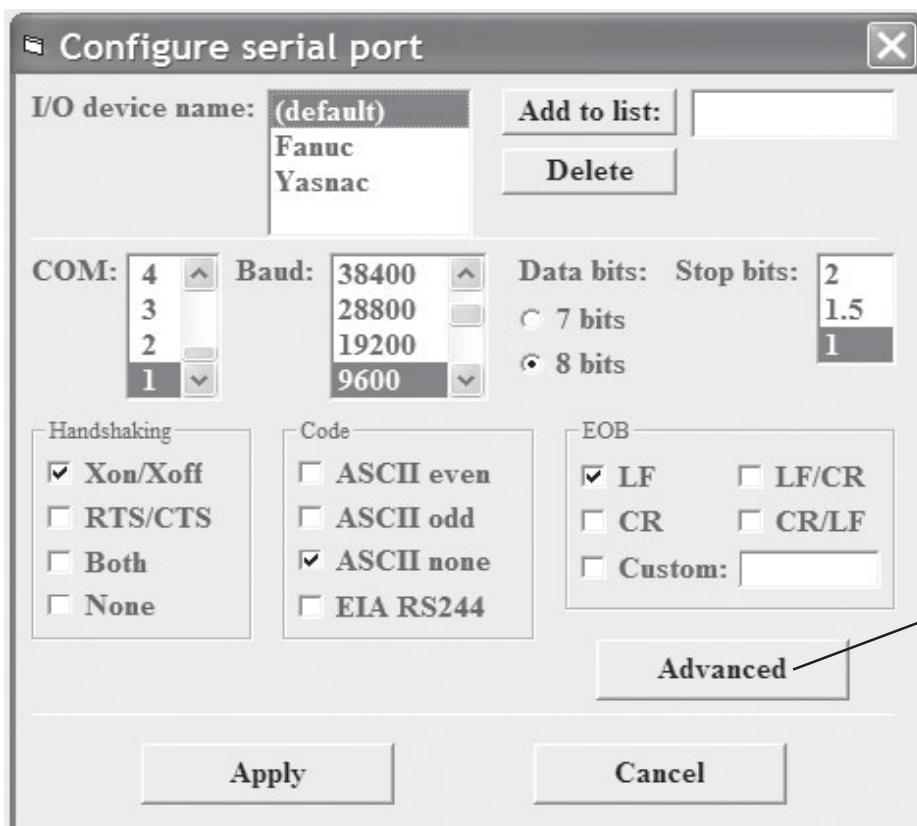
The I/O Menu

PC-DNC Editor has several I/O menu selections that make it possible for you to send and receive files using your PC's serial port. The I/O menu consists of the 10 selections listed below:

- | | |
|-------------------------|---|
| 1) Send File | Transmits the contents of the active text box with leader & trailer |
| 2) Receive File | Opens a new text box, and waits for incoming serial data |
| 3) Send to PC-DNC | Sends the contents of the active text box to a scanning PC-DNC system |
| 4) Get from PC-DNC | Sends a file request to PC-DNC, then downloads to a new text box |
| 5) Configure I/O Device | Sets all the I/O parameters for a serial device |
| 6) Select I/O Device | Selects the device you want to send to or receive from |
| 7) Terminal Window | Opens a "dumb" terminal window for serial port diagnostic work |
| 8) Mazatrol files | Lets you send and receive Mazatrol CMT format files |
| 9) Binary Files | Lets you send and receive files in pure binary code. |
| 10) Abort I/O | Stops a communication in process |

Configuring your serial port

PC-DNC Editor can access any available serial port from COM1 to COM128. You can configure and assign names to as many I/O "devices" as you want. Each device must have a unique name and a group of settings from the menu shown below. When you "Apply" the settings from this configure menu, those settings are stored on disk for future use. To use those settings, select an I/O device name by clicking on the I/O pull-down menu and choose "Select I/O device". To create a new I/O device, enter a name in the "Add to List" text box, and click on the Add to List button.



The configuration menu shown here contains the basic RS232 serial port settings. Additional settings can be made by clicking on the "Advanced" button

Fig.25

Serial port configuration (cont.)

The serial port configuration dialog box shown on the previous pages lets you use a wide range of tape codes, baud rates, handshaking protocols, etc. For any given situation, it should be possible to match the requirements of the device you are trying to communicate with. In all cases, you **MUST MATCH** the baud rate and stop-bits setting of the other device before good communications will occur. If you don't know the baudrate & stop-bits setting of the other device, you must somehow find out what they are before proceeding. Most CNC controls have parameters to select baud rate, stop-bits, etc. You may need to refer to your CNC's manual for the correct settings on your CNC control. For the popular Fanuc CNCs, refer Appendix A,

COM port number (from COM1 to COM128)

This is the COM port on your PC. The COM port you use must be available to Windows, and should be a "buffered" type using the 16550 UART chip (see Appendix C, page 3)

Baud rate (110 baud to 115,200 baud)

This is the speed in "bits per second" of the data flow. This setting must match the CNC.

Data bits (7 or 8)

Use 7 data bits for Even or Odd parity ASCII. Use 8 data bits for EIA or no parity ASCII

Stop-bits (1, 1 1/2 or 2)

This is the number of bits between each character. This setting must match the CNC.

Handshaking

- 1) Xon/Xoff: When PC-DNC sends data, it will pause if it receives an Xoff (ASCII # 19), and it will resume sending if it receives an Xon (ASCII #17).
- 2) RTS/CTS When sending, PC-DNC will pause if it sees the CTS signal turn off. CTS is the signal on pin 5 of a 25-pin plug, or pin 8 of a 9-pin plug.
- 3) BOTH PC-DNC will pause if either receives an Xoff, OR if CTS turns off
- 4) NONE PC-DNC will not pause when sending.

Code (ASCII even, odd, no parity, and EIA checkboxes)

ASCII even parity is most commonly used. Set ASCII even parity when your CNC is using ISO code (most Fanucs, Yasnacs, etc.). EIA code is the older code punched by Frieden Flexowriters.

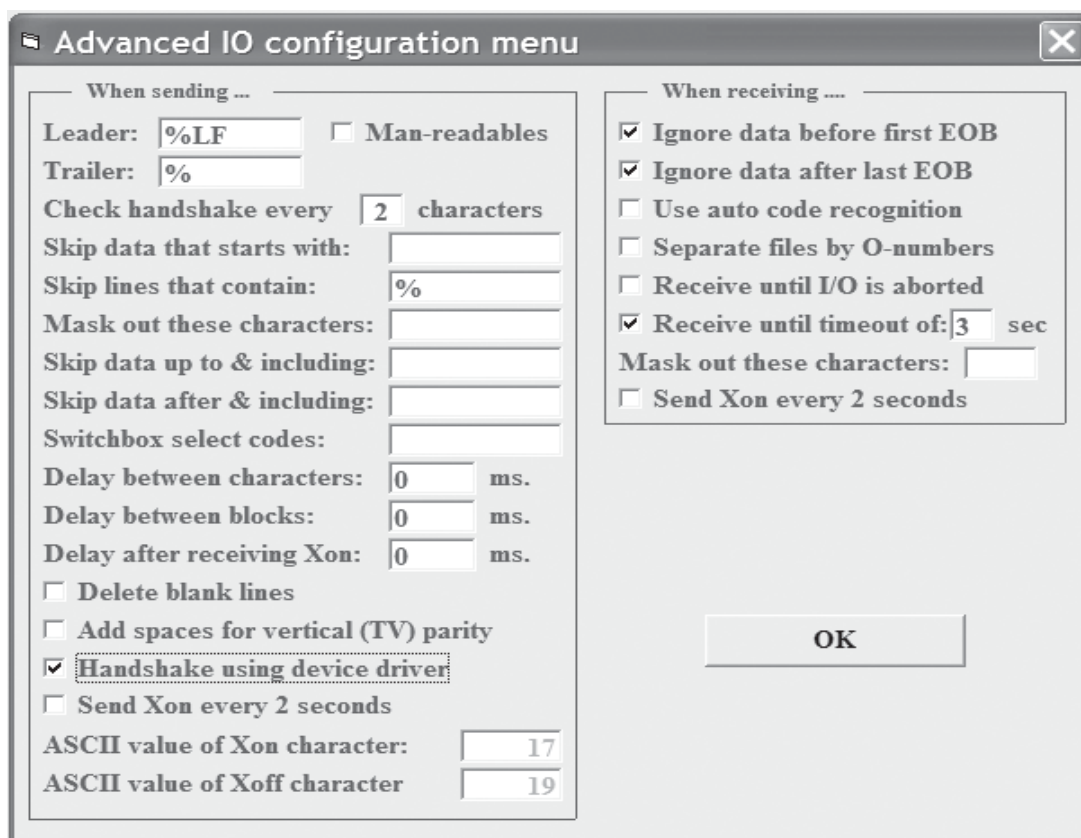
Note: When receiving data, PC-DNC performs automatic code recognition. This setting determines what code PC-DNC uses to send data only.

EOB character - These are the characters sent by PC-DNC Editor at the end of each line. Most Fanuc and Yasnac CNCs require only an LF (line-feed) character. Refer to your CNC operators manual for a description of the EOB code required by your CNC.

Note: When EIA tape code is selected, an EIA RS244 EOB code (ASCII # 128) is always sent.

Configuring your serial port (cont.)

The “Advanced” button on the IO/Configure IO Device menu lets you set the following information:



The image shows a Windows-style dialog box titled "Advanced IO configuration menu". It is divided into two main sections: "When sending ..." on the left and "When receiving ..." on the right. The "When sending ..." section includes fields for "Leader:" (set to "%LF"), "Trailer:" (set to "%"), "Check handshake every" (set to 2 characters), "Skip data that starts with:", "Skip lines that contain:" (set to "%"), "Mask out these characters:", "Skip data up to & including:", "Skip data after & including:", "Switchbox select codes:", "Delay between characters:" (0 ms), "Delay between blocks:" (0 ms), "Delay after receiving Xon:" (0 ms), checkboxes for "Delete blank lines", "Add spaces for vertical (TV) parity", "Handshake using device driver" (checked), "Send Xon every 2 seconds", and text boxes for "ASCII value of Xon character" (17) and "ASCII value of Xoff character" (19). The "When receiving ..." section includes checkboxes for "Ignore data before first EOB" (checked), "Ignore data after last EOB" (checked), "Use auto code recognition", "Separate files by O-numbers", "Receive until I/O is aborted", "Receive until timeout of:" (3 sec), "Mask out these characters:", and "Send Xon every 2 seconds". An "OK" button is located at the bottom right of the dialog.

Fig. 25b

Leader (text box) - PC-DNC Editor will automatically send any sequence of characters you want before sending the data in your file. If your CNC requires a percent sign (%) at the beginning of each file, enter a percent sign here. For special control characters, enter the ASCII value of the character between “greater-than” and “less-than” symbols “<>”. For example, to transmit an STX (Start-of-Text, or ASCII #2, enter the characters: <2> . For NUL characters (ASCII #0), enter the word “NUL”, or the characters: <0> . For an ESC (Escape character, or ASCII #27), enter: ESC or <27>. You can also enter a Line-Feed character (ASCII #10) as LF or <10>, and a Carriage-Return (ASCII #13) as either CR or <13> .

Trailer (text box) - PC-DNC Editor will automatically send any sequence of characters you want after sending the data in your file. Follow the same rules for trailers as described for leaders (above).

Man-Readables (Paper Tape Leader) checkbox

If checked, PC-DNC Editor will send a “man-readable” leader for paper tapes. When sending directly to a CNC, turn this feature off. If you are punching a paper tape, you may want this enabled.

Check handshake every (n) characters - When the CNC signals a handshake (Xoff, or CTS low), it can still accept a few more characters before its buffer overflows (Fanucs can accept 10 more characters). The number entered here is the MAXIMUM number of characters that will be sent after the handshake signal is received. If you encounter a “Buffer Overflow” on the CNC, make this number smaller. The default setting is 5. Note: This setting is only valid when NOT using the “Handshake using device driver” option.

Configuring your serial port (cont.)

Skip data that starts with: (text box) - If you have comments or tooling data within your file that you don't want sent to the CNC, enter a character (or sequence of characters) here. Within each block, this character and all data *after* this character (up to the EOB) is not sent.

Skip lines that contain: (text box) - If you want PC-DNC Editor to not transmit any line that contains a specific character or string of characters, enter it here. If any line contains this character or string of characters, the *entire line* is skipped.

Mask out these characters: (text box) If you have specific characters within your file that you don't want sent to the CNC, enter them here. All other characters are sent normally.

Skip data up to & including: (text box) - If you have tooling or operator information at the beginning of your file, and don't want that data sent to the CNC, enter the character(s) that denotes the end of the comment data. All data after this sequence is sent normally.

Skip data after & including: (text box) - If you have tooling or operator information at the end of your file, and don't want that data sent to the CNC, enter the character(s) that denotes the beginning of the comment data. All data before this sequence is sent normally.

Switchbox select codes: (text box) - When connecting to several CNCs using a code-operated switchbox, you can set the control-code sequence that the switchbox needs to select the correct port in this box. When you select the IO device name (using the Select IO device menu), PC-DNC Editor will automatically transmit any codes entered here for the selected device. For special control characters, enter the ASCII value of the character between "greater-than" and "less-than" symbols "<>". For example, to transmit an STX (Start-of-Text, or ASCII #2, enter the characters: <2> . For NUL characters (ASCII #0), enter the word "NUL", or the characters: <0> . For an ESC (Escape character, or ASCII #27), enter: ESC or <27>.

Delay between characters - You can enter a time delay (in milliseconds) in this text box that will occur between the transmission of every character. Use this option only if you want to "meter out" the data slowly to the receiving device. **DO NOT** use this feature to prevent "buffer overflow" errors in the receiving device. These kinds of errors are usually caused by an improper handshaking protocol or an incorrect setting in the serial port's FIFO buffer.

Delay between blocks - A time delay (in milliseconds) in this text box will occur between each block of data transmitted to the CNC. The time delay occurs after the EOB codes are transmitted.

Delay after receiving Xon - A time delay (in milliseconds) in this text box will occur when PC-DNC Editor is in a paused (Xoff) state, and the Xon character is received.

Configuring your serial port (cont.)

Delete blank lines - This checkbox lets you prevent the transmission of blank lines that appear in your programs. A line that is totally blank, or one that contains only “space” characters is skipped when this checkbox is checked.

Add spaces for vertical (TV) parity - Some CNC’s use an optional method of checking parity called “Tape Vertical” or “TV” parity. A program with TV parity always has an even number of characters within each block. Blocks that have an odd number of characters are padded with a “space” character at the end of the block, just before the EOB code. If this checkbox is checked, PC-DNC Editor inserts “space” characters to make all transmitted lines have even vertical parity.

Handshake using device driver - (checkbox)

The fastest, and by far the best, method for handshaking with the CNC control is to use the COM port device driver. This option should be checked under most circumstances. Some COM port device drivers, however, do not function properly and may result in “Buffer overflows” on the CNC control. If this should happen, first be sure that all other settings such as data bits, stop-bits, and parity are correct. If handshaking still does not occur properly, then disable this function (un-check this option) and use the PC-DNC software to perform “software” handshaking. The output performance may be slower, but the software can then be used to prevent buffer overflows in the following ways:

- 1) By adjusting the number of characters in the handshake loop (see page 42), you can reduce the number of characters that PC-DNC Editor places in the output buffer on each handshake cycle.
- 2) By adjusting the size of your Windows COM port’s “FIFO” buffer, you can further reduce the number of characters that may be transmitted after the CNC sends an Xoff signal. See Appendix C, page 3 for more details on setting your COM port’s FIFO buffer.
- 3) In extreme cases, you may need to use a time delay in between each block, or in between each character of the program. See “Delay between blocks” and “Delay between characters” on page 43.

Send Xon every 2 seconds - (checkbox)

A few CNC controls will not send an Xon code to receive data unless they receive an Xon character first. In these rare situations, you can have PC-DNC Editor send an Xon character every 2 seconds until the CNC replies with an Xon character. The Xon characters are sent as soon as PC-DNC Editor is prepared to send a file from the CNC.

ASCII value of the Xon character

Normally, an Xon character is ASCII #17 or Hex #11. This same character is sometimes called “DC1”.

ASCII value of the Xoff character

Normally, an Xoff character is ASCII #19 or Hex #13. This same character is sometimes called “DC3”.

Configuring your serial port (cont.)

Ignore data before 1st EOB (checkbox) - If your CNC sends a LF or CR before sending any significant data, check this box to prevent “garbage” characters such as nulls, control codes, and man-readable leaders from being saved by PC-DNC. This box should be checked on Fanuc CNCs. If PC-DNC “drops” the first line of incoming data from your program, turn off this checkbox.

Ignore data after last EOB (checkbox) - This function lets PC-DNC ignore trailer data or control-codes that your CNC may send at the end of a file. This box should be checked on Fanuc CNCs. If PC-DNC “drops” the last line of incoming data from your program, turn off this checkbox.

Use auto code recognition (checkbox) - If checked, PC-DNC Editor will automatically recognize the tape code being sent by the CNC. The code recognition algorithm uses the first valid EOB character to determine which code to use. Normally, we recommend that auto code recognition always be used. Sometimes, however, it may be necessary to turn this feature off, since some CNC controls may send data which will confuse the automatic code recognition algorithm.

Separate files by O-numbers (checkbox) - When checked, PC-DNC Editor will automatically open a new (separate) text box for each O-number sent by the CNC. If you send multiple programs from the CNC at one time, PC-DNC Editor will divide the incoming data into separate text boxes instead of recording all the data in one text box. Each text box will be assigned the O-number as a title, so that they can be easily saved using the O-number as a file name. PC-DNC Editor will recognize both the letter “O” and the colon (:) character as a valid program identifier.

Receive until IO is aborted (checkbox) - If checked, PC-DNC Editor will continue receiving data until you select the IO menu selection to “Abort IO”. Use this feature if incoming data is being received slowly and with long time delays between characters. A typical use for this option is the collection of digitized or inspection data from a CMM (Coordinate Measuring Machine).

Receive data time-out (text box) - Once PC-DNC Editor begins receiving data, it will assume that the transmission is complete after data stops coming in for a specified period of time. The default value is 3 seconds. Once data stops for this period of time, PC-DNC Editor will close the serial port and terminate the reception of data.

Mask out these characters: (text box) - If you want certain characters omitted from the file as they are received, enter them here.

Send Xon every 2 seconds - (checkbox)

A few CNC controls will not send a file unless they receive an Xon character first. In these situations, you can have PC-DNC Editor send an Xon character every 2 seconds until the CNC begins sending data. The Xon characters are sent as soon as PC-DNC Editor is prepared to receive a file from the CNC.

Sending a file

To send a file to a CNC control, first be sure your port configuration is correct, and that it matches the configuration of the CNC's serial port. Next, open your file so that it appears in the active text box, and select IO/Send File. PC-DNC Editor will then open the COM port, and display the following dialog box, indicating that it

is ready to send. If you click on the SEND NOW button, PC-DNC Editor begins sending data immediately. If you want PC-DNC Editor to wait for you to press [READ] on the CNC before sending, click on the WAIT FOR XON button. To run a program multiple times, (waiting for Xon each time), use the DNC button.

If you have highlighted some text in your file, a checkbox will permit you to send only this selected text (instead of the whole file.). A second checkbox will let you perform "continuous-loop" DNC for bar feed and/or continuous cycle applications where the DNC output never stops.

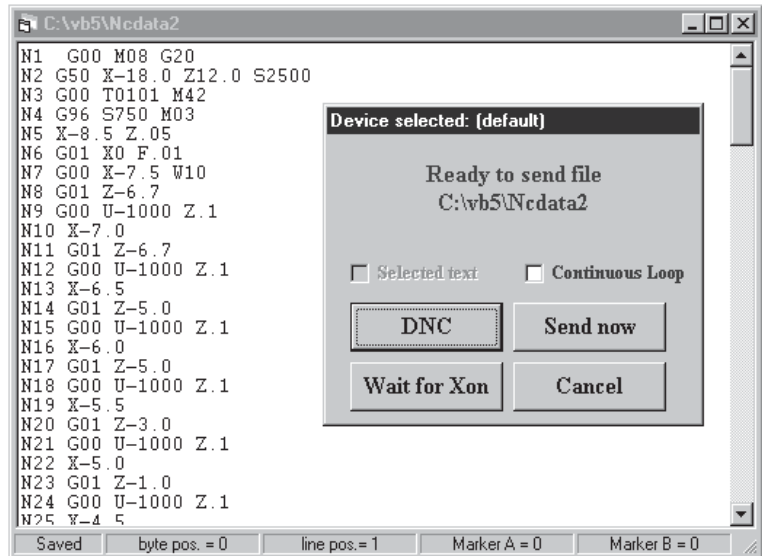


Fig28

Sending a file to a scanning PC-DNC system

If you connect your PC's serial port to a scanning PC-DNC communications system, you can send to, or retrieve files from the PC-DNC server with a special I/O menu selection (I/O Send to PC-DNC). Whenever sending a file to a PC-DNC scanning system, PC-DNC Editor lets you specify the file name and (optionally) the path that PC-DNC will use to store it. Also, PC-DNC Editor first interrogates the PC-DNC system to see if its ready to receive the file. When you use the Send to PC-DNC selection, the dialog box shown in Fig.29 will appear. If you want the file name and/or the

directory path to be different, simply change the name in the "PC-DNC file name" box before clicking on the SEND IT button.

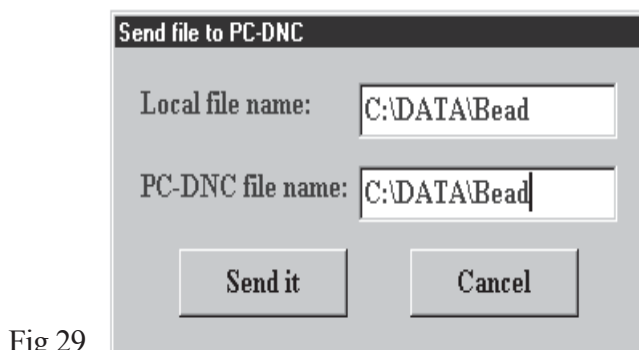


Fig.29

Receiving a file

To send a file from a CNC control to PC-DNC Editor, first be sure your port configuration is correct, and that it matches the configuration of the CNC control. Next, choose the IO/Receive File selection. PC-DNC Editor will open a text box and automatically prepare to receive data. The open text box will display the message “Waiting to receive data ...” indicating that the serial port is open.. At this point, go to the CNC control and begin the output of data. PC-DNC Editor should begin to scroll the incoming data in the open text window. PC-DNC Editor performs automatic code recognition when it receives. The switching between ASCII even parity, odd parity, no parity, and EIA RS244 tape codes is automatic, based on the first EOB character it receives.

When receiving a file, you can choose whether or not to recognize the data BEFORE the first EOB code, or AFTER the last EOB code. Most CNCs (including Fanucs) might send a stream of “nulls” and control codes before the first EOB. On all Fanucs, though, an EOB always precedes the first line of significant data. If you tell PC-DNC Editor to ignore everything before the first EOB, it will be functioning just like a Fanuc does, using its LSK, or “Label Skip” function.

If your CNC does not send an EOB before the first line of the program, PC-DNC Editor’s serial port will have to be configured to recognize data before the first EOB. Also, if your CNC does not send an EOB AFTER the last line of the program, you will have to configure PC-DNC Editor to receive all characters after the EOB as well.

Receiving a file from PC-DNC

To request a file from a scanning PC-DNC system, PC-DNC Editor will first interrogate the PC-DNC system to be sure it’s ready, then it will prompt you to enter the file name (and path) of the file you want. PC-DNC Editor then sends a request to PC-DNC, and downloads the file into an open text box automatically. When you use the I/O/Get File from PC-DNC selection, the following dialog box appears. Enter the file you want PC-DNC to send you in the lower box, and PC-DNC Editor will request it automatically. Once the file has been requested, PC-DNC Editor will either receive the file, issue a “PC-DNC not Ready” error message, or PC-DNC itself might return the text “(FILE NOT FOUND)”, which will appear in the active text box. The File-not-Found message indicates that PC-DNC received your request, but could not find the requested file in its directory.

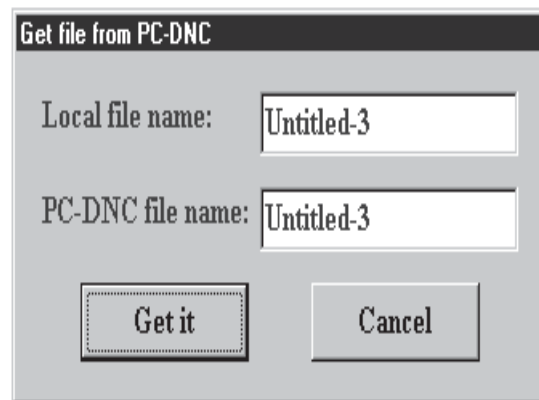
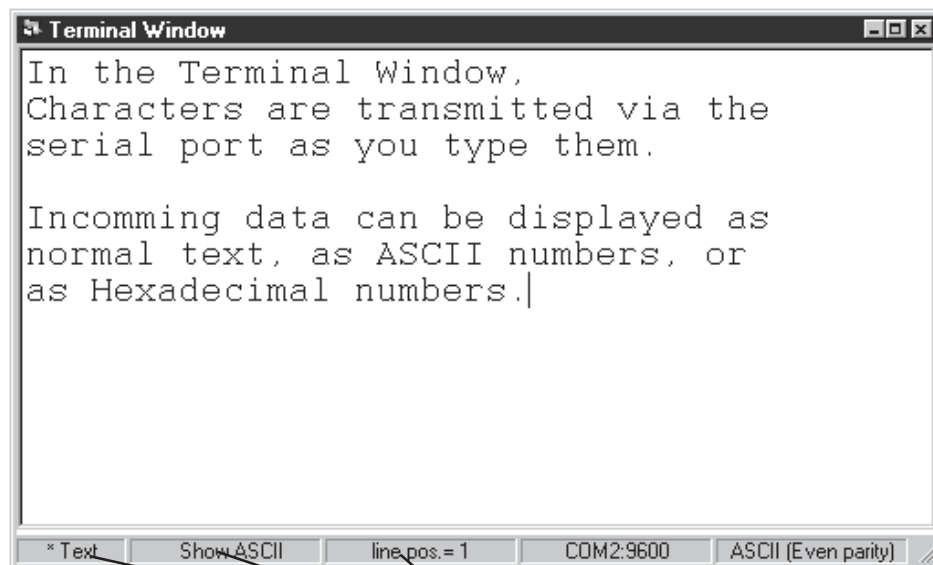


Fig.30

Terminal Window

The IO/Terminal Window selection can be used for a variety of diagnostic purposes. When selected, an empty text box is opened, which can be used to enter and display data like a “dumb” RS232 terminal. When the Terminal Window is open, a COM port is also opened using the port specifications of the currently selected I/O device. The port, baudrate, and code of the selected device is displayed at the bottom of the Terminal Window.

As you type characters into the Terminal Window, they are transmitted immediately, using the selected I/O device’s baudrate, stop-bits, and parity. When characters are received from an external device, they are displayed in the currently selected “accent” color. Incoming data can be displayed as text, as ASCII values (0-255) or as Hexadecimal values (0-FF). To switch between text, ASCII, and Hex, click on the appropriate status bar panel at the bottom of the Terminal Window.



Click here to select how incoming data is displayed

The Terminal Window can be used to diagnose a variety of RS232 communications problems. If you are not sure your PC’s serial port is working properly, jumper pins #2 and #3 together at the back of your PC, and use the Terminal Window to send some characters. If your port is healthy, you should see an “echo” of every character you type. Once it is proven that your port is working, you can then test your serial cable in the same way: Jumper pins #2 and #3 at the other end of your cable, and type some characters, looking for an echo.

In the ASCII or Hex mode, you can also use the Terminal Window to determine which tape code your external device is sending.

To close the Terminal Window, you can click the “X” in the upper-right corner, or you can the I/O menu selection “Abort I/O”. Closing the Terminal Window will also also close the COM port.

Sending and receiving Mazatrol CMT files

Mazatrol CMT files are saved as series of 2-digit hexadecimal numbers with a checksum at the end of each line. Mazatrol files are not intended to be edited off-line, but they can be saved on your PC using PC-DNC Editor, and they can be sent back to the CNC. Each model Mazatrol uses a slightly different function-key procedure for sending and receiving files, so we will not attempt to describe that process here. For more detailed information on operating your Mazatrol, or for information on Mazatrol parameter settings, visit the Refresh Your Memory, Inc. web site at www.rym.com and click “Online Support and Downloads”, then “CNC configurations.

All Mazatrol I/O requires a baud rate setting that matches the CNC, a stop-bits setting of “2”, and you must also have the checkbox “Handshake using device driver” checked on the “IO/Configure IO device/Advanced” menu.

Receiving a Mazatrol CMT file:

Click the I/O menu, then select “Mazatrol files”, then “Receive Mazatrol file”. An empty textbox will open, and the selected COM port will open. You must then press the proper buttons on your Mazatrol to send a CMT file. Please refer to the RYM website for the exact key sequence for your model control.

Once a file is received, you must use the “File/Save As” menu to save your CMT file to disk.

Sending a Mazatrol CMT file:

Click the I/O menu, then select “Mazatrol files”, then “Send Mazatrol file”. A Windows file dialog box will open, and you can select any CMT file you have previously saved. Once a file is selected, the COM port will open and PC-DNC Editor will be ready to send the file in CMT format. You must then press the proper buttons on your Mazatrol to read a CMT file. Please refer to the RYM website for the exact key sequence for your model control.

Once a file is received, by the Mazatrol, the PC-DNC Editor’s progress bar will disappear and the COM port will close automatically.

Sending and receiving binary files

Binary files are generally used for saving CNC “Exec tapes” or similar files that can not be transmitted in ASCII or ISO format. When you use the “IO/Binary files/Send binary file” menu, your file is sent without formatting of any kind. The port is opened with 8 data bits and NO parity, and the data in your selected file is sent without “leader”, “trailer” or any end-of-block sequences. Files received in binary are saved without parity. Null characters are also considered significant in binary files.

Receiving a binary file:

Click the I/O menu, then select “Binary files”, then “Receive binary file”. An empty textbox will open, and the selected COM port will open. Once a binary file is received, you must use the “File/Save As” menu to save your file to disk.

Sending a binary file:

Click the I/O menu, then select “Binary files”, then “Send binary file”. Your file will be sent in binary mode without any parity or formatting.

About menu

The “About” pull-down menu contains some useful information about PC-DNC Editor and about the companies involved with servicing and supporting the PC-DNC line of products. On the “Stand-alone” version of PC-DNC Editor, it also contains a hidden “back-door” method for implementing software security and permanently licensing the software.

About/PC-DNC Editor

Displays the version number of your PC-DNC Editor executable file (EDITOR.EXE), as well as the file creation date and the development system under which PC-DNC Editor was compiled.

About/Suburban Machinery Software, Inc.

Displays useful information about Suburban Machinery Software, Inc. and contact information for service and support.

About/Refresh Your Memory, Inc.

Displays useful information about Refresh Your Memory, Inc. and contact information for service and support.

About/The author

Displays a bit of personal information about Dan Fritz, the author of PC-DNC Editor

About/Support in Australia

Displays contact information for our Australian representative, Shera Bonnet Pty, Ltd. in New South Wales, Australia

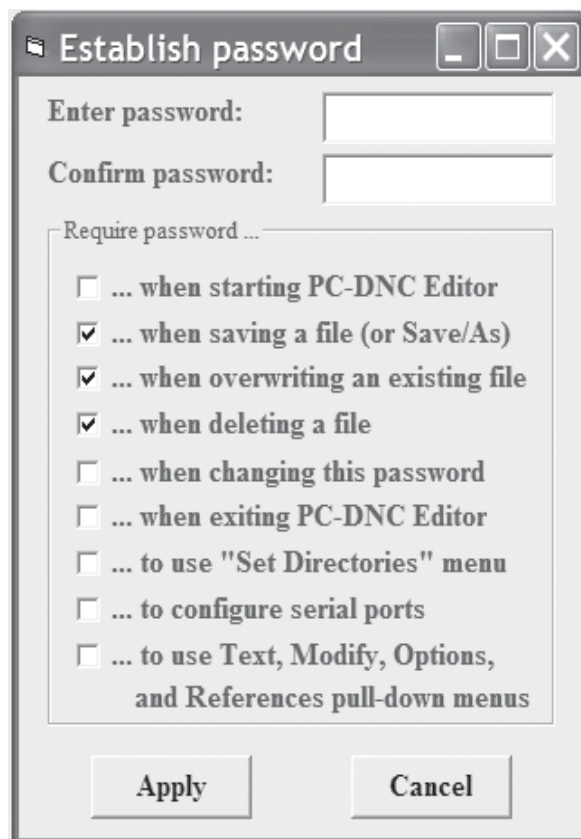
About/Purchasing information - (Stand-alone version of PC-DNC Editor only)

Displays your PC's 9-digit security number. This number is used to license your copy of PC-DNC Editor. To purchase a new copy of the software, you must install and run the software in “30-day demo” mode first, then contact Suburban Machinery Software, Inc. or Refresh Your Memory, Inc for a matching password. To enter the password, open the “About/Purchasing information” menu and press the Ctrl + Alt + “L” keys at the same time. This will display a licensing menu where you can enter your company name, city/state, and the 9-character password. Passwords must always be entered as uppercase (capital) letters.

Password Security Menu

Password security is only available on the “Stand-alone” version of PC-DNC Editor. The bundled version that comes with PC-DNC Plus relies on the more comprehensive PC-DNC Plus security system. For more information on the PC-DNC Plus password security system, refer to appendix “G” of the PC-DNC Plus operator’s manual.

The PC-DNC Editor password security menu can be used to limit specific PC-DNC Editor functions for certain users of the software. The password security system is turned off when you first install PC-DNC Editor, but you can enable it by entering a password. To open this menu, click on the “About/Purchasing information” menu, then press the Ctrl + Alt + “P” keys at the same time. The following menu will appear:



Establish password

Enter password:

Confirm password:

Require password ...

- ☐ ... when starting PC-DNC Editor
- ☒ ... when saving a file (or Save/As)
- ☒ ... when overwriting an existing file
- ☒ ... when deleting a file
- ☐ ... when changing this password
- ☐ ... when exiting PC-DNC Editor
- ☐ ... to use "Set Directories" menu
- ☐ ... to configure serial ports
- ☐ ... to use Text, Modify, Options, and References pull-down menus

Apply Cancel

To enable password security, enter and confirm your password, then check the functions that you want to restrict and click “Apply”. The functions you select will then require that the same password be entered each time the user attempts to use that function.

To disable password security, open the Password Security menu again and enter a “blank” password.

APPENDIX A

Fanuc Parameter Settings

Fanuc System 6/System 3 parameter settings

The Fanuc System 6 and System 3 controllers have several memory registers (parameters) that must be set correctly for the RS-232 port to be compatible with a PC-DNC system. Consult your CNC control operator's manual for details on how to change these settings from the controller's keyboard.

Baud rates:

- System 3: Two different baud rates can be set using parameters 68 & 69. For 4800 baud, set "4800" in parameter 68 & "0" in setting register I/O" (below).
- System 6A: Use parameter #25. For 4800 baud, set "11101111". Be sure parameter #24, bit on far left, is "0".
- System 6B: Four baud rates can be set using parameters 310-313. For 4800 baud, set "11001001" in #311 and set "2" in setting register #340 & 341 (below).

- Stop bits: System 3 - Parameters 005 & 014, bits on far right should be set to "0".
- System 6A - Parameter 24, bit on far right should be "0".
- System 6B - Parameters 310-313, 5th bit from right should be "0".

- Tape codes: Systems 3 and all 6 series - Setting register marked "ISO" should be "0" to output ISO/ASCII codes, "1" for EIA.

Device used:

- System 3: Setting register marked "I/O" can be set to "0" or "1" to indicate which baud rate is used (#68 or #69).
- System 6A: No setting possible.
- System 6B: Setting registers 340 & 341 are set "1" thru "4" to indicate which baud rate is used (310-313). Set to "2".

- Port select: For the System 3 series controls, the RS-232 port is always active, but for all System 6 controls (A & B), there is a setting register marked "INPUT DEVICE 2". This bit must be set to "1" when loading data by RS-232. If it is set to "0", the tape reader starts when you press [READ]. The operator can select the tape reader or PC-DNC as a source of data by changing this bit.

APPENDIX A (cont.)

Fanuc Parameter Settings

Fanuc System 10/11/12/15 parameter settings

System 10/11/12 & 15 controls can have up to 3 serial ports. In most cases, serial port #1 will be wired to the output plug on the side of your machine's cabinet. If port #1 does not work on your machine, you must try ports #2 and #3 to find out which one your machine tool builder selected.

Port selection: In the MDI mode, press the function key SETTING on the bottom edge of the CRT. Continue to press SETTING until the HANDY page is displayed. Input the following:

| | |
|------------------|-----------|
| TV CHECK | = 0 |
| TAPE CODE | = 0 (ISO) |
| INPUT DEVICE FG | = 1 |
| OUTPUT DEVICE FG | = 1 |
| INPUT DEVICE BG | = 1 |
| OUTPUT DEVICE BG | = 1 |

Press the SETTING button a second time to display the GENERAL setting Page. Place the cursor over setting #0000 and input the following data (8-bit binary):

00001000

Next, page up to setting #5110 and input the following data:

5110 = 3 (i/o with no leader, DC1-DC4 used)
5111 = 1 (select 1 stop bit)
5112 = 10 (4800 baud)
5120 = 3
5121 = 1 (same as above, but for port #2)
5122 = 10
5130 = 3
5131 = 1 (same as above, but for port #3)
5132 = 10

APPENDIX A (cont.)

Fanuc Parameter Settings

Fanuc System 0A, 0B, and 0C Parameters

Fanuc system 0 and 0-B and 0-C controls are set as follows. Bits marked “1” and “0” affect the RS-232 ports. Bits marked “x” are used for something else - do not change them. The following settings are for 4800 baud, 1 “stop” bit, and the output of leaders and trailers is suppressed.

Parameter #0002: 1xxxx0x0
Parameter #0012: 1xxxx0x0
Parameter #0552: 10
Parameter #0553: 10

Fanuc 16/18 (T and M) parameters

The following parameters set the 16 and 18 controls to communicate via RS-232 at 4800 baud, 1 “stop” bit. Parameters 0000, 0100, 0101, and 0121 are in 8-bit binary format, while all other parameters are decimal numbers. The binary bits marked “0” or “1” must be set as indicated. Bits marked “x” are used for something else - do not change the original factory settings.

On Fanuc 16/18 controls, there are two possible RS232 ports on the main CPU board. The first setting shown below is for the serial port on CPU board connector JD5A. This connector uses I/O setting of 0, and parameters 100, 101, 102, and 103 for baud rate, stop bits, etc. If you are wired to main CPU board connector JD5B, you must use an I/O setting of 2, and make your baudrate settings with parameters 121, 122, and 123.

If you are using the Fanuc “Remote Buffer” board for RS232 or RS422 communications, you must use an I/O setting of “3”, and set parameters 131-135. See your Fanuc documentation for these settings.

For standard RS232 connection at JD5A:

0000 x x x x x 1 0

TVON = 0 (vertical parity checking OFF)
ISO = 1 (use ISO tape code)

APPENDIX A (cont.)

Fanuc Parameter Settings

Fanuc 16/18 (T and M) parameters (cont.)

| | | |
|------|-----------------|--|
| 0020 | 0 | I/O device (decimal number) |
| 0100 | 1 x 1 x 1 x 0 x | TV check not performed in program comments LF used as EOB character (not LF CR CR) In DNC operation, read buffer full Null characters are ignored in EIA code |
| 0101 | 1 x x x 0 x x 0 | (settings for I/O device 0) 1 stop bit Automatic EIA/ISO input code recognition No leader is output when sending program |
| 0102 | 0 | Output protocol (RS232, use DC codes) |
| 0103 | 10 | Baudrate setting (10 = 4800 baud) |

For RS232 connection at CPU board JD5B:

| | | |
|------|-----------------|---|
| 0121 | 1 x x x 0 x x 0 | (settings for I/O device 2) 1 stop bit Automatic EIA/ISO input code recognition No leader is output when sending program |
| 0122 | 0 | Output protocol (RS232, use DC codes) |
| 0123 | 10 | Baudrate setting (10 = 4800 baud) |

APPENDIX B

SERIAL (RS232) CABLE CONSTRUCTION

When making RS232 cables for your PC-DNC system, you must be very careful to use quality components, and to pay careful attention to shielding. An improperly shielded cable is susceptible to all kinds of EMI (Electro-Magnetic Interference), which can cause unreliable data communications. It is also very important to avoid ground loops, which are usually a result of improperly grounded equipment. Here are some important rules:

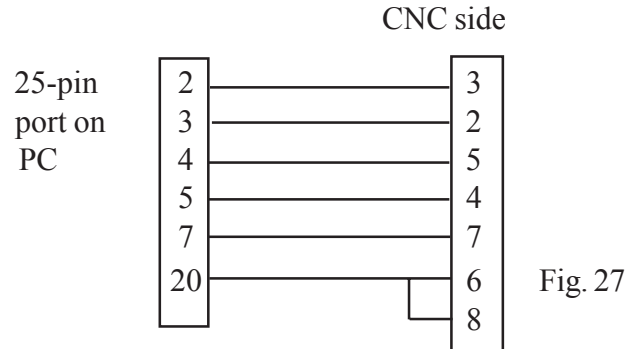
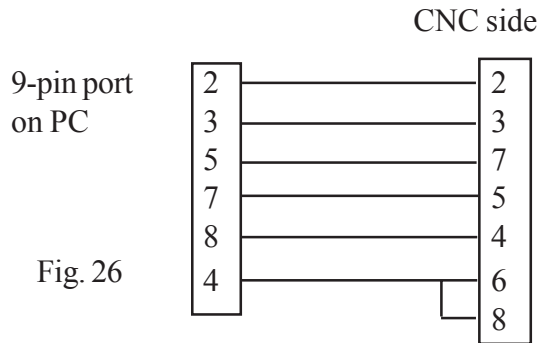
- 1) When buying components for your cables, always buy **shielded** cable that is designed for RS232 communications. Good quality 4, 6, or 8 conductor (22 or 24 gauge) cable is equipped with a foil shield, a braided shield, or both
- 2) If an individual cable run is over 100 ft. long, use a low-capacitance, or “low-cap” cable. Cables are rated in capacitance per linear foot (pf/ft). The lower the pf/ft. number, the better the cable can carry high-frequency data over long distances. Very low-cap cable can work up to 500 ft.
- 3) Always route cables as far away from strong EMI sources as possible. A strong EMI source is anything that generates a spark (Welders, EDM machines, etc.), or devices that have strong magnetic fields (transformers, solenoids, etc.). Also, be sure that your cables do not run parallel to high-voltage AC power lines for long distances.
- 4) Always buy RS232 connectors that have gold-plated pins. A thin “flash” plating of gold prevents corrosion. We recommend solder-type connectors rather than “crimp” style connectors.
- 5) Always be sure the shield in you cable is GROUNDED. If you are using die-cast metal connector covers (“hoods”), fold back the foil and/or braided shield, and firmly clamp the hood over the shield. The two screws that hold the hood onto the serial device will complete the ground connection. If you are using plastic hoods, connect the shield to pin #1 of the 25-pin RS232 connector at the CNC side.
- 6) Be sure that your CNCs are properly grounded. A ground-loop occurs when the “ground” on one device is not at the same level as the “ground” on another device. For example, if your computer is grounded to the 110vac wall plug, and the CNCs are grounded through the shop floor with ground rods, a ground loop can occur if any resistance occurs in the shop’s main power ground. Power from a shorted bench grinder motor could find its way through the shop’s 110vac ground, to the port controllers, and then (through the RS232 cables!) to a CNCs ground rod. If this path to “ground” has less resistance than the shop’s main power ground (usually, a ground rod outside the building), then you are risking a “blown” serial port on your computer, the CNC, or both. To avoid ground loops, be sure all your connected equipment is grounded well.
- 7) If ground loops cannot be avoided, or when routing cables to another AC power system (i.e. to another building), use an RS232 Opto-Isolator (Black Box Corp. # SP400A-R2 or equivalent)

APPENDIX B

SERIAL (RS232) CABLE CONSTRUCTION

In addition to using the correct cable components, your serial cable must also be wired correctly for your application.

If you are using a 9-pin serial plug on your PC, use a cable as shown in Fig. 26, below. If you have a 25-pin plug on your PC (or if you are using a 9-25 adapter), use a cable like the one shown in Fig. 27. This cable diagram should work for over 95% of the CNC controls.



Note the fact that the serial port pin assignments for the PC side of the cable are different for a 9-pin plug than for a 25-pin plug. Only these six wires are needed for Fanuc controls. The cables shown above are for PC to CNC communications ONLY. If you are connecting a PC to a scanning PC-DNC system, or if you are connecting to a MODEM or tape puncher, please refer to the manuals for those devices for the proper cable configuration.

APPENDIX C

Troubleshooting serial I/O problems

Several things must be done correctly before serial communication will work properly. If ANY ONE of these things is done incorrectly, your serial port I/O function will probably not work. For serial I/O to work correctly you must:

- 1) Construct your cable with quality components, using the correct pin connections. See Appendix B
- 2) Set your CNCs parameters to the baudrate, stop-bits, and tape code settings you want to use.
- 3) Configure your I/O port to match the CNCs baudrate, stop-bits, and tape-code settings
- 4) Identify which COM port you are using on your PC (COM1, COM2, etc.)
- 5) Send your CNC the kind of DATA that it requires.
- 6) When receiving, be sure that your PC's performance is adequate (see Appendix C, page 3)

Here are some common problems, and their possible solutions

PC locks up when you try to use serial I/O (or mouse won't move)

- 1) You may be trying to use the same COM port that your mouse is using. Some PCs use a serial mouse, others use a "buss", or PS/2 mouse. You must configure your serial device to use a port NOT already used by the mouse. Select the Windows Control Panel, then select "Mouse" to find out what kind of mouse you have.
- 2) Your PC's serial port board may be set incorrectly. Some serial boards have jumpers or DIP switches for setting the ADDRESS and the INTERRUPT level. If either the address or interrupt setting conflicts with another installed device (network card, scanner card, etc.) a lockup may occur.

No data in either direction (no alarms on CNC, no received data on PC)

- 1) You may have a defective cable, or one that's not wired correctly (see previous page)
- 2) You may not have matched the baudrate settings between devices correctly.
- 3) You may be configured to use the wrong COM port on your PC

Can send data in one direction, but not the other

- 1) The "stop-bits" setting may not match between devices. Some CNCs use 1 "stop-bit", others use 2 stop-bits. Check your CNCs parameters to see which setting it uses, and configure port to match it.
- 2) You may have one bad wire in your cable. Check connections on pins 2 and 3.
- 3) If you can SEND to the CNC, but can't RECEIVE from the CNC, see page 37 for description of "FIFO" buffers, and how it can affect serial I/O performance.

TV Parity alarms on CNC (or "Tape Vertical" parity)

- 1) TV parity checking should be disabled at the CNC side. Look for a setting bit (or a parameter) to disable TV parity, and turn it off

APPENDIX C (cont.)

Troubleshooting serial I/O problems

Must press READ button on CNC twice to download a file

1) Many CNCs read a percent sign (%) as the END of a file. On Fanuc, Yasnac, and many others, if your files have a “%” at the beginning, you MUST NOT use a “leader” when you configure your device. On these CNCs, a line-feed (LF) starts the read process, and a “%” ends the read process. Also, anything the CNC receives before the first LF is ignored (this is the “Label Skip” function).

First block of the program is lost when loading into the CNC

1) You may need a LF (line-feed) sent as the “leader” (see item above). CNCs with a “label-skip” function (Fanuc, Yasnac) must see a LF character before the first block of the program.

Can receive data from CNC, but can’t send to CNC

1) Your CNC may require that you begin sending data with some special character. Some CNCs require a percent sign (%) to be the first character sent. If this is so, Either you must have this character in your file, OR you must have this character set as the LEADER in your I/O configuration.

2) You may also be configured to send the wrong tape code. If your CNC requires ASCII even parity, and you are sending EIA code, the CNC may ignore you when you send to it. PC-DNC Editor uses an automatic code recognition algorithm when receiving data, so if your code setting does not match the CNC, PC-DNC Editor will probably receive OK anyway.

When receiving data from CNC, some characters are missing (or blocks run together)

1) This is a handshaking problem. On most CNCs (Fanuc, Yasnac, etc.) you MUST connect pin #5 on the CNCs serial port to the correct pin on the PC (see cable diagram, page 34). If this pin is “jumped-out”, then the CNC won’t be able to handshake properly when it SENDS.

2) On CNCs that use Xon/Xoff handshaking, be sure the CNCs parameters are set to enable this function. Note: Xon/Xoff handshaking is sometimes referred to as “Device Control” or “DC” codes.

3) See page 37 for description of “FIFO” buffers, and poor performance when receiving data.

When sending data to the CNC, some characters are missing (or blocks run together)

1) Be sure the handshaking setting in PC-DNC Editor’s I/O device configuration matches the type of handshaking used by the CNC. Most CNCs use Xon/Xoff (sometimes referred to as “DC codes”) when receiving data. When in doubt, set your I/O device to use “Both”

2) If you are also having trouble receiving data from the CNC, you may have a bad wire in your cable, or you may also have a “FIFO” buffer problem that prevents the PC from receiving the CNCs Xoff handshake signals. See following page suggestions for “Poor performance”

Buffer Overflow alarms on the CNC when sending to the CNC

1) Be sure the handshaking setting in PC-DNC Editor’s I/O device configuration matches the type of handshaking used by the CNC. Most CNCs use Xon/Xoff (sometimes referred to as “DC codes”) when receiving data. When in doubt, set your PC-DNC Editor’s IO device to use “Both”

2) Turn on the “Handshake using device driver” option in the IO/Configure/Advanced menu. If that fails:

3) Turn **OFF** the Device driver handshake option, then set the slider control for the FIFO transmit buffer is set no higher than 1/3 scale. See FIFO buffer setting on following page under “Poor performance”

APPENDIX C (cont.)

Troubleshooting serial I/O problems

Occasional “Junk” in data (either direction)

1) This may be a noise problem. Your cable may be too long, routed too close to fluorescent light fixtures, or may not be shielded properly. Refer to Appendix B for advice on serial cable construction.

Poor performance (can't send fast, or can't receive at all at high baud rates)

1) Your PC may not have a “buffered” serial port. If your PC's serial port has the newer 16550 UART chip, you can use its “FIFO” (First In, First Out) buffer to greatly improve the performance of the serial port - especially when the PC is receiving data. Without this buffer, the PC's operating system (Windows) 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 all these interrupts, and may lose some characters. With the FIFO buffer, Windows is only interrupted when the UART chip's buffer is full, which means that it can handle several characters at a time, resulting in a much higher speed.

If you can't receive data from the CNC at all, try this experiment: Set the baudrate at the CNC and in your I/O device configuration menu to a VERY LOW setting (say, 300 baud), and try to receive a file. If the file comes in OK, but switching back to a higher baudrate does not work, then you probably have a FIFO buffer problem. Next, use the Windows Control Panel in the following manner to check if Windows is using its FIFO buffer:

Windows 95,98, & ME

- 1) click START/SETTINGS/CONTROL PANEL
- 2) double click on SYSTEM icon
- 3) click DEVICE MANAGER tab
- 4) double-click on Ports (COM and LPT)
- 5) right-click on your port (COM1, COM2, etc.)
- 6) click on PROPERTIES then SETTINGS
- 7) click on ADVANCED button
- 8) turn ON the “Use FIFO buffers” checkbox
- 9) set the “Transmit” slider control to 1/3 scale

Windows 2000, XP

- 1) START/SETTINGS/CONTROL PANEL
- 2) double click on SYSTEM, then HARDWARE
- 3) click DEVICE MANAGER button
- 4) double-click on Ports (COM and LPT)
- 5) right on your port (COM1, COM2, etc.)
- 6) Click on PROPERTIES then SETTINGS
- 7) click on ADVANCED button
- 8) turn ON the “Use FIFO buffers” checkbox
- 9) set the “Transmit” slider control to 1/3 scale

Windows NT 4.0:

On Windows NT 4.0 equipped computers, you may have to disable the FIFO buffer altogether. If you are experiencing “Buffer overflow” alarms, open the Control Panel, double-click on the “PORTS” icon, then select the COM port you are using. Under the “Advanced” menu, turn the FIFO buffer OFF.

If you are experiencing poor performance (not “buffer overflows”) on a Windows NT 4.0 PC, be sure that the FIFO buffer checkbox is turned ON.

APPENDIX C (cont.)

Troubleshooting serial I/O problems

TH Parity alarms on CNC (or “Tape Horizontal” parity)

1) CNCs using the ISO tape code (Fanuc, Yasnac, etc.) won’t accept lowercase letters and some punctuation marks. (ISO is a subset of ASCII even parity). If your file contains lowercase letters or any non-ISO legal character, edit your file. Refer to the ISO code table under PC-DNC Editor’s References menu for information ISO code.

2) If your CNCs must use EIA tape code, beware that many characters in the normal ASCII character set cannot be converted to EIA code, and cannot be used in your files. Refer to the EIA code table under PC-DNC Editor’s References menu for information on EIA code.

3) You may be sending data to the CNC using the wrong tape code. Most CNCs use ASCII (even) parity. If your CNC uses “ISO” tape code, set PC-DNC Editor to send ASCII even parity, and avoid using lowercase letters in your NC programs. If your CNC has separate parameter settings for “data” bits and “parity”, refer to the following table:

| CNC setting | PC-DNC Editor setting |
|-------------------------|-----------------------|
| 7 data bits Even parity | = ASCII (even) or ISO |
| 7 data bits Odd parity | = ASCII (odd) |
| 8 data bits No parity | = ASCII (no parity) |

Notice that several possible settings on the CNC side are not included in this list. This is because they are illegal settings. Do not set your CNC to any of the following combinations unless there is an unusual reason for doing so:

| | |
|-------------------------|------------------------|
| 7 data bits No parity | = (an illegal setting) |
| 8 data bits Even parity | = (an illegal setting) |
| 8 data bits Odd parity | = (an illegal setting) |

Appendix D

Multi-port DNC option

The Multi-port DNC enhancement for the PC-DNC Editor consists of an additional executable (.EXE) file called DNC_OUTPUT.EXE. When this option is installed with your PC-DNC Editor software, you can:

- 1) Transmit data through several serial ports simultaneously
- 2) Display a “live” text window of each active DNC port
- 3) Start transmission in the middle of a file
- 4) Search for your desired start point with character or string search function
- 5) Call files like subroutines using CALL statements in your programs
- 6) Close the PC-DNC Editor while multi-port DNC output continues

This PC-DNC Editor enhancement is designed for multi-port “drip-feed” applications where the PC is fast enough to keep up with the demands of the CNCs. As with the basic PC-DNC Editor, the Multi-Port Enhancement can be set to transmit through any Windows COM port (COM1 through COM16) at up to 38,400 baud. The enhancement is designed for multi-port transmission of data only, and does not permit multi-port reception of data.

Whenever a single PC is used to “drip-feed” several CNCs, you must consider the performance limitations of your PC. Although it may be possible to send data through several COM ports simultaneously at high baud rates, you may find that actual transmission speeds (in characters/second) will slow down as you try to do too many things at once. Just because the COM ports are configured to use high baud rates does not mean that the PC can actually process and send data at that speed.

When the Multi-port DNC Enhancement is installed, PC-DNC Editor will display a different dialog box when you click on the I/O menu, and select “Send File” (see following page). It will also permit you to initiate a DNC sequence, and then exit the editor, (or) initiate a DNC sequence, select another I/O device, then start another DNC sequence (as long as you are using different COM ports). Without the Multi-port enhancement, you cannot exit the Editor when an I/O operation is in progress, nor can you send data through multiple ports simultaneously.

Once an enhanced DNC output operation has been started from the I/O menu of PC-DNC Editor, a DNC output window will appear. Each DNC output window behaves like a separate application, and can be minimized, maximized, or closed using its own control box buttons.

Appendix D

Multi-port DNC option (cont.)

When you click on the I/O menu, and select “Send File” the enhanced PC-DNC Editor will display the following dialog box:

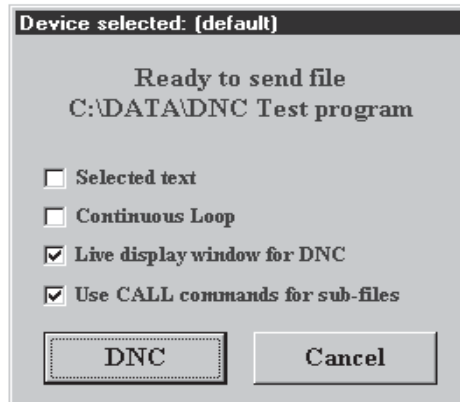


Fig. 1e

Selected text

If you have highlighted (selected) some text in the PC-DNC Editors active text box, this checkbox will be enabled, permitting you to send only the selected portion of your main program. If this box is not checked, it is assumed that you want to send the entire contents of the text box.

Continuous loop

This option is only used for continuous loop applications (such as running a lathe with a bar feeder). Normal DNC operation also permits multiple cycles, but the CNC operator must press “Cycle Start” on the CNC each time. This option should only be used if your file does not have a CNC reset command (M02 or M30) and you don’t want the CNC to stop between cycles.

Live display window for DNC

This checkbox activates the Enhanced Multi-Port DNC feature. When checked, a “live DNC display window” is created, and a snapshot of the data in your active text window is loaded into it. You can then control this DNC window like a separate application. Without this option, DNC output is done from within the PC-DNC Editor, like the non-enhanced version.

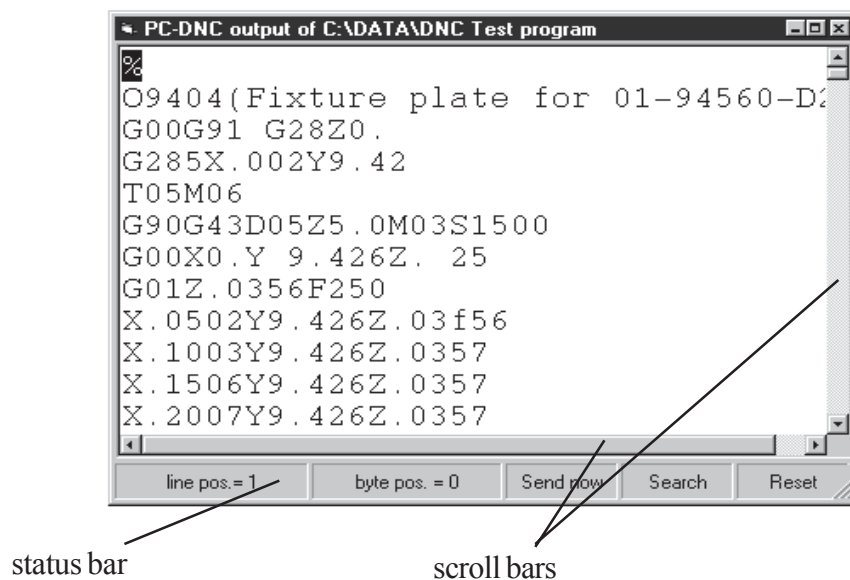
Use CALL commands for sub-files

This checkbox enables the CALL command. With this box checked, you can nest CALL commands up to 7 layers deep, and can CALL sub-files multiple times. See page E5 for information on the CALL commands. Without this option, any occurrence of the word “CALL” in your main program is treated like ordinary text.

Appendix D

Multi-port DNC option (cont.)

When the “Live DNC Display” option is selected, a separate DNC output window appears, and the contents of the PC-DNC Editor’s active text box is loaded into it. In addition, the “leader” and “trailer” data from your serial device configuration menu is added to the beginning and end of the file. Also, if you use CALL statements within your main program, the CALLED files are all linked together. This text window should then be showing the actual data AS IT WILL BE SENT to your CNC control.



The DNC window is similar to a normal PC-DNC text box, but with some important differences. You cannot edit the text within a DNC window. You can, however, position the cursor anywhere you want by the following methods:

- 1) You can scroll through the data with the DNC windows scroll bars
- 2) You can click on any text within the DNC window to position the cursor.
- 3) You can search to any character or string of characters with a Search function
- 4) You can reset to the first line of data in the DNC window.

Whenever you search to a position within the DNC window, or click on a line of text, that line becomes highlighted. This line then becomes the next line of data sent to the CNC. Normally, you would then press “Cycle Start” on the CNC to begin DNC operation. If you are sending to a “dumb” device such as a tape puncher or MODEM, you can also begin transmission by clicking on the “Send now” panel at the bottom of the DNC window.

Appendix D

Multi-port DNC option (cont.)

You can select any line of data within the DNC window by just clicking on it. The highlighted line will become the first line sent to the CNC when you press “Cycle Start”.

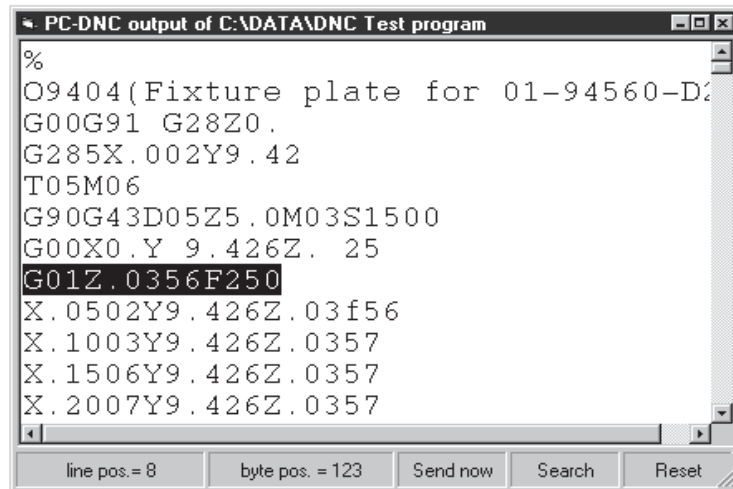


Fig. 3e

The status bar at the bottom of the DNC window is used for the following functions:

Line position (status display only)

Shows what line of data within the DNC window is currently highlighted

Byte position (status display only)

Shows your position in bytes (characters) from the beginning of the data

Start now

Begins sending data immediately. Use only when sending to devices that cannot trigger the DNC transmission with a normal Xon handshake signal

Search

Displays a dialog box that lets you search (forward) to any character or string of characters within the DNC window.

Reset

Sets the cursor to the first line of data within the DNC window

NOTE:

Once you press “Cycle Start” on your CNC and DNC operation commences, the Start now, Search, and Reset status bar panels will not function until the DNC output stops, and is idle for at least 7 seconds. This time delay prevents you from accidentally interfering with DNC operation with a mouse click. Once the DNC window has been in an idle (Xoff) state for 7 seconds, the “hourglass” mouse pointer changes back to an arrow, and these status bar panels become effective again.

Appendix D

Multi-port DNC option (cont.)

Subprogram CALLing functions

When the Multi-port DNC option is installed with PC-DNC Editor, you can use a CALL statement to merge sub-files into the transmitted data stream. By placing the word “CALL” in your main program, you can call a sub-file from any drive/directory on your system. The word “CALL” must be in all capital letters to be recognized. For example, the main program:

```
N001 G90 G00
N002 X1.234 Y5.6787
N003 CALL C:\NCFILES\XYZ
N004 X4.5678
N005 M30
```

Will result in the first 2 lines of the main program being sent to the CNC, followed by the entire contents of the sub file called “C:\NCFILES\XYZ”, followed by the rest of the main program.

Nesting Sub-files

PC-DNC Editor can nest sub files up to 7 layers deep. You can place a CALL xxxx statement in your main program (which calls a sub-file), and you can place CALL statements in your sub-files. If you exceed the 7-layer limit for call statements, an alarm will be issued.

CALLing sub-files multiple times

With an additional command in parentheses (), you can run a sub-file multiple times before it returns to the calling file. The correct syntax for a multiple call statement is:

```
CALL xxxxxxxx (25 TIMES)
```

In all cases, the CALL statement itself is omitted from the data stream, and a message within parentheses is inserted to denote the beginning and end of each sub file. Also, any M30 or M02 commands are omitted from any sub-files, so the CNC cannot become reset within a subprogram.

```
N001 G90 G00
N002 X1.234 Y5.6787
(BEGINNING OF SUB FILE)
  (the contents of the file)
(END OF SUB FILE)
N004 X4.5678
N005 M30
```

Calling sub-files with the CALL command is different from calling a sub file in the CNC memory with an M98 or M99 command. You can still use conventional M98 commands in any file or sub-file, but these M98 commands will execute a subprogram from the CNC memory.

Appendix E

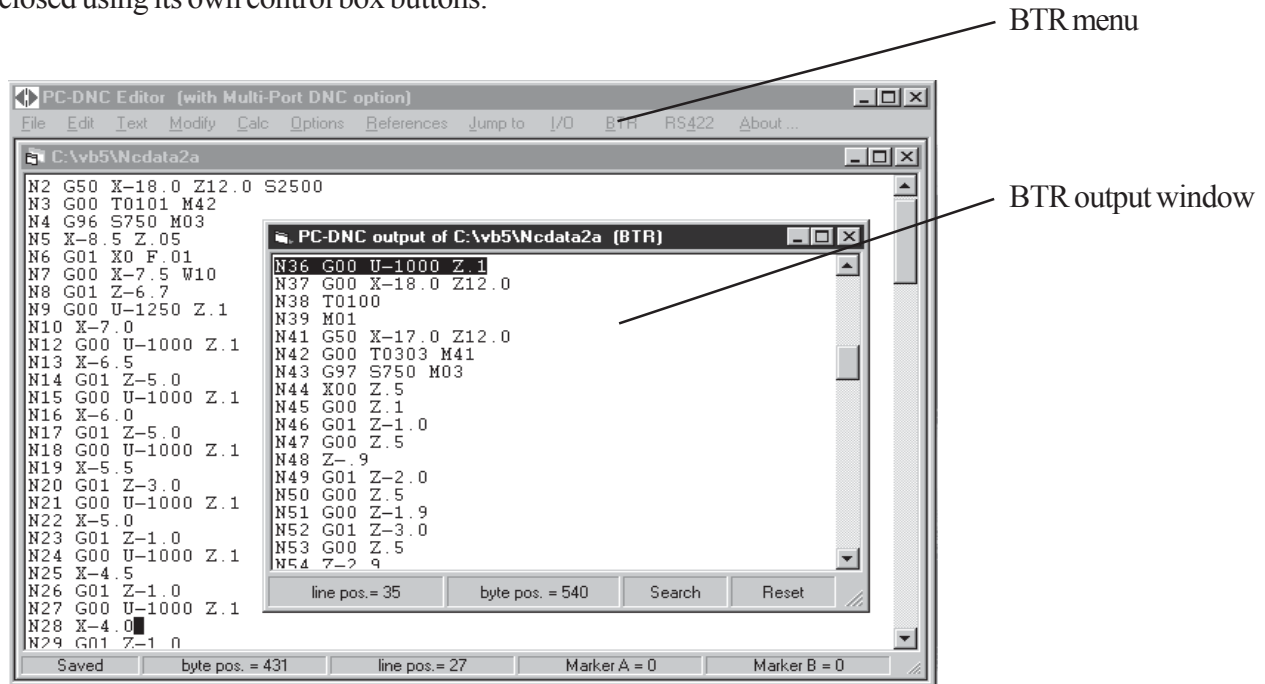
BTR output option

ABTR (Behind the Tape Reader) output function is part of the Multi-port DNC enhancement for the PC-DNC Editor. This option includes an additional executable (.EXE) file called BTR_OUTPUT.EXE. When this optional file is installed with your PC-DNC Editor software, you can:

- 1) Transmit parallel data through your PC's parallel (printer) ports LPT1-LPT4
- 2) Display a "live" text window of each active BTR port
- 3) Start transmission in the middle of a file
- 4) Search for your desired start point with character or string search function
- 5) Call files like subroutines using CALL statements in your programs
- 6) Run decimal-point formatted programs on older, non-decimal CNCs
- 6) Close the PC-DNC Editor while multi-port DNC output continues

This PC-DNC Editor enhancement is designed for "drip-feed" applications where the program data must be sent to the CNC in parallel "Behind-the-Tape-Reader" (BTR) mode. The BTR enhancement is designed for transmission of data only, and does not permit reception of data from the CNC. In most cases, a special BTR cable is provided with the PC-DNC Editor software. This cable must be specifically made for the type of CNC control you are connecting.

When PC-DNC Editor is equipped with the BTR output option, an additional menu selection "BTR" becomes available. Under this BTR menu are 3 basic selections; Send File, Configure BTR device, and Select BTR device. Once a BTR/Send File operation has been started, a BTR output window will appear. Each BTR output window behaves like a separate application, and can be minimized, maximized, or closed using its own control box buttons.



Appendix E

BTR output option (cont.)

The BTR output window (shown here) runs like a separate application in its own “thread”. While the CNC is running, you cannot close this window. You must wait until the CNC is inactive for 7 seconds (a safety time-out) before you can manually control this window.

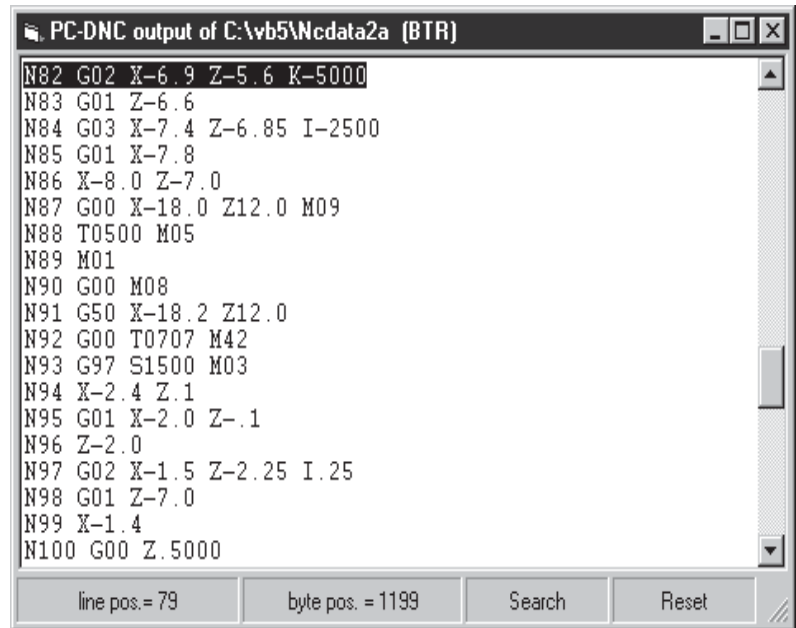


Fig.30

You can select any line of data within the DNC window by just clicking on it. The highlighted line will become the first line sent to the CNC when you press “Cycle Start”.

The status bar at the bottom of the DNC window is used for the following functions:

Line position (status display only)

Shows what line of data within the DNC window is currently highlighted

Byte position (status display only)

Shows your position in bytes (characters) from the beginning of the data

Search

Displays a dialog box that lets you search (forward) to any character or string of characters within the DNC window.

Reset

Sets the cursor to the first line of data within the DNC window

NOTE:

Once you press “Cycle Start” on your CNC and DNC operation commences, the Search and Reset status bar panels will not function until the DNC output stops, and is idle for at least 7 seconds. This time delay prevents you from accidentally interfering with DNC operation with a mouse click. Once the DNC window has been in an idle state for 7 seconds, the “hourglass” mouse pointer changes back to an arrow, and these status bar panels become effective again.

Appendix E

BTR output option (cont.)

Installing BTR driver

There is a special device driver that must be installed before you can use the PC-DNC Editor's BTR output option. Normally, this device driver is loaded automatically when you install the PC-DNC MultiPort Editor from our website or from the Refresh Your Memory, Inc, CD-ROM. However, if you are upgrading from the basic PC-DNC Editor to the MultiPort version, you may have to install this device driver manually. Contact Suburban Machinery Software, Inc. if you need help to download and install the BTR drivers for your PC. The device driver is called "WinRT", and it permits our software to have direct access to the parallel port. A device driver for Windows 95, 98, and ME is available, and a different driver for Windows NT 4.0, 2000, and XP is also available.

The device drivers are available as self-extracting ZIP files from our website. These files can be downloaded by entering this address into your web browser:

Windows 95/98/ME: http://www.sub-soft.com/download/BTR_drivers/98_BTRDrivers.exe
Windows NT, 2000, XP: http://www.sub-soft.com/download/BTR_drivers/NT_BTRDrivers.exe

Download and run the self-extracting .EXE file, select the "Self-extract" menu, then unzip the files to any empty folder. Next, run the SETUP.EXE file from that folder to install the WinRT device driver.

Configure BTR (parallel) port

BTR device name: (default) Add to list: Delete

Port #: LPT1 LPT2 LPT3

Code: ☒ ASCII/ISO ☐ EIA RS244

EOB: ☒ LF ☐ LF/CR ☐ CR ☐ CR/LF

Data output: ☒ Positive logic ☐ Negative logic

Sprocket output: ☒ Positive logic ☐ Negative logic

Run/Stop input: ☒ Positive logic ☐ Negative logic

Address: 378 Speed (cps.): 300 Leader: %LF Trailer: %

Data "on" time (ms): 3.33 Sprocket "on" time (ms): 2.2 Sprocket/data overlap (ms): .565

Delay between characters (ms): 0 Delay between blocks (ms): 0

Reset to beginning of file on: M30 Mask characters: Format string:

☒ CALL sub files ☐ Mask comments ☐ Auto format

Fanuc defaults Yasnac defaults

Apply Cancel

Fig.29

The menu shown above can be displayed by selecting "Configure BTR port" from the BTR main menu. In most cases, you can click on either the "Fanuc defaults" or "Yasnac defaults" button, and clicking "Apply". In those cases where a more in-depth installation is required, you can select from a wide variety of BTR signal types and data output options.

Appendix E

BTR output option (cont.)

Special note for Windows 2000 and XP

The WinRT BTR drivers will not work under Windows 2000 or Windows XP unless you first disable the native Windows parallel port driver. This is done with special utility program called “**LPT_switcher.exe**”, which is installed automatically in the “C:\Program files\RYM\PC-DNC Editor MP” directory. Run this program by double-clicking on it in Windows Explorer, and click the button marked “Set LPT port for BTR use”. This setting will enable the BTR drivers and DISABLE the normal parallel port drivers. To return your LPT parallel port to normal use (for printers), run the utility again and click the “Set LPT port for standard use” button. This utility only needs to be run once.

BTR port configuration

Once the BTR drivers are loaded and the Multi-Port PC-DNC Editor software is installed, you must configure the BTR port for proper operation. Run the PC-DNC Editor software, and select the pull-down menu called “BTR”. Under this menu, click on the selection “Configure BTR port” (a warning message will be displayed – click “OK”). On the Configure BTR port menu, you can “name” a BTR device if you wish, or just use the “default” device name. If you have more than one BTR device connected to this computer, enter a unique name for each device in the upper right of the menu and click “Add to list”. You can then configure each device separately. You must use a different parallel (LPT) port for each device. Once you select the LPT parallel port you wish to use, click the “Apply” button to store your configuration. Other typical settings for Fanuc CNCs are:

| | | |
|-----------------------|------------------|------------------------------|
| Code | ASCII/ISO | CALL sub files (checked) |
| EOB: | LF | Mask comments (checked) |
| Leader: | %LF | Auto Format (checked) |
| Trailer: | % | Format string X4Y4Z4I4J4K4F2 |
| Data “on” time | 3.3 ms | Data logic: Positive |
| Sprocket “on” time | 2.2 ms | Sprocket logic: Positive |
| Data/sprocket overlap | .565 ms | Run/Stop logic: Positive |
| Output speed: | 300 (calculated) | |
| Block delay: | (leave blank) | |
| Reset on: | M30 | |

Running a program through the BTR port

Once a BTR port is configured, you can output a file to the CNC. Simply open a file with the “File/Open” menu, select the BTR pull-down menu and click on “Send file (BTR)”. If the text in the BTR output window “scrolls” before pressing Cycle Start on your CNC, you may not be configured properly. If this happens, verify that you are plugged into the correct LPT port on the back of your PC.

Notes on tape codes:

If you press “Cycle Start” and the BTR window begins “scrolling” data on the screen, but the CNC does not do anything, you may be sending the wrong tape code. On older Fanuc and Yasnac CNCs, there is a setting parameter for ISO tape code. This setting bit should normally be a “1” for ISO codes (0=EIA codes). If changing this setting bit has no effect, your CNC may not have the ISO code option, in which case, you will have to setup your BTR device to send EIA code instead.

Appendix E

BTR output option (cont.)

Subprogram CALLing functions

When the Multi-port DNC option is installed with PC-DNC Editor, you can use a CALL statement to merge sub-files into the transmitted data stream. By placing the word “CALL” in your main program, you can call a sub-file from any drive/directory on your system. The word “CALL” must be in all capital letters to be recognized. For example, the main program:

```
N001 G90 G00
N002 X1.234 Y5.6787
N003 CALL C:\NCFILES\XYZ
N004 X4.5678
N005 M30
```

Will result in the first 2 lines of the main program being sent to the CNC, followed by the entire contents of the sub file called “C:\NCFILES\XYZ”, followed by the rest of the main program.

Nesting Sub-files

PC-DNC Editor can nest sub files up to 7 layers deep. You can place a CALL xxxx statement in your main program (which calls a sub-file), and you can place CALL statements in your sub-files. If you exceed the 7-layer limit for call statements, an alarm will be issued.

CALLing sub-files multiple times

With an additional command in parentheses (), you can run a sub-file multiple times before it returns to the calling file. The correct syntax for a multiple call statement is:

```
CALL xxxxxxxx (25 TIMES)
```

In all cases, the CALL statement itself is omitted from the data stream, and a message within parentheses is inserted to denote the beginning and end of each sub file. Also, any M30 or M02 commands are omitted from any sub-files, so the CNC cannot become reset within a subprogram.

```
N001 G90 G00
N002 X1.234 Y5.6787
(BEGINNING OF SUB FILE)
  (the contents of the file)
(END OF SUB FILE)
N004 X4.5678
N005 M30
```

Calling sub-files with the CALL command is different from calling a sub file in the CNC memory with an M98 or M99 command. You can still use conventional M98 commands in any file or sub-file, but these M98 commands will execute a subprogram from the CNC memory.

Appendix E

BTR output option (cont.)

Using decimal point programs in your older Fanuc or Yasnac control

PC-DNC Editor can automatically convert decimal point programs “on the fly”, so you can use decimal point formatted files directly in an older Fanuc or Yasnac control with trailing-zero format. To use this feature, you must enter a “format” string in the “Configure BTR port” menu, and check the option box labeled “Auto Format”. The format string would look like so:

X4Y4Z4I4J4K4F2E6

The string shown above will convert all X,Y,Z,I,J, and K values to a “trailing-zero” format which assumes 4 digits after the decimal point. It will also convert F-codes to 2-digit trailing zero format and E-codes into a 6 digit trailing zero format. For example:

| | | | | |
|--------------|---------|------------------|--------|-----------------|
| The command: | X1.2345 | is converted to: | X12345 | |
| | X1.0 | “ “ | X10000 | |
| | X.0003 | “ “ | X3 | |
| | X20 | | X20 | (no conversion) |

If any X value is programmed without a decimal point, it will be passed through to the CNC with no code conversion. If a decimal point occurs in any X command, the number is formatted with the following algorithm:

Where format string contains “X4”:

$$\text{NEW X} = \text{INT}(\text{OLD X} * 10 ^ 4 +.5)$$

This algorithm will “round off” any X value to the nearest .0001 inch.

Note 1: If any address (letter) is programmed with a decimal point, and that letter does not appear in the FORMAT string, a number formatting error will be generated by PC-DNC Editor.

Note 2: If any address within your program has more than one decimal point, or if a line of NC code begins with a decimal point, a formatting error will occur.

Note 3: All addresses that are programmed without a decimal point will not be converted at all. This information is passed through to the CNC unchanged.

Note 4: When programming in metric mode, you will need to create a FORMAT file with 3-digit format commands. i.e.: X3Y3Z3I3J3K3 etc.

Appendix F

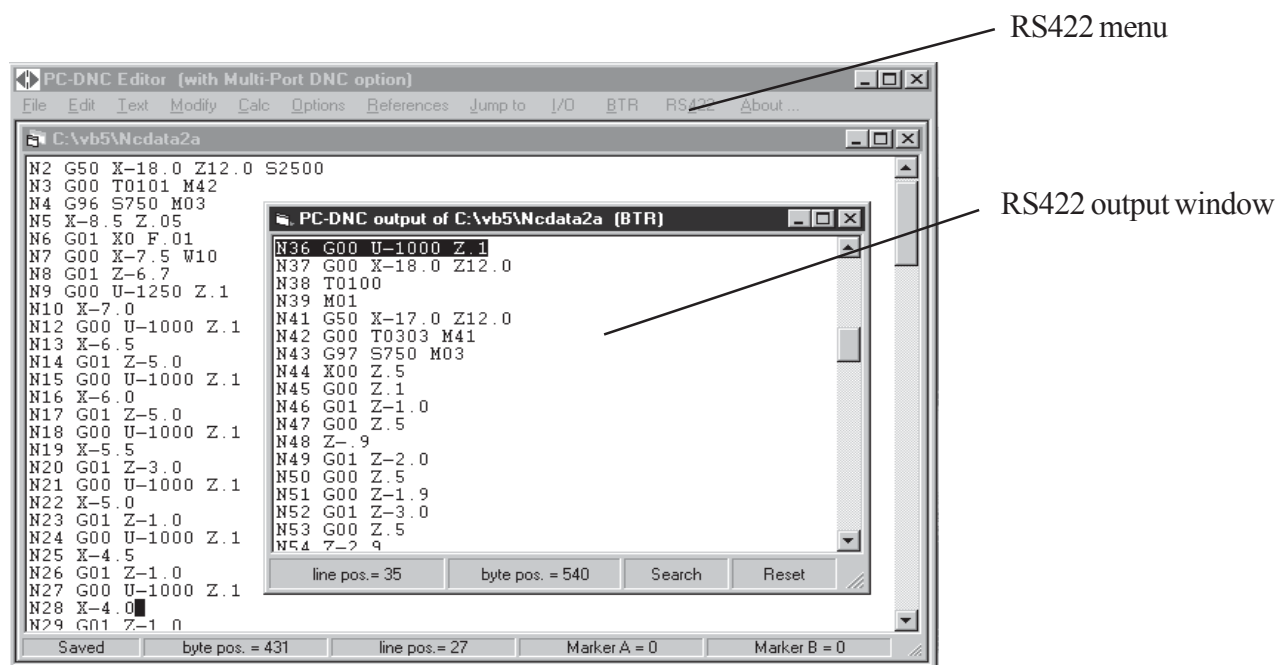
RS422 output option

An RS422 output function is available as an extra-cost enhancement for the PC-DNC Editor. This option requires the installation of a special RS422 board from Sealevel Systems, Inc., and is designed specifically for the Fanuc Remote Buffer option. The option also includes an executable (.EXE) file called RS422_OUTPUT.EXE. When this optional file is installed with your PC-DNC Editor software, you can:

- 1) Transmit data to the Fanuc Remote Buffer board at 86,400 baud
- 2) Display a “live” text window of each active RS422 port
- 3) Start transmission in the middle of a file
- 4) Search for your desired start point with character or string search function
- 5) Call files like subroutines using CALL statements in your programs
- 6) Close the PC-DNC Editor while multi-port DNC output continues

This RS422 enhancement is designed for “drip-feed” applications where the program data must be sent to the CNC at a high baudrate. The RS422 enhancement is designed for transmission of data only, and does not permit reception of data from the CNC with the RS422 link. A special RS422 cable is provided with the RS422 output option. This cable must be specifically made for the type of CNC control you are connecting.

When PC-DNC Editor is equipped with the RS422 output option, an additional menu selection “RS422” becomes available. Under this menu are 3 basic selections; Send File, Configure RS422 device, and Select RS422 device. Once an RS422/Send File operation has been started, an RS422 output window will appear. Each RS422 output window behaves like a separate application, and can be minimized, maximized, or closed using its own control box buttons.



Appendix F

RS422 output option (cont.)

INSTALLATION

The Sealevel Systems RS-422 board supplied by Suburban Machinery Software, Inc. can be plugged into any open slot of a standard IBM PC/AT buss. The jumpers and switches on the board are preset to the following:

- 1) Base address: Hex 238-23F
- 2) IRQ jumper : All interrupts disabled
- 3) TX/RX clocks: Both used
- 4) DMA mode: Disabled

The base address of (Hex) 238 is selected so as not to conflict with other ports or I/O devices on your PC. If your PC has another board with the same address, you can use any of the available addresses by setting the DIP switch on board. The address and DIP switch settings must match the software configuration or the RS422 output will no function properly.

Connect the supplied RS422 cable between the RS-422 board and the Honda connector CD3 on the Fanuc remote buffer board. Be sure to connect the shield wire to the CNCs cabinet ground. Also be sure to secure the screws at the PC side, so that a good common ground is established between the two devices.

Set the following parameters must be set on the Fanuc 15M CNC:

| | |
|-----------------------------|-----------------------------|
| Parameter #5000: Bit #0 = 1 | (RS-422 input) |
| Parameter #5070: 12 | (Clock used at speeds > 12) |
| Parameter #5071: 0 | (Device type =0) |
| Parameter #5072: 1 | (Stop bits = 1) |
| Parameter #5073: 15 | (Baudrate = 86,400) |
| Parameter #5074: 1 | (Protocol B) |

Settings: INPUT DEVICE (FG) = 10 (remote buffer input)

Note: whenever changing the protocol parameter (#5074) you must turn the CNC power off, then on again to reset.

Appendix F

RS422 output option (cont.)

Installing RS422 driver

There is a special device driver that must be installed before you can use the PC-DNC Editor's RS422 output option. Normally, this device driver is loaded automatically when you install the PC-DNC MultiPort Editor from our website or from the Refresh Your Memory, Inc, CD-ROM. However, if you are upgrading from the basic PC-DNC Editor to the MultiPort version, you may have to install this device driver manually. Contact Suburban Machinery Software, Inc. if you need help to download and install the RS422 port drivers for your PC. The device driver is called "WinRT", and it permits our software to have direct access to the RS422 port. A device driver for Windows 95, 98, and ME is available, and a different driver for Windows NT 4.0, 2000, and XP is also available.

The device drivers are available as self-extracting ZIP files from our website. These files can be downloaded by entering this address into your web browser:

Windows 95/98/ME: http://www.sub-soft.com/download/BTR_drivers/98_BTRDrivers.exe
Windows NT, 2000, XP: http://www.sub-soft.com/download/BTR_drivers/NT_BTRDrivers.exe

Download and run the self-extracting .EXE file, select the "Self-extract" menu, then unzip the files to any empty folder. Next, run the SETUP.EXE file from that folder to install the WinRT device driver.

Configure BTR (parallel) port

RS422 device name: (default) Monarch Add to list: Delete

Address range: 238-23F 280-287 2A0-2A7

ACB-IV board DIP switch (SW1):

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----|----|----|----|-----|-----|-----|
| off | on | on | on | off | off | off |

☒ ACB-IV port A Reset to beginning of file after: M30
☐ ACB-IV port B After reset, wait 30 sec. before next cycle

☐ Run from text window ☒ CALL files as subroutines
☒ Spool directly from disk ☒ Mask comments

Leader: LF Mask characters:
Trailer:

Apply Cancel

Fig. 32

The menu shown here is used to configure the RS422 output port. When you select an address range, the correct DIP switch setting for your Sealevel Systems ACB-IV board is automatically displayed. Normally, the board's "Port A" is used for this output function.

Appendix F

RS422 output option (cont.)

RS422 port configuration

Once the BTR drivers are loaded, you must configure the RS422 port for proper operation. Run the PC-DNC Editor software, and select the pull-down menu called “RS422”. Under this menu, click on the selection “Configure RS422 port”. On this menu, you can “name” an RS422 device if you wish, or just use the “default” device name. If you have more than one RS422 device connected to this computer, enter a unique name for each device in the upper right of the menu and click “Add to list”. You can then configure each device separately. You must use a different physical port for each device. Each ACB-IV board contains two physical ports (Port A and Port B). Once you select the port and board address you wish to use, click the “Apply” button to store your configuration. Other typical settings for Fanuc CNCs are:

| | |
|--------------------------------|------------------------------|
| Reset to beginning of file on: | M30 |
| After reset, wait | 30 seconds before next cycle |
| Call files as subroutines | (checked) |
| Mask comments | (checked) |
| Run from text window | (your choice) |
| Spool data from disk | (your choice) |
| Leader | LF |
| Trailer | (blank) |
| Mask characters | (blank) |

If you select “Run from text window”, the data will be scrolled in the text window as it is being output to the CNC. If your PC is not very fast, this may slow down program execution. Also, since a program file must be completely loaded into the text window before you can run the program, the load time for a very large file may present an unwanted delay. To avoid these issues, select “Spool data from disk” instead. This will eliminate the text window load time, and the program data will be output to the CNC faster, since no text scrolling is required.

If you have any further questions about how to configure your RS422 port, please feel free to call us at: (440) 951-8974.

Running a program through the RS422 port

Once an RS422 port is configured, you can output a file to the CNC. Simply open a file with the “File/Open” menu, select the RS422 pull-down menu and click on “Send file (RS422)”. If the text in your RS422 window does not scroll when you press “Cycle Start” on your CNC, check the port configuration settings and the CNC parameters for proper Remote Buffer configuration.

Notes on the M30 delay:

At the end of a typical program, the “M30” command causes the CNC to reset. In a normal DNC cycle, however, the data being sent to the Remote Buffer board can be up to 4kb (4000 bytes) ahead of the CNC’s program execution. When PC-DNC editor transmits the M30, it resets to the beginning of the file and waits for you to press Cycle Start again (signaled by an Xon control code). The remote buffer board, however, sends an Xon when it’s buffer is nearly empty, fooling PC-DNC into sending the beginning of the file again, even though the CNC has not yet executed the M30 command. A time delay is provided for this reason. After an M30 is sent, PC-DNC Editor will ignore Xon commands for this period of time. This allows the CNC to process the last 4kb of the program, and reset itself with the M30 before the next part cycle is started.