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## Introduction

Congratulations! You have purchased the most advanced and the easiest to use bar code software package available for MS Windows. The Standard Edition of B-Coder has all the features necessary to produce professional quality bar codes for all types of applications including product packaging, document tracking, Postal bar coding and special purpose bar code labeling applications. Not only is B-Coder powerful, but it is extremely easy to use.

The philosophy behind B-Coder is that instead of forcing you to stay within the limits of a bar code labeling program, B-Coder acts as a bar code graphics tool for use with other Windows applications. With B-Coder you design the printed output or label layout with another program that you already know how to use like MS Word, Pagemaker, Quark Express, Windows Write, etc., you then use B-Coder to produce bar codes that are quickly and easily pasted into the other program.

Most other bar code software packages are strictly label design programs that force you to use their own label design tools. B-Coder on the other hand allows you to incorporate bar codes into any Windows application program that you like!

The Standard Edition of B-Coder supports the most commonly used bar code symbologies, it allows full selection for both the foreground and background colors, it supports symbol rotation in 90 degree increments and it allows complete font selection for the human readable text below a bar code symbol. Some advanced features include target printer selection, measurement unit selection and complete and accurate control over all bar code dimensions. B-Coder's intuitive warning messages make it virtually impossible to produce unreadable bar codes no matter what type of printer you are using.

The Professional Edition of B-Coder adds the following additional features:

1. Support for additional bar code symbologies including CodaBar, Code 93, Code 128, EAN/UCC 128, PDF417, and BPO 4 State Code.
2. Full Dynamic Data Exchange (DDE) Support. This allows you to control B-Coder directly from within other Windows application programs.
3. Support for automatic numeric sequencing or incremental numbering of bar code symbols.
4. Bar code message input from a disk file.

For information on how to upgrade from B-Coder Standard Edition to B-Coder Professional, please contact TAL Technologies, Inc. at Tel: 800-722-6004 or (215)-763-5096 Fax: (215)-763-9711 or visit our web site at: <http://www.taltech.com>

## Installing B-Coder On Your Computer

B-Coder is provided with a "Setup" program that will install the B-Coder program files onto your hard disk to a directory that you specify. The setup program also creates a B-Coder program group in the Windows Program Manager with the B-Coder program icons in it.

To install B-Coder on your PC, place the B-Coder Setup diskette in your disk drive ( A: or B:). Next, open the Windows Program Manager and select **Run** from the Program Manager's **File** menu. A dialog box will appear where you should enter the command: **A:SETUP** (or **B:SETUP** if using drive B:). After you press the **Enter** key the Setup program will prompt you for the name of a directory where you would like to install B-Coder and then it will copy all necessary files to the specified directory.

## Getting Started

B-Coder is an extremely easy to use program that generates professional quality bar codes in all major symbologies and sizes and places them in the Windows clipboard so that they can be pasted directly into files or documents created with other Windows programs. Bar codes generated with B-Coder may be scaled to any size and can be used by any Windows program that supports pasting of Windows MetaFile or Bitmap graphics (i.e. MS Word, Windows Write, Excel, Lotus 123, Word Perfect, Micrografx Draw, Pagemaker, Corel Draw, Visio, etc.).

B-Coder can also be used to generate bar codes and save them to disk in practically every major graphics file format including EPS, TIF, GIF, AI, JPG, WMF, DIB, BMP and over a dozen other commonly used image types. This makes B-Coder ideal for all desktop publishing applications that require bar code images to be incorporated in a document, label or product package design.

B-Coder gives you the ability to quickly incorporate bar codes into any Windows application program. Instead of dealing with expensive and complex bar code label design programs, simply paste perfect bar codes directly into the programs that you already know how to use and print them on any printer supported by Windows (i.e. any standard printer).

## Using B-Coder With Other Windows Programs

B-Coder was designed as a bar code generating tool to be used along with other Windows programs. The simplest way to use B-Coder is to run both B-Coder and the program that you want to paste bar codes into at the same time. When you need to insert a bar code into the other program, switch to B-Coder, enter the text that you want represented as a bar code in the B-Coder window and select **BUILD/COPY** from B-Coder's Edit menu. This will create your bar code and automatically copy it to the Windows clipboard. Finally switch back to your original program and select **PASTE** from the program's Edit menu. The bar code will appear in the program's window.

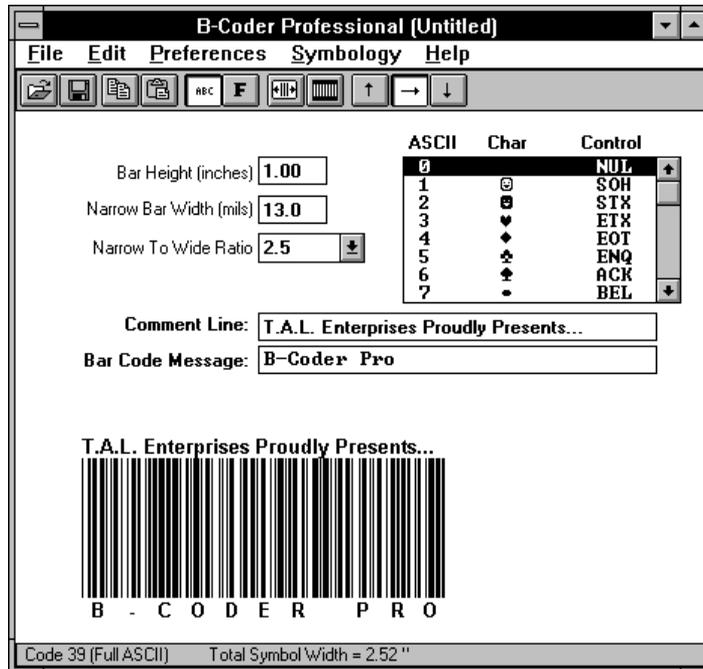
Note: Your monitor's resolution may not be high enough to display the bar code exactly as it will appear when you finally print the bar code on your printer.

The following samples were all pasted into Microsoft Word and were printed on an HP Laserjet 4 laser printer.

Using B-Coder is Fun!



## The B-Coder Window



The B-Coder window contains a main menu just below the title bar. A *tool bar* directly below the main menu allows quick access to some of the more useful items in the main menu. Below the tool bar, inside the B-Coder window, are several data input fields that allow control over the dimension of your bar codes. These fields will differ depending on the features of each chosen bar code symbology. For details on all options available in the main menu see the section: The B-Coder Main Menu. For details on the fields that control the dimensions of your bar codes refer to: Bar Code Dimensions and Symbology Descriptions and Rules.

The Bar Code Message text field in the center of B-Coder's window is where you enter the text that you want represented as a bar code. The Comment Line text field allows you to enter an additional comment line that is printed either above or below your bar code symbol.

At the bottom of B-Coder's window is a status area that displays the currently selected bar code symbology as well as the total overall width of each generated bar code symbol. The status area will also display any check digit values that B-Coder calculates for all bar code symbols that include a check digit.

Note: If you press the Enter key while editing a bar code message, B-Coder will insert a carriage return linefeed pair in your message. These characters will appear as a musical note and a small rectangle in the message text. Unless you want a carriage return linefeed in your bar code, you should not press the Enter key when finished editing a bar code message.

**Hint:** Double clicking your *right* mouse button with the mouse cursor on any blank space in B-Coder's window will delete all text in the Bar Code Message text edit field and the Comment Line text edit field.

If the bar code symbology that you are using supports characters that cannot be typed in on your keyboard, an ASCII chart will also appear so that you can enter all characters in the symbology's character set. To enter characters in your bar code text using the ASCII chart, move the text cursor in the bar code text edit box to the point where you want to insert a specific character and then select the character by double clicking your mouse on it in the ASCII chart. The character will automatically appear in the bar code text edit control. You may also select characters from the ASCII chart using the arrow keys or scroll bars to scroll the chart and then pressing the Enter key to select a hi-lighted character.

ASCII	Char	Control
0		NUL
1	☺	SOH
2	☻	SIX
3	♥	ETX
4	♦	EOT
5	♣	ENQ
6	♠	ACK
7	•	BEL

## The Main Menu



B-Coder's main menu contains the following sub menus: **File**, **Edit**, **Preferences**, **Symbology** and **Help**.

The **File** menu contains commands for performing disk file related operations like loading configuration files, saving bar code images to a disk file, selection of the target printer that will be used to print your bar codes and the Exit command.

The **Edit** menu contains commands for building and copying a bar code symbol, pasting text into B-Coder from other programs, editing of incremental numbering parameters and for scrolling forward and backward through a sequence of bar code messages.

The **Preferences** menu contains commands that allow you to customize the way that B-Coder works including such features as font and color selection, controlling symbology specific options, changing the orientation of bar code symbols, selection of measurement units, etc..

The **Symbology** menu allows you to select the type of bar code to produce. (The bar code symbology).

The **Help** menu provides quick access to B-Coder's on line help system.

## File Menu Commands

<b>File</b>
<b><u>N</u>ew</b>
<b><u>O</u>pen Configuration...</b>
<b><u>S</u>ave Configuration</b>
<b>Save Configuration <u>A</u>s...</b>
<b>T<u>a</u>rget Printer...</b>
<b>P<u>r</u>inter Setup...</b>
<b>P<u>r</u>int...</b>
<b>Save <u>B</u>ar Code As...</b>
<b>E<u>x</u>it</b>

The first four options in the File menu: **New**, **Open Configuration**, **Save Configuration**, and **Save Configuration As...** allow you to create, open and save B-Coder configuration files. When you set up B-Coder by selecting all the various parameters necessary to produce the correct bar code symbols for your particular application, you can save your settings in a "configuration file" so that when you exit B-Coder, you can open your configuration and thus start up where you left off the next time you run B-Coder.

**NOTE:** You can automatically load a configuration file when you start up B-Coder by placing the name of a configuration file on the command line used to invoke B-Coder. For example, the command line: **C:\B-Coder\B-Coder.EXE C:\B-Coder\MyConfig.BCF** would cause B-Coder to automatically read in and use the config file "MyConfig.BCF" at startup.

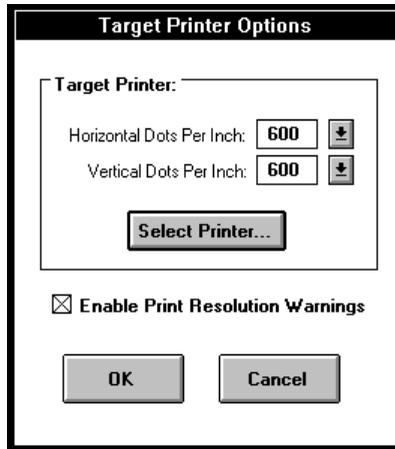
The **New** command in the File Menu causes B-Coder to reset itself to its default configuration.

The **Open Configuration** command allows you to open a previously saved B-Coder configuration. When you select this option, a standard Windows file selection dialog box will appear so you can easily select a previously saved B-Coder configuration file. When you open a configuration file, the filename will appear in the title bar of the B-Coder window.

The **Save Configuration** command allows you to quickly save any changes that you make to an open configuration and the **Save Configuration As...** command allows you to save your current B-Coder configuration with a filename that you specify. When you choose **Save Configuration As...**, a standard Windows "file save as" dialog box will appear so that you can enter the filename and directory path where you would like your configuration to be saved.

The **Target Printer** command allows you to specify the dots per inch resolution of the printer that you will use to print your bar codes on. The reason that B-Coder allows you to select the target printer is because B-Coder can be configured to warn you if you try to create a bar code that will not be readable when printed on a particular printer. For example if the target printer has a resolution of 100 dots per inch (i.e., 10 mils per dot) and you try to create a bar code with a narrow bar width less than the width of three printer dots, B-Coder will warn you that the bar code may be unreadable when printed on the selected target printer. B-Coder also allows you to specify all dimensions for your bar codes in units of printer dots instead of inches and mils or metric units. Specifying all bar code dimensions in printer dots guarantees that you will end up with perfectly readable bar codes no matter what type of printer you will be using.  
See Also: Bar Code Dimensions and Preferences Menu Commands

When you select **Target Printer** from the File menu, the following dialog box will appear:



The values that appear by default for the horizontal and vertical dots per inch will be those of the currently selected default printer. If the default printer is not the printer that you intend to use and you know the horizontal and vertical dots per inch values for the printer that you will be using, then you can enter those values manually simply by typing them in. If you do not know the correct values for a particular printer but a Windows printer driver has been installed on your system for the desired printer, then you can use the **Select Printer...** option to select the specific printer from a standard Windows printer selection dialog box. When you select a printer using the Printer Setup option, B-Coder will automatically calculate the correct horizontal and vertical dots per inch values for the chosen printer.

The check box labeled **Enable Print Resolution Warnings** is used to enable or disable printer resolution warning messages. This option is also available in the Preferences menu.

The File menu command **Printer Setup...** will open the Printer Setup dialog box for the currently selected default printer. The dialog box that will appear will have options that are specific to the currently selected printer.

The File menu command **Print...** will print any bar code graphic that is currently displayed in the B-Coder window. The Print... option is provided mainly so that you can test the printed output directly from within B-Coder. When you select this option a dialog box will appear prompting you for a Left and Top margin value in inches. The margin values specify exactly where on a page the bar code should be printed. When you print a bar code from within B-Coder, the bar code is printed as a Windows Metafile and therefore should produce the best output possible for whatever printer you are using.

The File menu command **Save Bar Code As...** opens a standard Windows "File Save As..." dialog box so that you can save your bar code images to a disk file. B-Coder allows you to save bar codes in all standard graphic file formats including: .AI, .EPS, .WMF, BMP, .JPG, .PCT, .GIF, .TIF, .PCX as well as over a dozen other popular formats. Many graphics formats allow you to select various options or *Preferences* that affect how the image is actually stored on disk. In the "Save As" dialog box, there will be a check box marked "Set Preferences". If you check this option, another dialog box will appear before the image is saved to disk so that you can select the various options available for the specific file format that you are saving your bar code in. To save a bar code in a particular graphics format, simply specify the file name along with the normal file name extension for the particular format that you want to use. For example, to save a bar code as an EPS file, specify a file name with the extension **.EPS**.

Important: B-Coder initially creates all bar code graphics as Windows **Metafile** graphic images. Metafiles consist of a sequence of detailed drawing instructions that are used by Windows programs to reproduce a graphic image exactly as it was originally created. Because of this, Metafiles are both smaller and much more accurate than any other type of graphic representation. When you save a bar code to a disk file in a different graphics file format, B-Coder will convert the graphic from the original Metafile format to the specific format that you choose. Because other graphic formats have lower resolutions than a Metafile, images often get distorted when they are converted and thus may not always be readable. Also, the file size of most other image formats are usually much larger than an equivalent Metafile. It is highly recommended that you save your bar codes as Metafiles whenever possible.

The command **Exit** in the File menu will close B-Coder's window and remove it from memory.

## Edit Menu Commands

<b>E</b> dit	
<b>B</b> uild/Copy	F2
<b>C</b> lipboard Format	✓ <b>M</b> etafile
<b>P</b> aste	F3
	<b>B</b> itmap
	<b>D</b> evice Independent Bitmap
	<b>A</b> ll

The **Edit** menu contains the choices: **Build/Copy**, **Clipboard Format** and **Paste**

The **Build/Copy** command is used to generate a bar code from the text entered in the bar code text edit box in B-Coder's window. When you select Build/Copy, your bar code will be generated, displayed, and finally the graphic image of the bar code is copied into the Windows clipboard so that you can paste it into other Windows programs.

**Hint:** Double clicking your *left* mouse button with the mouse cursor on any blank space in B-Coder's window will perform the same function as selecting Build/Copy from the Edit menu..

The **Clipboard Format** command allows you to select either **Metafile**, **Bitmap**, **Device Independent Bitmap** or **All** of the above as the image format for all bar codes placed in the clipboard. The best choice for the Clipboard Format is Metafile. If you have trouble getting a particular program to accept a Metafile through the clipboard, you may have to change the format to one of the Bitmap formats in order to get things to work.

Note: Bitmap images have a much lower resolution than Metafiles and thus can cause the printed output of a bar code to be unreadable. It is highly recommended that you work with Metafiles whenever possible. If you use any other graphics format you should test the printed output of your bar codes to insure that they are readable by your bar code hardware.

The **Paste** command pastes text from the Windows clipboard into the Bar Code Message text box or the Comment Line text box. Thus you can paste text strings from other programs into B-Coder. The Paste option will be active (not grayed) whenever there is text data in the clipboard. NOTE: When you create a bar code by selecting Build/Copy, the clipboard is first cleared and the graphics image of your bar code is placed there. After a Build/Copy operation, the clipboard will no longer contain text data and the Paste feature will be deactivated until another text string is "Copied" from another Windows program.

## Preferences Menu Commands

Preferences	
✓ Include <u>T</u> ext	Ctrl+T
Text <u>A</u> bove Bar Code	Ctrl+A
✓ <u>C</u> omment Above Bar Code	Ctrl+O
Automatic Font <u>S</u> caling	Ctrl+S
<u>F</u> ont...	Ctrl+F
Foreground <u>C</u> olor...	Ctrl+C
<u>B</u> ackground Color	▶
Include <u>Q</u> uiet Zones	
Include <u>B</u> earer Bars	
Include Code39 / I-2of5 Check Character	
Bar Width Reduction / <u>G</u> ain	▶
<b>Symbol <u>O</u>rientation</b>	✓ <b><u>H</u>orizontal</b>
Measurement <u>U</u> nits	Vertical <u>9</u> 0 degrees
	Vertical <u>2</u> 70 degrees
✓ Enable Invalid Message <u>W</u> arnings	
✓ Enable Printer <u>R</u> esolution Warnings	
Fix Driver <u>I</u> ncompatibility Problems	

All of the commands in the Preferences menu except the **Font**, **Foreground Color** and **Background Color** commands are toggle options. Selecting any of the toggle options will switch the option either ON or OFF where "ON" is indicated by a check mark appearing to the left of the menu item.

The **Include Text** option causes B-Coder to include the human readable version of your bar code message neatly centered along the bottom or top edge of the bar code symbol.

Note: This option does not apply to PDF417, POSTNET, or BPO 4 State bar codes.

The **Text Above Bar Code** option causes B-Coder to print the human readable version of your bar code message along the top edge of the bar code symbol. If this option is not selected, B-Coder will print the message along the bottom edge of the bar code symbol.

The **Comment Above Bar Code** option causes the comment text to be printed above your bar code. If this option is not selected, the comment will be printed below the bar code symbol.

The **Automatic Font Scaling** option causes B-Coder to automatically scale all text to a font size that is approximately one fifth the height of the generated bar code symbol.

The **Font...** command displays a standard font selection dialog box where you can choose the font for all text printed with a bar code symbol. The font selection dialog box allows you to select a font name, size, color and strikeout or underline effects for a chosen font.

NOTE: Most bar code symbology specifications recommend the font **OCR-B** (Optical Character Recognition revision B). The choice of font is not really that important unless your bar codes are being used in an OCR application however it is a good idea to choose fonts that are close to the recommended specification. The font **MS Sans Serif** that comes with Windows is very close to OCR-B and the True Type Font **Arial** is also very similar.

Different fonts behave differently thus some fonts may appear different on screen than when printed. True Type fonts are the most WYSIWYG under Windows and they also align better when rotated 90 or 270 degrees.

Note: When the Automatic Font Scaling option is in effect, it will override any font size chosen from the font selection dialog box

The **Foreground Color** and **Background Color** options allow you to specify the colors used for the bars and spaces in your bar code symbols. The Background Color option can be set to either **Transparent** or to a specific **Custom Color**. When you select either Foreground Color or a Custom Background Color, a standard Windows color selection dialog box will appear where you can select a desired color from a color palette. The color palette has an option allowing you to define custom colors by specifying exact Red, Green and Blue (RGB) color values or by specifying colors in terms of Hue, Saturation and Luminescence values.

Note: It is entirely possible to choose color combinations that render a bar code symbol unreadable. The reason a bar code reader is able to read a bar code at all is because of a high contrast between the shades of the bars and spaces. Although two colors may appear to the human eye to have a high of contrast between them, a bar code reader may not be able to determine any difference at all between the two colors. Solid black bars on a solid white background always produces the best results. If you must use colors other than black on white, a good rule of thumb is to select solid foreground colors with a luminescence value no greater than 60 and select solid background colors with a luminescence value no less than 180. **Always test colored bar codes** before committing to a color scheme.

See Also: Bar Code Basics - How A Bar Code Reader Works

The **Include Quiet Zones** command causes B-Coder to include a small region of blank space (10 times the width of the narrow bar elements) at either end of a bar code image. This space, called *Quiet Zones*, helps to insure that a bar code reader will be able to correctly determine the true beginning and end of a bar code symbol. Most bar code symbology specifications require quiet zones therefore it is highly recommended that you enable this option.

The **Include Bearer Bars** command causes B-Coder to draw lines surrounding a bar code symbol. The purpose of bearer bars is to equalize the pressure exerted by the printing plate over the entire surface of the symbol. Bearer bars also enhance the reading reliability of a bar code by reduction of the probability of misreads or short scans which may occur when a skewed scanning beam enters or exits the symbol through the top or bottom edge of the bar code. When the scanner path leaves the symbol either through the top or bottom, it crosses the bearer bar, thereby resulting in an invalid start/stop code. Bearer Bars are typically used with Interleaved 2 of 5 and EAN/UCC 128 type bar codes.

The **Include Code 39 / I 2 of 5 Check Character** command causes B-Coder to automatically calculate and append a modulo 43 check character to all Code 39 bar code symbols or a weighted modulo 10 check character to Interleaved 2 of 5 bar code symbols. This feature should be enabled if the bar code reader that you are using is configured to expect a check character when reading Code 39 or Interleaved 2 of 5. This feature only applies to Code 39 and I 2 of 5 type bar codes. Code 39 with a check character is also sometimes referred to as HIBC Code (Health Industry Bar Code). The check character adds an extra measure of data security to a bar code symbol.

The **Bar Width Reduction / Gain** option allows you to specify a Reduction or Gain factor ranging from 0% to 75%. Selecting a non-zero Bar Width Reduction or Gain causes B-Coder to reduce or enlarge the width of all solid bars in a bar code. Bar Width Reduction is often necessary to compensate for ink spread when generating bar codes that will be used in wet ink printing processes. The percentage that you specify is based on the narrow bar width that you choose for your bar codes. For example if you specify a bar width reduction of 25% and your narrow bar width is set at 10 mils, B-Coder will reduce the width of all solid bars in your bar codes by 2.5 mils (25% of 10 mils = 2.5 mils). Bar width gain is typically used when printing on glass or other surfaces that cause ink to bead up or shrink as it dries.

The **Symbol Orientation** option allows you to rotate a bar code symbol in increments of 90 degrees from horizontal. Three choices of orientation are available: Horizontal (picket fence orientation), Vertical 90 degrees clockwise and Vertical 270 degrees clockwise (ladder orientation).

The **Measurement Units** option allows you to select either **Inches/Mils**, **Metric units** or **Printer Dots** for all bar code dimensions. Bar code dimensions are normally expressed in Inches and Mils but B-Coder lets you have your choice of measurement units. When creating bar codes with very small dimensions, the best choice of units is Printer Dots. When bar code dimensions are expressed in Printer Dots, the resulting printed symbols will have the least possible chance of being distorted due to limitations imposed by the dot size resolution of the printer being used. (A printer cannot print lines narrower than the width of a single printer dot).

The **Enable Invalid Message Warnings** and **Enable Printer Resolution Warnings** options cause B-Coder to warn you with a message box whenever you try to generate a bar code that does not conform to the rules for the currently selected symbology or when a bar code will not print correctly on the selected target printer. When these options are disabled, B-Coder will not prompt you with a warning but it will beep your PC's speaker one short beep. These options are typically disabled when B-Coder is being controlled by another application through the use of DDE commands. See Also: **DDE Commands Supported By B-Coder**

The **Fix Driver Incompatibility Problems** option is used to correct printer and display driver incompatibility problems. B-Coder will work correctly with all video and printer drivers that come with Windows however some third party video drivers and some printer drivers are unable to display or print bar codes generated by B-Coder correctly.

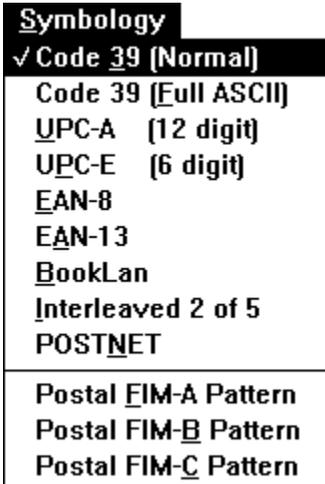
If a complete bar code does not appear when you print a bar code generated by B-Coder, try correcting the problem by enabling this option. If this problem occurs on your system, then the problem is with your printer driver - not with B-Coder. The best way to deal with this problem is to use the printer or video drivers supplied with Windows. To change video drivers, run the *Windows Setup* program in the *Main* program group of the Windows Program Manager and select one of the video drivers that were originally supplied with Windows.

**IMPORTANT:** The Fix Driver Incompatibility Problems option should really only be used to repair problems with printer drivers. If your video driver is unable to display a bar code generated by B-Coder, it does not mean that the bar code will not print out correctly on your printer. In fact, if your printer driver is able to print a bar code correctly without enabling this option, you may cause the bar code to print incorrectly if you enable it to compensate for a video driver problem.

Older display drivers distributed with the Diamond Stealth VRAM or Diamond SpeedStar video adapters are known to have problems. Diamond Computer Systems can be reached at 408-736-2000. Perhaps, by the time you read this, they will have updated video drivers available.

See Also: Special Considerations and Incompatibilities

## Symbology Menu Commands



The SYMBOLOGY menu allows you to select a specific symbology for your bar codes. The currently selected symbology will have a check mark to the left of it's name in the menu.

For details about each of the symbologies supported by B-Coder see the section: Symbology Descriptions and Rules

When you select a particular symbology, the bar code dimension data entry fields in B-Coder's window may change to reflect the options available for the specific symbology.  
See Also: Bar Code Dimensions and Symbology Descriptions and Rules

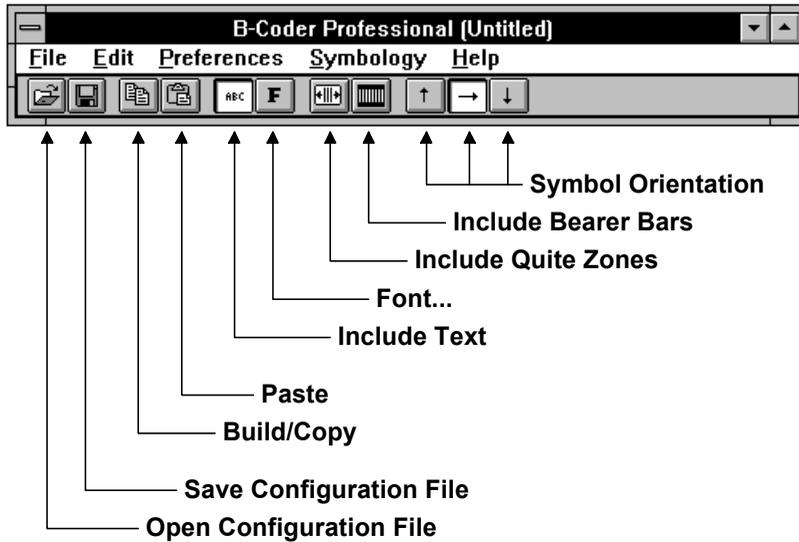
## Help Menu Commands

The HELP menu contains the choices: *Index*, and *About*.

The *Index* command accesses the Windows Help system and displays an index for all help topics available for B-Coder and the *About* command displays a product version number and a copyright notice.

## The B-Coder Toolbar

The toolbar below B-Coder's main menu provides quick access to some of the more useful commands in B-Coder's main menu. Below is a summary of the main menu commands that are associated with each toolbar icon. Clicking your mouse on any of the tool icons in the toolbar has the same effect as selecting the associated command from the main menu.



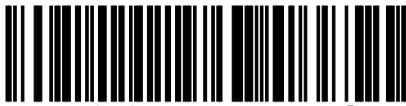
## Bar Code Dimensions

Because of differences in the design of each bar code symbology, there are differences in the way that the dimensions for each symbology are expressed. When you select different symbologies from B-Coder's symbology menu, you will notice that some of the data entry fields for entering the dimensions of your bar code will change. For example, when you select Code 39, B-Coder allows you to specify a Bar Code Height, a Narrow Bar Width, and a Narrow To Wide Ratio. When you choose UPC or EAN type bar codes, B-Coder allows you to specify a Bar Code Height, a Narrow Bar Width, and a Magnification Factor.

The two main dimensions used to define the size of most common bar codes are the **Narrow Bar Width** and the overall **Bar Height**. The Height is generally less important than the Narrow Bar Width and you can scale the height to any size that you like. For the sake of readability the height should not be less than a quarter of an inch or 15% of the total width of the symbol, whichever is greater. UPC and EAN bar codes have more specific size requirements if they are to be used for product identification. For details refer to UPC and EAN Magnification Factors on the following page.

The Narrow Bar Width effectively determines the total width of a bar code symbol. All other bar and space width dimensions are based on this width (referred to as the nominal X dimension). The best choice for this dimension depends partly on the resolution of your bar code reading equipment and also on the resolution of the printer being used to produce the bar code.

As a general rule the Narrow Bar Width should fall in a range between 10 to 30 mils and should never be less than 7.5 mils. For UPC and EAN bar codes, the smallest allowable Narrow bar width is 10.4 mils. One simple way to determine a good Narrow Bar Width is to actually print out a typical bar code using several different values and try reading each one with your scanning equipment. You should choose the value that produces bar codes with the highest "first pass" read rate.



X = 1 3 S a m p l e



X = 2 0 S a m p l e

## Narrow To Wide Element Ratios

Some symbologies consist of bars and spaces with only two element widths, *Narrow* and *Wide* Elements where the width of the wide elements is a multiple of the width of the narrow elements. The specifications for these symbologies allow you to choose a *Narrow to Wide Element Ratio*.

The symbologies that support this feature are Code 39, Interleaved 2 of 5, Discrete 2 of 5, and Codabar. If you select one of these symbologies, a list box will appear where you can select a narrow to wide element ratio between 2.0 and 3.0 in increments of .1 (i.e. 2.0, 2.1, 2.2, 2.3....3.0). The rules for these symbologies specify that when the narrow element width is less than 20 mils, the narrow to wide element ratio must be 2.2 or greater. B-Coder defaults to a narrow to wide ratio of 2.5 and this value should be acceptable for most applications.

Note: Higher quality readers may be able to successfully read bar codes with a narrow to wide ratio less than 2.2 no matter what the narrow element width is. Lower quality readers often need a ratio of at least 2.5 in order to read correctly. Because of the great variability between readers, you should always experiment with different ratio values and select the value that produces bar codes with the best successful read rate.

## UPC and EAN Magnification Factors

UPC and EAN bar codes are defined with a standard, fixed, narrow element width of exactly 13 mils; however, the specifications for these symbologies allows for a *magnification factor* of between 80% and 200%. This translates to an allowable range of narrow element widths of between 10.4 and 26 mils.

When you select either of these symbologies a text box will appear where you can specify the magnification factor as a percentage of the standard element width (80% to 200%).

See Also:

Bar Code Symbology Descriptions & Rules (UPC and EAN)  
How To Produce Readable Bar Codes.

## How To Produce Readable Bar Codes

Although there are many different types of bar codes, they all share the same requirements in order to be readable by most commercially available scanning devices. Because a beam of light is used to read a bar code, it should be clean and free of defects or smudges and there should be a high contrast between the color of the bars and the color of the spaces. Black bars on a white background yield the best results. If you intend to use colored bar codes or colored paper, you should always test the readability of your bar codes before committing to a color scheme.

Another important consideration is that there should always be a small amount of space or *Quiet Zones* preceding and following the bar code so that the reading device is able to properly determine the true start and end of the bar code symbol. A good rule of thumb is to reserve at least a quarter of an inch or 10 times the width of a single narrow bar (whichever is greater) for blank space at either end of a bar code. B-Coder will automatically include Quiet Zones of ten times the narrow bar width if the "Include Quiet Zones" option is enabled in the Preferences menu.

When printing bar codes, laser, ink jet and thermal transfer printers produce the best results. Dot matrix printers produce the poorest quality (but not necessarily unacceptable) bar codes. Dot matrix printers are especially poor when the bar code dimensions are set to a small size. You should try to avoid very small or very large bar codes, both narrow bar widths and overall bar code dimensions. As a precaution you should always test your printed output with whatever bar code reading equipment you eventually intend to use.

B-Coder can be configured to display a warning message if the specified Narrow Bar Width will be smaller than three printer dots for a particular printer. You can select a specific target printer or printer resolution and also enable Printer Resolution Warning Messages using the **Target Printer...** command in the File menu.

See Also:

Symbology Descriptions and Rules  
Special Considerations And Incompatibilities  
Bar Code Basics

## Bar Code Basics

Bar code is an automatic identification technology that allows data to be collected rapidly and with extreme accuracy. Because of this, bar code technology is finding its way into a broad range of applications in almost every sector of business. Bar codes provide a simple and easy method of encoding text information that is easily read by inexpensive electronic readers. A bar code consists of a series of parallel, adjacent bars and spaces. Predefined bar and space patterns or *symbolologies* are used to code character data into a printed symbol. Bar codes can be thought of as a printed version of the Morse code with narrow bars representing dots, and wide bars representing dashes. A bar code reading device decodes a bar code by scanning a light source across the bar code and measuring the intensity of light reflected back to the device. The pattern of reflected light produces an electronic signal that exactly matches the printed bar code pattern and is easily decoded into the original data by inexpensive electronic circuits. Due to the design of most bar code symbolologies it does not make any difference if you scan a bar code from right to left or from left to right.

Shown Below is the structure of a typical bar code symbol.

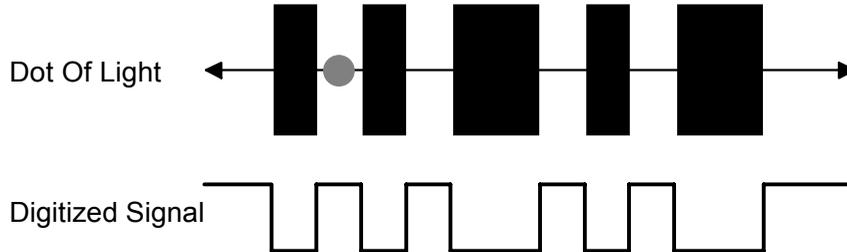


The basic structure of a bar code consists of a leading and trailing quiet zone, a start pattern, one or more data characters, optionally one or two check characters and a stop pattern.

There are a variety of different types of bar code encoding schemes or "symbolologies", each of which were originally developed to fulfill a specific need in a specific industry. Several of these symbolologies have matured into de-facto standards that are used universally today throughout most industries. The symbolologies supported by B-Coder are those most commonly used across all industries. For more information about specific bar code symbolologies supported by B-Coder see: [Symbology Descriptions And Rules](#)

## How A Bar Code Reader Works

A bar code reader works by scanning a dot of light across a bar code symbol. As the dot scans across the bar code, light is reflected back to the bar code reader by the light areas and is absorbed by the dark areas. The scanner electronically measures the intensity of the light reflected back to produce a digitized waveform that can be decoded back to the original message similar to the way morse code dots and dashes are decoded.



The factors that make a bar code readable are: an adequate print contrast between the light and dark bars and having all bar and space dimensions within the tolerances for the symbology. It is also helpful to have sharp bar edges, few or no spots or voids, a smooth surface and clear margins or quiet zones at either end of the printed symbol.

Bar code scanners can be purchased with different resolutions to enable them to read bar codes of different sizes. The scanner resolution is measured by the size of the dot of light. The dot of light should be equal to or slightly smaller than the narrowest element width ("X" dimension). If the dot is wider than the width of the narrowest bar or space, then the scanner can get confused due to the dot overlapping two or more bars at a time. If the dot is too small, then any spots or voids in the bars can be misinterpreted as light areas thus making a bar code unreadable.

## Special Considerations and Incompatibilities

B-Coder has been thoroughly tested with a wide variety of Windows application programs as well as different printing devices and has been found to produce extremely high quality bar codes. There are a few minor incompatibilities with some programs but fortunately most of these problems have simple solutions. Three general types of problems have been identified as listed below and are outlined in further detail in the following pages.

Pasting Bar Codes into Word, Excel and PageMaker  
Pasting Bar Codes Into Programs That Work With Bitmaps.  
Pasting Bar Codes Into A Spreadsheet.  
Printing Bar Codes On A Dot Matrix Printer.

See Also: How To Produce Readable Bar Codes.

### Pasting Bar Codes Into Word, Excel or PageMaker

When you create a bar code in B-Coder, a Windows MetaFile is placed in the clipboard so that you can paste the bar code into other windows programs. Starting in Windows 95, Microsoft has added a new MetaFile format called the "Enhanced MetaFile" or "EMF" format. The new EMF format is supposed to be compatible with the standard WMF file format however there are some inherent technical problems with the EMF format that make it less than ideal for creating bar codes.

Most 32 bit Windows programs (including Word for Windows and Pagemaker) support both the WMF and the EMF file formats however some 32 bit programs (i.e. Word and all 32 bit versions of Pagemaker) automatically convert any metafile found in the clipboard to an Enhanced MetaFile. When you paste bar codes from B-Coder into these programs by selecting "Paste" from their EDIT menu, the bar code will be converted to an Enhanced MetaFile and subsequently will not print correctly. For these applications you must select "Paste Special" and choose either "Picture" or "MetaFile" (instead of "Enhanced MetaFile") in the "Paste Special" dialog box as the format. Unfortunately Excel 97 does not support pasting metafiles that are not "Enhanced Metafiles" however it will allow you insert metafiles from a disk file as long as the Windows Metafile graphics import filter was installed when you originally installed Excel on your computer. This means that to add bar codes to an Excel 97 worksheet, you must save your bar codes to a disk file using the WMF file format and then use the "Insert Picture From File" menu option in Excel to read the metafile from the disk file into the sheet.

## Pasting Bar Codes Into Programs That Work With BitMaps

When cutting and pasting bar codes from B-Coder into other programs, the best graphics format to use is the Metafile format. Metafile images are scaleable images that consist of drawing instructions used internally by Windows to reproduce an image in a manner that uses the highest resolution of the device that the image is being printed on. Because most printers have a much higher resolution than most computer monitors, the printed version of a MetaFile will almost always have a much higher degree of detail than the same image when it is displayed on your computer's monitor. Bitmaps on the other hand do not automatically use the highest resolution possible when printed and therefore the printed output of a bitmap will retain the same (lower) quality as that of your monitor.

When you paste a Metafile bar code produced by B-Coder into a graphics or drawing program that only has the capability of working with bitmap files (.BMP) such as the **PaintBrush** program that comes with Windows, your bar code will be automatically converted from a Windows Metafile format to a bitmap format. During this conversion process, the bar code will most likely be deformed and thus it may be unreadable when it is eventually printed. A possible solution to this problem is to increase the Narrow Bar Width value and avoid the use of any scaling features in the target application (i.e. SHRINK & GROW in PaintBrush). Acceptable bar codes can be produced with these types of programs but their output should always be tested for readability.

## Pasting Bar Codes Into A Spreadsheet

A minor problem with spreadsheets is that they normally display and print a grid pattern around all cells. Cell grid lines can be confused by a bar code reader as part of a bar code. This problem can easily be corrected simply by turning grid lines off before printing the spreadsheet. In Excel this is done by selecting "Options" and "Display..." from Excel's main menu and then clearing the "Grid lines" check box.

Another small problem is that most spreadsheet programs will automatically draw a border around images both while displayed on screen and when printed on a printer. If there is no leading or trailing "Quiet Zone" at either end of your bar code, the border appears to a bar code reader as part of the bar code and thus it will probably be unreadable. The easiest way to avoid this problem is to enable the **Include Quiet Zones** option in B-Coder's Preferences menu. Another solution is to remove the unwanted border with a formatting command in the spreadsheet. In Microsoft Excel you can get rid of borders around graphics by selecting "Format" & "Patterns" from Excel's main menu. This will display a dialog box where you can instruct Excel to remove a border from a selected graphic.

## **Printing Bar Codes On A Dot Matrix Printer**

Dot matrix printers offer the lowest resolution of all available printers. Although dot matrix printer manufacturers claim resolutions as high as 360 dots per inch, the real resolution of most is only 60 dots per inch. Higher resolutions are simulated by overlapping consecutive dots. The reason that the true resolution is only 60 dots per inch is because the width of each dot is approximately 1/60th of an inch (16 mils). In order to print readable bar codes on a dot matrix printer, the Narrow Bar Width must never be less than the width of a printer dot as it is impossible for a dot matrix printer to print a line narrower than the width of a single dot. The larger the value that you choose for the Narrow Bar Width (within the allowable range for a specific symbology), the more readable your bar codes will be.

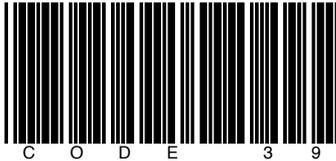
When you set up the Windows printer driver for your dot matrix printer you should select the highest dot resolution that the printer is capable of. If the driver has a Dithering option, you should also select "Line Art" or the finest dithering resolution that is supported. Some dot matrix drivers also allow you to set the intensity or darkness of the printing. If your printer supports this feature, you should set the intensity to the darkest level supported.

Finally, you should always test bar codes printed on a dot matrix printer.

See Also: [How To Produce Readable Bar Codes](#)

## Bar Code Symbology Descriptions and Rules

### CODE 39 (Normal and Full ASCII versions)



The Normal CODE 39 is a variable length symbology that can encode the following 44 characters: 1234567890ABCDEFGHIJKLMNPOQRSTUVWXYZ-.\*\$/%. Code 39 is the most popular symbology in the non retail world and is used extensively in manufacturing, military, and health applications. Each Code 39 bar code is framed by a start/stop character represented by an asterisk (\*). The Asterisk is reserved for this purpose and may not be used in the body of a message. B-Coder automatically adds the start and stop character to each bar code therefore you should not include them as part of your bar code message. If you select the NORMAL version of CODE 39 and your bar code text contains lower case characters, B-Coder will convert them to upper case. If your bar code message contains any invalid characters, B-Coder will prompt you with a warning message (if the Enable Invalid Warning Messages option is selected in the Preferences menu).

Code 39 optionally allows for a (modulo 43) check character in cases where data security is important. The health care industry has adopted the use of this check character for health care applications. To enable the Code 39 check character feature in B-Coder, select the option **INCLUDE CODE 39 / I 2 of 5 CHECK CHARACTER** in B-Coder's Preferences menu. When this option is enabled, B-Coder will automatically calculate and append the proper check character to all Code 39 symbols.

Another feature of Code 39 allows for concatenation of two or more bar codes. It is sometimes advantageous to break long messages into multiple, shorter, symbols. If the first data character of a Code 39 symbol is a space, some readers will store the remainder of the symbol in a buffer and not transmit the data. This operation continues for all successive Code 39 symbols with a leading space, with each message appended to the previous one. When a message without a leading space is read, it is appended to the previously scanned data in the buffer and the entire buffer is transmitted as one long message.

The FULL ASCII version of Code 39 is a modification of the NORMAL (standard) version that can encode the complete 128 ASCII character set (including asterisks). The Full ASCII version is implemented by using the four characters: \$/+%. as *shift* characters to change the meanings of the rest of the characters in the Normal Code 39 character set. Because the Full ASCII version uses shift characters in combination with other standard characters to represent data not in the Normal Code 39 character set, each non-standard character requires twice the width of a standard character in a printed symbol. The table below shows the character combinations used to produce the Full ASCII version of Code 39.

<u>ASCII</u>	<u>CODE 39</u>						
NUL	%U	SP	SPACE	@	%V	.	%W
SOH	\$A	!	/A	A	A	a	+A
STX	\$B	"	/B	B	B	b	+B
ETX	\$C	#	/C	C	C	c	+C
EOT	\$D	\$	/D	D	D	d	+D
ENQ	\$E	%	/E	E	E	e	+E
ACK	\$F	&	/F	F	F	f	+F
BEL	\$G	'	/G	G	G	g	+G
BS	\$H	(	/H	H	H	h	+H
HT	\$I	)	/I	I	I	i	+I
LF	\$J	*	/J	J	J	j	+J
VT	\$K	+	/K	K	K	k	+K
FF	\$L	,	/L	L	L	l	+L
CR	\$M	-	-	M	M	m	+M
SO	\$N	.	.	N	N	n	+N
SI	\$O	/	/O	O	O	o	+O
DLE	\$P	0	0	P	P	p	+P
DC1	\$Q	1	1	Q	Q	q	+Q
DC2	\$R	2	2	R	R	r	+R
DC3	\$S	3	3	S	S	s	+S
DC4	\$T	4	4	T	T	t	+T
NAK	\$U	5	5	U	U	u	+U
SYN	\$V	6	6	V	V	v	+V
ETB	\$W	7	7	W	W	w	+W
CAN	\$X	8	8	X	X	x	+X
EM	\$Y	9	9	Y	Y	y	+Y
SUB	\$Z	:	/Z	Z	Z	z	+Z
ESC	%A	;	%F	[	%K	{	%P
FS	%B	<	%G	/	%L	:	%Q
GS	%C	=	%H	]	%M	}	%R
RS	%D	>	%I	^	%N	~	%S
US	%E	?	%J	_	%O	DEL	%T,%X,%Y,%Z

**Note:** Because all of the characters used to implement Full ASCII Code 39 are part of the Normal Code 39 character set, readers that do not support Full ASCII Code 39 will still read Full ASCII Code 39 symbols. The reader will output shifted characters as if they were normal Code 39 characters. For example the following string: **B-CODER=FUN** will be read as: **B-CODER%HFUN** by a reader that only supports Normal Code 39. Instead of converting the Full ASCII encoded characters %H to an equal sign, the reader blindly outputs %H.

## UPC-A, UPC-E, and UPC Supplementals



UPC-A is a 12 digit, numeric symbology used in retail applications. UPC-A symbols consist of 11 data digits and one check digit. The first digit is a number system digit that usually represents the type of product being identified. The following 5 digits are a manufacturers code and the next 5 digits are used to identify a specific product.

UPC numbers are assigned to specific products and manufacturers by the Uniform Code Council (UCC). To apply for a UPC number or for more information, you can contact the UCC at 8163 Old Yankee Road, Suite J, Dayton, OH 45458 Tel: 513-435-3870

When specifying UPC-A messages, you may enter up to 11 digits. B-Coder will automatically calculate the check digit for you. If you enter less than 11 digits or if you enter any digits other than 0 to 9, B-Coder will prompt you with a warning message. If the option "Enable Invalid Message Warnings" in the Preferences menu is not selected and you do not enter 11 digits, B-Coder will left pad short messages with zeros and truncate longer messages so that the total length is 11.

UPC-E is a smaller, six digit, UPC symbology for number system 0. It is often used for small retail items. UPC-E is also called "zero suppressed" because UPC-E compresses a normal 12 digit UPC-A code into a six digit code by "suppressing" the number system digit, trailing zeros in the manufacturers code and leading zeros in the product identification part of the bar code. A seventh check digit is encoded into a parity pattern for the six main digits. UPC-E can thus be uncompressed into a standard UPC-A 12 digit number.

For UPC-E bar codes, you may enter up to 6 digits. Again, B-Coder will calculate the check digit and truncate or pad the number to a total length of 6 digits as with UPC-A.

Both UPC-A and UPC-E allow for a supplemental two or five digit number to be appended to the main bar code symbol. This supplemental message was designed for use on publications and periodicals. If you enter a supplemental message, it must consist of either two or five numeric digits. The supplemental is simply a small additional bar code that is added onto the right side of a standard UPC symbol.

## EAN-8 / EAN-13, BookLan and EAN Supplementals

EAN-8



EAN-13 with supplemental (ISBN Version)



EAN or European Article Numbering system (also called JAN in Japan) is a European version of UPC. It uses the same size requirements and a similar encoding scheme as for UPC codes.

EAN-8 encodes 8 numeric digits consisting of two country code digits, five data digits and one check digit. B-Coder will accept up to 7 numeric digits for EAN-8. B-Coder will automatically calculate the check digit for you. If you enter less than 7 digits or if you enter any digits other than 0 to 9, B-Coder will display a warning message. If the option “Enable Invalid Message Warnings” in the Preferences menu is not selected and you do not enter 7 digits, B-Coder will left pad short messages with zeros and truncate longer messages so that the total length is 7.

EAN-13 is the Euro version of UPC-A. The difference between EAN-13 and UPC-A is that EAN-13 encodes a 13th digit into the parity pattern of the left six digits of a UPC-A symbol. This 13th digit, combined with the 12th digit, usually represent a country code.

Both EAN-8 and EAN-13 support a supplemental two or five digit number to be appended to the main bar code symbol. The supplemental is designed for use on publications and periodicals. Supplemental messages must consist of either two or five numeric digits and will appear as a small additional bar code on the right side of a standard EAN symbol.

EAN bar code numbers are assigned to specific products and manufacturers by an organization called **ICOF** located in Brussels, Belgium. Tel: 011-32-2218-7674

EAN-13 has been adopted as the standard in the publishing industry for encoding ISBN numbers on books. An ISBN or *BookLan* bar code is simply an EAN-13 symbol consisting of the ISBN number preceded by the digits **978**. The supplemental in an ISBN bar code is simply the retail price of the book preceded by the digit **5**. For example, if your ISBN number is 1-56276-008-4 and the price of the book is \$29.95 then you would enter **978156276008** as the bar code message and **52995** for the supplemental. If you choose BookLan as the bar code symbology, B-Coder will automatically create the correct EAN-13 bar code if you supply just the first 10 digits of the ISBN number and optionally a price (without the preceding 5).

## INTERLEAVED 2 OF 5

Interleaved 2 of 5 is a high density variable length numeric only symbology that encodes digit pairs in an interleaved manner. The odd position digits are encoded in the bars and the even position digits are encoded in the spaces. Because of this, I 2 of 5 bar codes must consist of an even number of digits. Also, because partial scans of I 2 of 5 bar codes have a slight chance of being decoded as a valid (but shorter) bar code, readers are usually set to read a fixed (even) number of digits when reading I 2 of 5 symbols. The number of digits are usually pre-defined for a particular application and all readers used in the application are programmed to only accept I 2 of 5 bar codes of the chosen length. Shorter data can be left padded with zeros to fit the proper length. B-Coder will only accept numeric digits for I 2 of 5 bar codes. If an odd number of digits is entered, B-Coder will Left-Pad one zero to the number entered.

Interleaved 2 of 5 optionally allows for a weighted modulo 10 check character for special situations where data security is important. To enable the I 2 of 5 check character feature in B-Coder, select the option **INCLUDE CODE 39 / I 2 of 5 CHECK CHARACTER** in B-Coder's Preferences menu. When this option is enabled, B-Coder will automatically calculate and append the proper check character to all Interleaved 2 of 5 symbols.

## POSTNET



POSTNET (**POST**al **N**umeric **E**ncoding **T**echnique) is a 5, 9 or 11 digit numeric only bar code symbology used by the U.S. Postal Service to encode ZIP Code information for automatic mail sorting by zip code. The bar code may represent a five digit ZIP Code (32 bars), a nine digit ZIP + 4 code (52 bars) or an eleven digit Delivery Point code (62 bars).

POSTNET is unlike other bar codes because data is encoded in the height of the bars instead of in the widths of the bars and spaces. Most standard bar code readers cannot decode POSTNET. This symbology was chosen by the Postal Service mainly because it is extremely easy to print on almost any type of printer. POSTNET is a fixed dimension symbology meaning that the height, width and spacing of all bars must fit within exact tolerances.

B-Coder will only create POSTNET bar codes that follow the guidelines published by the Postal Service. B-Coder does not allow direct control over the size of POSTNET bar codes.

NOTE: Most other Windows programs allow you to modify the size of metafile graphic images pasted from the clipboard. If you change the size of a POSTNET bar code even by a small amount, it will be completely unreadable by the Postal Service bar code readers.

B-Coder will ignore non-numeric data in any bar code message that you enter for POSTNET. For example, if you enter "Chicago, IL 60601-3222" for a POSTNET bar code message, B-Coder will still create a correct bar code. This feature allows you to cut an address line from another Windows program and paste it into B-Coder without having to edit the bar code text.

## Postal FIM Patterns

FIM or Facing Identification Mark patterns are another type of postal bar code used in automated mail processing by the U.S. Postal Service. FIM patterns are used for automatic facing and canceling of mail that does not contain a stamp or meter imprint (business reply mail, penalty mail, etc.). They also provide a means of separating business and courtesy reply mail from other letters. Three FIM patterns are currently in use. FIM-A is used on courtesy reply mail that has been preprinted with Postnet bar codes. FIM-B is used on business reply, penalty and franked (government) mail that is not preprinted with Postnet bar codes. FIM-C is used on business reply, penalty and franked mail that has been preprinted with Postnet bar codes. FIM patterns are placed in the upper right corner along the top edge and two inches in from the right edge of letters and cards. For more information about all postal bar codes contact your local post office.

When you select a FIM pattern from the symbology menu, B-Coder will immediately generate the requested pattern without switching from the currently selected symbology and without having to select Build/Copy from B-Coder's Edit menu.

## Choosing A Bar Code Reader

There are essentially three main types of bar code readers currently available: Bar Code Wands or Pen type readers, CCD type bar code readers, and Bar Code Laser Scanners. Each of the three types of readers have their own specific advantages and disadvantages.

### WANDS

Bar Code Wands are the smallest and least expensive of the three main reader types typically ranging in price between \$200 to \$400. Wands are pen shaped devices that use an LED light source mounted at the tip of the "pen". To read a bar code, the wand must be physically dragged across the bar code in a smooth steady motion. Because the tip of the wand is usually in contact with the bar code symbol, there is a good chance that the bar code image will get scratched or damaged if it is read with a wand repeatedly. Another disadvantage with wands is that it can be difficult to read bar codes printed on irregular shaped objects like cans or bottles. Wands are a good choice when all your bar codes are printed on flat surfaces and the number of times that each bar code is to be read is low and when size, price and power consumption are major considerations. Wands are typically used in the Video Rental and Air Parcel business.

### CCD READERS

CCD readers are the next step above bar code wands in both price and performance. CCD readers use an array of sensors approximately 2 to 4 inches wide to read a bar code. Because of this, CCD readers are limited to reading bar codes that have an overall width that is less than the width of CCD sensor array. Typical prices for CCD readers are between \$400 and \$800. They are non contact devices meaning that they do not damage a bar code during the reading process but they must be held within a few inches of a bar code in order to read successfully. CCD readers have better success than wands when reading bar codes printed on irregular shaped surfaces. CCD readers are a good choice when reading small to medium sized bar codes that might be printed on irregular surfaces. CCD readers are typically used in retail Point of Sale applications.

## LASER SCANNERS

Laser scanners are the most expensive types of bar code readers because they use a moving laser beam to perform a read. Like CCD readers laser scanners are non contact devices but laser scanners are capable of reading a much wider range of bar code sizes over a wider range of distances. Laser scanners come in two varieties, hand held and fixed mount. Hand held laser scanners look similar to CCD readers but are usually smaller and narrower. Most hand held scanners use a trigger to activate a reciprocating mirror that rapidly scans the laser beam across the surface of a bar code. Hand held laser scanners must be aimed at a bar code so that the moving laser beam scans across the entire bar code perpendicular to the bars and spaces. The most common type of fixed mount laser scanners are the kind used in grocery store check out lines. Fixed mount readers use a sophisticated scanning system that rapidly scans the laser beam in many directions so that the orientation of a bar code does not matter. This allows for extremely rapid reading of many different sized bar codes printed on different shaped objects. Hand held laser scanners are typically priced between \$800 and \$2000 and fixed mount scanners start at about \$800 and go up from there. Laser scanners are excellent for all bar code applications but they really excel when speed or distance is a major factor and when very long bar codes must be read. The only drawback to laser scanners is that they consume the most power of all the three main types of bar code readers.

## Connecting A Bar Code Reader To A PC

The traditional way to connect a bar code reader to a PC is to use a device called a *Keyboard Wedge* that plugs into the keyboard port of a PC. The keyboard and the bar code reader are then plugged into the Wedge so that the PC receives data from both devices as keystrokes. Keyboard wedges are fine for simple DOS based applications but they have several major drawbacks. They cannot be used on a laptop PC that does not have a keyboard port, they cannot handle large amounts of data such as data from a PDF417 bar code symbol, and they do not work well under multitasking operating systems like Windows or OS/2. With a keyboard wedge, the program that is being used to collect the bar code data must be running in the foreground and thus the PC cannot be used for any other purpose while the bar code reader and the keyboard wedge are being used.

To solve these problems TAL Technologies has developed a product called **WinWedge™** that allows a bar code reader to be connected to a PC's serial port. The WinWedge™ is a *software only* solution that performs the exact same function as a Keyboard Wedge except that it has far more capabilities including the ability to handle large amounts of data and the ability to transfer data to a program that is running in the background (minimized) under Windows or OS/2. Other features include date/time stamping, the ability to capture data directly to a disk file, parsing and filtering functions, keystroke macro insertion, and data translation capabilities. WinWedge™ is not only better than a keyboard wedge, it is also much less expensive.

**WinWedge™** is by far the best solution for interfacing a bar code scanner to a PC.