'Fontware'™

BARCODE 2000

User Guide & Programming Manual

November 99

For
Laser Printers
in
PCL Format

Includes:
- OCR & MICR Fonts
- Most Standard Scalable Barcode Fonts
- Euro Symbol Fonts
- "Barcodes & More" Product
- and much more

First in Document Technology

'Fontware'™

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Acknowledgement

Warranty

All Fontware products are covered by a 30-day warranty from defect.

Errors and omissions excepted.

Printed in UK
By Fontware Limited

Fontware™

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Introduction to Barcode 2000

Thank you for choosing the **Barcode 2000** solution from Fontware Limited.

We hope that the product performs well and functions to your expectations.

This manual serves as a user guide to our **Barcode 2000** Product.

Barcode 2000 will enhance the feature set of any PCL printer allowing the production of Barcodes, OCR, MICR fonts and specialist symbols.

Barcode 2000 is the latest culmination of the most frequently used barcodes, in one product, the barcodes have been made scalable, and most allow easy "with text" printing. Symbol sets for text fonts have been made multi-national to allow access to language variations of character sets.

Additional commonly associated fonts have been added for greater flexibility, these are OCR, MICR, Letter Gothic and Line Printer fonts.

The Product also contains within it, our **'Barcode Plus'** Product which is Code and Data compatible with the **"HP Barcodes and More"** product, and the HP922628W, and HP922628X font cartridges.

Barcode 2000 is supplied in one of several formats.
To use any barcode, various calculations, check digits and data formatting need to be applied to produce the correct output, this will generally need to be processed by user application software.

Contained within the package is:

- The Barcode font data in one of the available formats.
- Utility disk with drivers, examples, and test files.
- Documentation

You should be able to find which barcode types are supported for the product you have purchased from these specifications.

Barcodes

Barcodes are now a very common feature in daily business, from retail and stock control, through shipping and distribution, to document tracking. Barcodes enable a unique and automated way of processing data.
Barcode information is machine readable, and is often accompanied with Human readable text for additional processing.
Barcodes are a series of varying width vertical lines (called bars) and spaces. The bars and spaces when scanned are decoded by a reader which detects the reflection from the white space. This reflection value dictates the value that the barcode contains.

There are many different types of barcodes.
Numeric only characters, (i.e. EAN, UPC, Interleaved 2 of 5). Codabar, MSI
Fixed length,
(i.e. UPC-A is 12 digits, UPC-E is 6 digits, EAN-13 is 13 digits, and EAN-8 is 8 digits).
Alphanumeric characters,
(i.e. Code 3 of 9, Code 128, Code 93. One allows you to encode all 128 character, (Code 128)).

Many barcodes were invented some time ago and have been superseded by newer barcodes. Some industries standardised on older bar codes before better ones had been invented, and therefore there is a continuing requirement for their use in particular industries.

Constructing Barcodes.
All barcodes begin with a **Start guard bar** (start character), followed by **data**, and then a **check digit** (if required) and end with a **stop guard bar** (stop character). Some types of barcodes have the same start and stop character.

Barcodes require a **space zone** or quiet zone. This is a blank space around the printed barcode. The zone is either defined by the scanning application or hardware, or is part of the specification of the barcode. Usually about 5 to 6mm space is enough.

Barcodes can be used in different methods.
- With and without a check digit
- Different proportions.
- Expansion for upper and lowercase characters.
- With or without readable text.

Barcodes often have the ability to add an optional **check digit**. These check digits are always represented by as regular character from within the barcode character set. If the scanning device is not programmed for checking the optional check digit, it would then be read as regular data.

Product Formats

Barcode 2000 can be implemented in a number of formats, these may be hardware or software, and allows support for many different printer makes, and models.
The list is being upgraded as new formats and models appear on the market.

Barcode 2000 has a set of specific scalable and fixed bitmap data.
Barcode Plus and Barcode Plus Deluxe are formats in bitmap format
Barcode Plus Scalable is available as scalable data.

Cartridge	Support for font cartridges is available for HP LaserJet printer series III, and series IV. Barcodes Plus and Barcodes Plus deluxe are also available for HP LaserJet II series printers, compatible printers and DeskJet 1200.
Font Card	Bitmap products are available for the IBM 4019, 4029, Canon LBP MkIII. Both bitmap and scalable products are available for the Kyocera FS Range.
HP SIMM	Both Bitmap and Scalable products are available for: HP 4, 4M, 4P, 4MP, 4 Plus, 4M Plus, 4V, 4MV, 4Si, 4Si MX, 5, 5N, 5M, 5P, 5MP, 5Si, 5Si MX, 5Si Mopier, 6P and 6MP. DeskJet 1200C, 1600C
HP DIMM	Both Bitmap and Scalable products are available for: HP 2100x, 4000x, 5000x, 8000x, 8100x, Mopier 240 and Mopier 320.
Flash SIMM	Both Bitmap and Scalable products are available for: IBM 4039, Lexmark Optra R range, Lexmark Optra S range, Genicom, IBM Network Printers, Hewlett Packard and others.
VersaPort	Both Bitmap and Scalable products are available for any PCL4 and above compatible printer that has a parallel port and a suitable amount of available memory.
Soft Data	Both Bitmap and Scalable products are available under licence for use as soft loaded data, and can be built into application software.

Product Installation

For installation of any hardware versions of the product please follow the installation guide in your printers User Reference Manual. Especially follow all instructions to reduce the risk of damage to the device by static electricity. Some devices will accept an external plug in unit, others will require the insertion of a Chip device internal to the printer, often in a memory slot. Please refer to the specific printer documentation to be sure.

Ensure that all anti static precautions are observed, for personal and product protection.

Our solutions come in many formats:
Cartridge, SIMM / DIMM, PCMCIA Card, Specialist Cards: IBM 4019, IBM 4029, IBM 4029
Soft Fonts (Various Formats), etc

Please ensure that all manufacturers instructions are followed (where appropriate) for the installation of any hardware or software formats.

Testing the Installation

Once the product is installed, several tests should show that the data is accessible and working.

Perform a printer font list, this will show that the font data is being recognised by the printer. Please refer to your specific printer user manual to see how to perform these tests.

A full test is to print out a test file from the supplied utility disk. Test files are located in the **TEST** (folder), sub directory.

<filename>.txt can be copied to the printer and will print test data to ensure the fonts are working. <filename> is a filename from the list below.

There is an individual test file for each barcode, showing the selection sequence and some sample data.

On a connected PC, use the command prompt:

COPY/b A:\TEST\<filename>.txt LPT1:

Specific files for each barcode are also available in the \TEST directory and should be copied to the printer in the same way.
Each test will sample the fonts and print some test data.

OCR.TXT
MICR.TXT
CODE39.TXT
CODE128.TXT
EANUPC.TXT
12OF5.TXT
CODE93.TXT
MSIPLES.TXT
CODABAR.TXT

BCPLUS.TXT

When the tests are complete, the process of integrating within the application and dealing with the particular barcode encoding can begin.

Driver support

Barcode 2000 can be supported in a number of ways.
Direct integration with application software, where you have total control of what is output to the printer will be the most flexible. This requires PCL4 / 5 language programming expertise and is discussed later in the manual.

"Barcodes & More"
92286X, 92286W and "Barcode & More" are supported directly in many pieces of software, within different Operating, systems and these options should be selected and used.

Windows
Barcode 2000 is supported in Windows, with some restrictions. The **Barcode2000** disk contains a font description file, (.PCM) in the **A:\DRIVERS** folder which can be installed to allow access to the fonts from within Windows applications. The fonts will appear as normal in the font selection box and can be selected, the screen however will NOT display the fonts, and instead they will be represented with alphanumeric characters that are spaced correctly. The fonts will however print on the printer with the correct settings.

There is one PCM files available:
B2KV2.pcm for **Barcode 2000**.

Note: Any Interleaving and checksums must be calculated prior to using the barcode or entered directly.
All printer settings must allow PCL4 or 5 and be set to 300 or 600 dpi resolution.

Windows 3.1
Open Control Panel, select Printers, select the printer to be used, then set-up, then Fonts, then either select Barcodes & More, or add in the PCM Support files.

Windows 95/98
Start, Settings, Control Panel, Printers
Select the printer to be used, then Properties, then Fonts, then either select Barcodes & More, or add in the PCM Support files.

Windows NT 4.x
PCM support in printer drivers was removed, so a special version of an HP5Si driver is available. This driver may be suitable for your requirements. If hard format font support is required under NT4, this special driver is required, and as it is for a 5Si, it is PCL compatible and it can be used on other PCL printers, with certain restrictions. HP5Si data will be sent to the output device, if the target printer is compatible, the data should print, if it is not, there may be printer problems.

Start, Settings, Control Panel, Printers
Select add printer, then select the BK2 – 5Si Driver. This will install as a normal 5Si printer. Configure the printer's settings, and use in the normal way.

PCM support has now been returned within new printer drivers and is available for the current HP printers including the HP4050 PCL5e driver.

Word
Within Word you can directly input PCL control codes in your documents, (This is dependant on the printer driver you are using: (Some Fail)), via the **Insert, Field, Print** options. You can therefore invoke fonts / barcodes and macros.

Be very careful that the document formatting is maintained, or you may get odd output.

DOS, UNIX, Mainframe.
These environments tend to require PCL Escape Sequence programming. All required information is available in this documents, and a PCL technical reference manual.
Certain Mainframe formats may require specific Escape code formatting, via connection/conversion software or hardware.

Other
SAP/R3 has the ability to use SAP Scripts, these are administrator customisable to allow printer control codes to be entered, and therefore allowing control to switch fonts on and off, control of macros, and allowing many output formats

** Adding in the PCM Support files.
This option will show itself as available if the printer driver supports it. The software will ask for the source directory of the .PCM file, which then needs to be selected and installed. A copy is supplied on the disk.

Readability

Barcodes once printed will be read again by one of many types of barcode reader. Each reader will have different capabilities, specifications and tolerances. Please determine from your barcode reader supplier what limits are set for your device, to understand if there are limitations you must work within.

Barcodes can be read within certain tolerances, generally the bigger the better. Barcodes do require the quiet zone around them and certain codes lend themselves to being printed at a small size within a small space.

Some barcodes can be used with different width settings. This width is defined by the smallest bar or space.
A code that is scaled with a ratio 1:3 is more easily read but takes up more printing space than a ratio of 1:2.

The output device and the media printed is very important to the readability of the barcode. Degradation in print quality will affect the barcode readability. A clean print engine and new toner are sometimes required.

The media used to print on should be a good contrast to the toner being used, as it is the black to white variation that allows the barcode to be read.

It can be useful to use a higher print resolution for printing barcodes at small sizes.

If reading problems persist, it is advisable to make sure the printer is clean, the toner is fresh, the media is white, and the resolution is high.

Product Programming

When directly programming PCL to access the Barcode fonts, care must be taken to deliver the correct codes in the correct format.

Conventions
Throughout the rest of the manual some characters are shown as literal characters, or as Decimal or Hexadecimal values.
Decimal values are denoted within less than and greater than signs, and a hex value is preceded with a lowercase 'h', as follows:

The **ESC** character,	**<027>** is decimal,	**h1b** is hexadecimal
The **A** character,	**<069>** is decimal,	**h45** is hexadecimal

It is useful to ensure that certain characters are not misread, it is very important to get ESCAPE codes **EXACTLY** correct.
Typical miss-reading errors
The 'O' (Uppercase O, as in One) and the digit 0
The 'l' (Lowercase l, as in Select) and the digit 1

Printer drivers must be able to select and de-select the relevant font. Certain barcodes need the check digits calculated and applied.
Certain applications such as **SAP R/2** and **R/3**, can be accessed with **SAP** Scripts, there are other integrated solutions available.

An interleaving and check digit example for all type of barcodes can be found later in this documentation.

This product uses **HP PCL 4** and requires an HP LaserJet III or above, or compatible printer. (Some features require **HP/GL2**).

If you are not familiar with Barcodes and encoding, it is recommended to experiment with the Code 3 of 9 barcode, as this is the simplest format.

PCL Usage

HP PCL ESCAPE sequences take on a particular structure and hierarchy. All sequences begin with the ESCAPE Character **<027>**, they are grouped in feature sets denoted by a non A-Z character, they are then followed by alphanumeric values as variables and all codes end with an upper case alpha character.
Multiple ESCAPE Sequences can be concatenated if they are in the same feature set. Care must be taken to process ESCAPE Sequences in a logical order.

Please refer to a PCL Technical reference manual for detailed information. This document will supply all the access codes for the fonts required.

Any application print jobs will contain a lot of output information, but must contain as a minimum codes for the basics of setting up a print page:
Page set-up,
Size, Orientation, Cursor Positioning, Font Selection, Data, Page end

Cursor Positioning
In order to correctly position your data you must move the page cursor to the correct position, there are several techniques available from within PCL. One accurate method is to move the cursor in printer units 1/720th Inch.

<027>&a###H and **<027>&a###V**

H is for Horizontal and **V** is for Vertical, **###** is 1/720th Inch units with decimal places.
<027>&a720H will move the cursor 1 Inch Horizontally
<027>&a720V will move the cursor 1 Inch Vertically
<027>&a720h2160V will move the cursor 1 Inch Horizontally and 3 Inches Vertically.
The movement is based from the **Printer Origin**, which can vary depending on the printer.
A plus or minus sign in front of the positioning value will cause an absolute **relative** move from current cursor position.
<027>&a-720V will move the cursor 1 Inch up the page, from the current position.

If you need to save the cursor position, and then return to it, you can with the PCL **PUSH** and **POP** commands.
<027>&f0S Push cursor (save cursor position) and **<027>&f1S** Pop Cursor (return to saved cursor position).

Use of CR-LF in the wrong places will upset the cursor positioning, so be careful not to logically fall off of the bottom of the page, you will not be able to return!

Barcode Font Selection & Manipulation

Selection of a Barcode font is the same as any other PCL printer font. The Barcode font needs to be selected, then followed by print data and it will be printed.
The PCL codes for selecting internal fonts will be available from the printer manufacturer's manual, and the **Barcode 2000** fonts are listed in this manual, Printer front panel self-tests should also provide the same information.

Fonts are selected with two parts, a symbol set, and a font selection sequence. Full sequences should be used to gain exact results. One shortcut is to use **primary** and **secondary** font selection, once defined these fonts can be switch in and out of by the ASCII codes **Shift-In <014>** and **Shift-Out <015>**

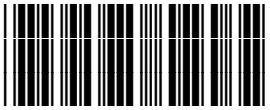
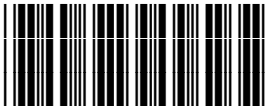
Examples of Font Selection:

Selection of Code 39	**<027>(10U<027>(s1p10v0s0b1999T**
Data	*12345*
Selection of Courier Text	**<027>)10U<027>(s0p10h12v0s0b4099T**
Shortcut selection	
Set Code 39 as primary font	**<027>(10U<027>(s1p10v0s0b1999T**
Set Courier as secondary font	**<027>)10U<027>(s0p10h12v0s0b4099T**
Data	Reference <014> *12345* <015> Code <014> *67890* <015>
Example	Reference  Code 

Font Manipulation
Barcodes may be scaled in various ways.
Simple scaling within PCL requires setting of a new point size and will scale the font Horizontally and Vertically at the same time, the font must be scalable. (Bitmap fonts are fixed sizes).

Vertical extension at correct Horizontal size
This is achieved by printing the Barcode twice, with a vertical shift, and "stacking" the Barcode vertically above itself, this can be done many times.

Examples of Vertical Extension:

Selection of Courier Text	**<027>)10Q<027>)s1p20v0s0b10004T**
More data	
Save Cursor position	**<027>&f0S**
Absolute position move	**<027>&a###h####V**
Shift IN	**<014>**
Save Cursor position	**<027>&f0S**
Absolute –ve move	**<027>&a-##V**
Data String	**<027>*12345***
Return to Cursor position	**<027>&f1S**
Data String	**<027>*12345***
Shift OUT	**<015>**
Return to Cursor position	**<027>&f1S**
More data	
Data	Reference <014> *12345* <015> Code <014> *67890* <015>
Example	Reference  Code 

Vertical shortening at correct Horizontal size
This is achieved by printing "White" boxes or lines around the Barcode.

Examples of Vertical Shortening:

Selection of Barcode	**<027>)10Q<027>)s1p20v0s0b10004T**
More data	
Save Cursor position	**<027>&f0S**
Absolute position move	**<027>&a###h####V**
Shift IN	**<014>**
Save Cursor position	**<027>&f0S**
Data String	**<027>*12345***
Return to Cursor position	**<027>&f1S**
Shift OUT	**<015>**
Absolute –ve move	**<027>&a-##V**
Overlay White print	**<027>*c##h##v1P**
Return to Cursor position	**<027>&f1S**
More data	
Data	Reference <014> *12345* <015> Code <014> *67890* <015>
Example	Reference Code

Independent scaling width and height
In order to achieve independent direction scaling, you must use the HP-GL/2 code set from within PCL5e. This will only apply to the scalable fonts available.
A PCL code must be used to scale the X direction, and then HP-GL2 is used to scale the Y direction.

Examples of Font Scaling, width and height:

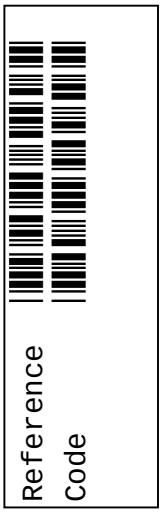
Save Cursor position	**<027>&f0S**
Absolute position move	**<027>&a###h####V**
Shift IN	**<014>**
Set Courier as secondary font	**<027>*c28D**
Selection of Barcode	**<027>)10Q<027>)s1p20v0s0b10004T**
Set font ID	**<027>*c6F**
Shift OUT	**<015>**
Enter GL, Select Pen/Font	**<027>%1BSP1;SA;FN28;**
GL code	**AD1,341**
GL code	**DT#;**
GL code	**SI###,###;**
GL code	**LB*12345*#;**
Return to PCL mode	**<027>%0A**
Return to Cursor position	**<027>&f1S**
Data	Reference <014> *12345* <015> Code <014> *67890* <015>
Example	Reference Code

Font Rotation

In order to rotate the Barcode relative to existing text, any font can be rotated in units of 90 degrees.

<027>&a90P Rotate to 90 degrees and **<027>&a270P** Rotate to 270 degrees.

<027>&a0P Rotate back to 0 degrees.



The full extent of PCL control code programming can be found in the HP PCL Technical reference manual, most type of output can be created via this method.

Examples

Barcode 2000 – Font Definitions.

Barcode 2000 contains many fonts, the table below shows the fonts available, and indicates the availability of human readable text versions for the barcodes.

Contents of **Barcode 2000**

Barcode Type	Point Size	Pitch	Density	Human Readable
Code 3 of 9	Scalable	Prop	High, Medium, Low	Yes
Code 93	Scalable	Prop	Medium	Yes
Interleaved 2 of 5	Scalable	Prop	High, Medium, Low	
EAN / UPC *	Scalable	Prop	High, Medium, Low	Yes
MSI / Plessey	Scalable	Prop	Medium	Yes
Code 128 **	Scalable	Prop	High, Medium, Low	
Codabar	Scalable	Prop	Medium	Yes
MICR (3 Versions)	Scalable	Prop		
MICR (3 Versions)	12	7.89		
CMC-7	Scalable	Prop		
CMC-7	14	8.11		
OCR A	Scalable	Prop	Medium	
OCR B	Scalable	Prop	Medium	
Euro Symbols ***				
Euro & Symbols	Scalable	Prop	Regular	
Barcode Plus				
Code 3 of 9	12	8.11		
Code 3 of 9	12	4.69		
EAN/UPC 10 Mil	12	Prop		
EAN/UPC 12 Mil	12	Prop		
OCR A	12	10		
OCR B	12	10		
Letter Gothic	9.5	16.66		
Letter Gothic	12	12		
Letter Gothic	14	10		
Line Draw	12	10		
USPS Barcode	12	Prop		

* Includes EAN 8 / EAN 13 / UPC A / UPC E / EAN/UPC Add-on 2 / EAN/UPC Add-on 5

** Includes EAN 128 / UPC 128

*** Euro Symbols are a single euro character support for all LaserJet 4 internal fonts.

Barcode Solutions – OCR-A and OCR-B

Description
OCR A and B fonts are Industry standard Optical Character Recognition fonts.

Valid Characters
01234567890, A-Z, and some of the top half of the ASCII Table. ****

Formatting the Fonts
These are textual fonts so there is no encoding required.

Display

This is an example of OCR-A
ABCDEFGHIJKLMNOPQRSTUVWXYZ - 0123456789

This is an example of OCR-B
ABCDEFGHIJKLMNOPQRSTUVWXYZ - 0123456789

Sequences
Valid ESCAPE sequences

<027>(0O <027>(s1p##v0s0b11500T	OCR-A	
<027>(1O <027>(s1p##v0s0b11501T	OCR-B	
<027>(0O<027>(s0p10h12v0s0b104T	OCR-A	Bitmap Barcode Plus OCRA
<027>(1O<027>(s0p10h12v0s0b110T	OCR-B	Bitmap Barcode Plus OCRB

Notes:
is the variable for Multiple Symbol sets
is the variable point size, (i.e. 12v is a 12 Point sized font) any point size available.

Examples of OCR printing:

Select OCR A as secondary	**<027>)0O<027>)s1p12v0s0b11500T**
Shift IN	**<014>**
Move to horizontal position	**<027>&a1440H00000123456789<0126>**
Move to horizontal position	**<027>&a2440H212134567<096>**
Move to horizontal position	**<027>&a3440H78964235<0126>01<096>**
Shift OUT	**<015>**

00000123456789♪ 212134567♩ 78964235♪01♩

Character Table
The character set will provide some useful extra characters in the extended table.
Use of the multi-national character sets will allow access to other characters in the top half of the character table, mainly for use with special European characters

Barcode Solutions – MICR (E13B)

Description
MICR fonts are Industry standard Magnetic IC-Recognition fonts, also known as E13B.

Valid Characters
& % / - 0123456789

Formatting the Fonts
These are textual fonts so there is no encoding required.

Display
⑆ ⑇ ⑈ ⑉ 0123456789

Sequences
Valid ESCAPE sequences

<027>(9U<027>(s1p##v0s#b11000T	MICR
<027>(10O<027>(s0p7.89h12.0v0s0b104T	Bitmap Version 1
<027>(10O<027>(s0p7.89h12.0v0s1b104T	Bitmap Version 2
<027>(10O<027>(s0p7.89h12.0v0s2b104T	Bitmap Version 3

Notes:
is the variable for Multiple Symbol set
is the variable point size, (i.e. 12v is a 12 Point sized font) any point size available.
is variable for
0 – Version 1
1 – Version 2
2 – Version 3

Examples of MICR printing:

Select MICR as secondary	**<027>)9U<027>)s1p12v0s0b11000T**
Shift IN	**<014>**
Move to horizontal position	**<027>&a1440H00000123456789<038>**
Move to horizontal position	**<027>&a2440H21213456<037>**
Move to horizontal position	**<027>&a3440H78964235<047>01<045>**
Shift OUT	**<015>**

0000123456789⑆ 21213456⑇ 78964235⑈01⑉

⑆ Route & Transit Field
⑇ Amount Field
⑈ Auxiliary On-us Field
⑉ On-us Field

0123456789 Digits

Barcode Solutions – CMC-7

Description
CMC-7 fonts are Industry standard Magnetic IC-Recognition fonts, used widely as an alternative to MICR.

Valid Characters
; ; < = > 0123456789

Formatting the Fonts
These are textual fonts so there is no encoding required.

Display

Sequences
Valid ESCAPE sequences

<027>(9U<027>(s1p##v0s0b12000T	CMC-7
<027>(7C<027>(s0p8.11h14.0v0s3b0T	Bitmap Version CMC-7

Notes:
is the variable for Multiple Symbol set
is the variable point size, (i.e. 12v is a 12 Point sized font) any point size available.

Examples of CMC-7 printing:

Select CMC-7 as secondary	**<027>)9U<027>)s1p12v0s0b12000T**
Shift IN	**<014>**
Move to horizontal position	**<027>&a1440H00000123456789**
Move to horizontal position	**<027>&a2440H:;<=>**
Move to horizontal position	**<027>&a3440H9876543210**
Shift OUT	**<015>**

Barcode Solutions – Code 3 of 9

Description
Code 3 of 9 can use alphanumeric data and is the simplest code to use.

Valid Characters
01234567890, A-Z, a-z, $ % + - . / Space

Formatting the Barcode
The data you encode is the data which is configured for the final data code. For example if we use the following data for our example. **12345ABCDE/**
The Start and Stop character is the asterisk symbol (ASCII 042)
The final code is printed as *12345ABCDE/*

Check Digits
Check digits can be used and is the modulus 43 sum of all the character values in a given message, and is printed as the last character of the readable information on a barcode.

Our data: 12345ABCDE/
Sum of ASCII Values (Taken from the Table below) = 1+2+3+4+5+10+11+12+13+14+40 = 115
115 / 43 = 2 Remainder 29

The check digit is the character corresponding to the value of the remainder, which in the example above is 29 or ### (as referred below)

Final Print *12345ABCDE/T*

Final Print 

Sequences
Valid ESCAPE sequences

<027>(9U<027>(s1p##v0s#b11001T	
<027>(0Y<027>(s0p8.11h12v0s0b0T	Bitmap Barcode Plus Code 3 of 9 – 4.6
<027>(0Y<027>(s0p4.69h12v0s0b0T	Bitmap Barcode Plus Code 3 of 9 – 8.1

Notes:
is Multiple Symbol set
is variable point size
is variable for

0 – 3 of 9	Medium
1 – 3 of 9	Medium Text
2 – 3 of 9	High
3 – 3 of 9	High Text
4 – 3 of 9	Low
5 – 3 of 9	Low Text

Code 3 of 9 Character Table

ASCII	CODE39	ASCII	CODE 39	ASCII	CODE 39	ASCII	CODE 39
NUL	%U	SP	Comma	@	% 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	I	I	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

Barcode Solutions - Code 128

Description
Code 128 consists of three Sub-Sets for different uses of this Barcode.

Sub-Set A
Includes all of the standard upper case alphanumeric keyboard characters plus the control and special characters.

Sub-Set B
Includes all of the standard upper case alphanumeric keyboard characters plus the control and special characters.

Sub-Set C
Includes the set of 100 digit pairs from 00 to 99 inclusive, as well as special characters. This allows double density numeric digits, two digits per bar coded character, to be defined.

Special Characters
The last seven character of Code Subsets A and B and the last three characters of code set C are special non-data characters that define special operations to the code reading device.
It is possible to change from one code subset to another within a symbol using the special code or shift characters. The code characters allow a code subset change for all characters following it in the symbol. The Shift character allows a code subset shift for characters only. Function Characters (FNC) defines instructions to the code reading device to allow for special operations and applications.

Code Characters
Code A, B or C characters change the symbol code subset from the subset defined previously to the new code subset defined by the code character. This change is applicable for all characters following the code character until either the end of the symbol or another code character is encountered.

Shift Character
The shift character change the code subset from A to B or B to A for the single character following the affected character revert to the Code Subset A or B that was defined previously to the shift character.

Function Characters
FNC 1 is reserved exclusively for EAN / UCC use (EAN128).

FNC 2 (Message Append) instructs the code reader to temporarily store the data from the symbol containing the FNC 2 character and transmit it as a prefix to the next symbol data. This may be used to concatenate several symbols before transmission. This character can occur anywhere in the symbol.

FNC 3 (Initialise) instructs the code reader to interpret the data from the symbol containing the FNC 3 character as instructions for initialisation or re-initialisations of the code reader. The data from the symbol will not be transmitted by the code reader. This character can occur anywhere in the symbol.

FNC 4 is available for use in closed systems.

How do I calculate each subset?
Values are obtained from the table below.

	Code Set A						Code Set B				
Start Code		F	O	N	T			F	O	N	T
Value	103	38	47	46	52		104				
Position	1	1	2	3	4		1	1	2	3	4
Multiply Values	103	38	94	138	208		104	38	94	138	208
Total	581						582				
Divide (MOD)	581 / Code Set A(103) 5 Remainder 66						582 / Code Set A(103) 5 Remainder 67				
Symbol Value	66	+	32	=	84		67	+	32	=	99
ASCII Char	'b'						'c'				
Final Code	135	FONT		b	138		136	FONT		c	138

Code C.
Code C checksum processed by calculating the data as paired. For example the data 1234567890 would be paired as 12 34 56 78 90

Now we have our data pair we can calculate them into barcode data.

Data Pair	12	34	56	78	90	0	0	0
Data Position	1	2	3	4	5	0	0	0
Data Value	12	34	56	78	90	0	0	0
Value * Pos	12	68	168	312	450	0	0	0

Add the values together with the Code C (105) value. 105+12+68+168+312+450+0+0+0 = 1115

Divide the total by 103 = 10 remainder 85, the checksum character is symbol character 85 = ASCII 117, u.
To encode your data string, you simply add 32 to each of the values created from pairing the original data.

e.g.	ASCII	Char
12	44	,
34	66	B
56	88	X
78	110	N
90	122	Z

Then you have the final string sequence.

137	Start Character
,BXnz	Encoded data string
u	Checksum character
138	Stop Character

If typing this into Windows use ALT NNNN, with the num lock on and use a leading Zero

If Alphanumeric, Use the Shift to Shift in and out of code sets, this is a more complex process.

Final Data

Sequences
Valid ESCAPE sequences
<027>(1Y<027>(s1p##v0s#b11003T

Notes:
is Multiple Symbol set
is variable point size
is variable for

0 – Code 128 Medium
1 – Code 128 Low
2 – Code 128 High

There is **NO** readable text version of Code128

Code 128 Character Table

Symbol Char	ASCII Char	Code A	Code B	Code C		Symbol Char	ASCII Char	Code A	Code B	Code C
0	32	SP	SP	00		56	88	X	X	56
1	33	!	!	01		57	89	Y	Y	57
2	34	"	"	02		58	90	Z	Z	58
3	35	#	#	03		59	91	[	[	59
4	36	$	$	04		60	92	\	\	60
5	37	%	%	05		61	93	]	]	61
6	38	&	&	06		62	94	^	^	62
7	39	`	`	07		63	95	_	_	63
8	40	(	(	08		64	96	NUL		64
9	41	)	)	09		65	97	SOH	a	65
10	42	*	*	10		66	98	STX	b	66
11	43	+	+	11		67	99	ETX	c	67
12	44	,	,	12		68	100	EOT	d	68
13	45	-	-	13		69	101	ENQ	e	69
14	46	.	.	14		70	102	ACK	f	70
15	47	/	/	15		71	103	BEL	g	71
16	48	0	0	16		72	104	BS	h	72
17	49	1	1	17		73	105	HT	i	73
18	50	2	2	18		74	106	LF	j	74
19	51	3	3	19		75	107	VT	k	75
20	52	4	4	20		76	108	FF	l	76
21	53	5	5	21		77	109	CR	m	77
22	54	6	6	22		78	110	SO	n	78
23	55	7	7	23		79	111	SI	o	79
24	56	8	8	24		80	112	DLE	p	80
25	57	9	9	25		81	113	DC1	q	81
26	58	:	:	26		82	114	DC2	r	82
27	59	;	;	27		83	115	DC3	s	83
28	60	<	<	28		84	116	DC4	t	84
29	61	=	=	29		85	117	NAK	u	85
30	62	>	>	30		86	118	SYN	v	86
31	63	?	?	31		87	119	ETB	w	87
32	64	@	@	32		88	120	CAN	x	88
33	65	A	A	33		89	121	EM	y	89
34	66	B	B	34		90	122	SUB	z	90
35	67	C	C	35		91	123	ESC	{	91
36	68	D	D	36		92	124	FS	|	92
37	69	E	E	37		93	125	GS	}	93
38	70	F	F	38		94	126	RS	~	94
39	71	G	G	39		95	127	US	DEL	95
40	72	H	H	40		96	128	FNC 3	FNC 3	96
41	73	I	I	41		97	129	FNC 2	FNC 2	97
42	74	J	J	42		98	130	SHIFT	SHIFT	98
43	75	K	K	43		99	131	Code C	Code C	99
44	76	L	L	44		100	132	Code B	FNC 4	Code B
45	77	M	M	45		101	133	FNC 4	Code A	Code A
46	78	N	N	46		102	134	FNC 1	FNC 1	FNC 1
47	79	O	O	47		103	135	START (Code A)		
48	80	P	P	48		104	136	START (Code B)		
49	81	Q	Q	49		105	137	START (Code C)		
50	82	R	R	50		106	138	STOP		
51	83	S	S	51						
52	84	T	T	52						
53	85	U	U	53						
54	86	V	V	54						
55	87	W	W	55						

Barcode Solutions - EAN 128

Description
EAN128 is the same barcode font as Code128. The encoding method is just different.

This code is identical to the code 128. The control character FC1 must be printed directly after the start bar.

Barcode Solutions - EAN 8

Description
EAN B consists of 7 characters of data. The 8th digit is the check digit.

Check digit
This is a simple format, lets look at some data. Our Data 5070929
All odd numbers are multiplied by 3 and the even numbers multiplied by 1.

Example

Char Position	O	E	O	E	O	E	O	Total = 92
Data	5	0	7	0	9	2	9	Modula 10 of 92 = 100
Multiply	3	1	3	1	3	1	3	Check Digit = 8
Results	15	0	21	0	27	2	27	

The total minus the modula 10 value of the total gives you the check digit number.

What is the layout of the Barcode?
Below is a simple Layout.

Start Char	Left Hand Data	Centre Bar	Right Hand Data	Check Digit	Stop Char
1 Digit	4 Digit	1 Digit	3 Digit	1 Digit	1 Digit

How to compile the Barcode?
Start with the first 4 characters which are simply kept as they are, example 5070
The remaining 3 and the check digits are encoded with parity set C, shown below

Parity Set C										
Font Character	A	B	C	D	E	F	G	H	I	J
Numeric Position	0	1	2	3	4	5	6	7	8	9

Below is a table showing our data encoded as EAN B

	Left Data					Right Data			Check Digit
Data String	5	0	7	0		9	2	9	8
Index	1	2	3	4		5	6	7	8
Parity	N	O	N	E		C	C	C	C
Result	5	0	7	0		J	C	J	I

How to put it all together?
We now have the final encoded data, now all we have to do is to add our additional control characters.
Result from Above 5 0 7 0 J C J I
Start & Stop Characters is (or ASCII 40, Centre Character is – or ASCII 45,

Our Final Code look like this (5070-JCJI(

Barcode Solutions - EAN 13

Description
EAN 13 consists of 12 characters of data. The 13th digit is the check digit.

Check Digits
This is a simple format, lets look at some data. Our Data 800377350000
All odd numbers are multiplied by 1 and the even numbers multiplied by 3.

Example

Char Position	O	E	O	E	O	E	O	E	O	E	O	E
Data	8	0	0	3	7	7	3	5	0	0	0	0
Multiply	1	3	1	3	1	3	1	3	1	3	1	3
Results	8	0	0	9	7	21	3	15	0	0	0	0

The total minus the modula 10 value of the total gives you the check digit number.

What is the layout of the Barcode?
Below is a simple Layout.

Start Char	Defining Parity	Left Hand Data	Centre Bar	Right Hand Data	Check Digit	Stop Char
1 Digit	1 Digit	6 Digit	1 Digit	5 Digit	1 Digit	1 Digit

How to compile the Barcode?
To Start with we have a parity table, this gives details of how the Barcode is complied according to varying data. The first digit is used to define the parity, so in this case, the defining digit is the number 8.

A Parity table encode the Barcode to use the correct characters in the Font.

In the table below the letters A & B denote parity. Parity in the fonts is defined as follows.

Parity Set A										
Font Character	0	1	2	3	4	5	6	7	8	9
Numeric Position	0	1	2	3	4	5	6	7	8	9

Parity Set B										
Font Character	a	B	c	d	e	f	g	h	i	j
Numeric Position	0	1	2	3	4	5	6	7	8	9

Parity Set C										
Font Character	A	B	C	D	E	F	G	H	I	J
Numeric Position	0	1	2	3	4	5	6	7	8	9

13th Left Hand Character Values						
Digit	1	2	3	4	5	6
0	A	A	A	A	A	A
1	A	A	B	A	B	B
2	A	A	B	B	A	B
3	A	A	B	B	B	A
4	A	B	A	A	B	B
5	A	B	B	A	A	B
6	A	B	B	B	A	A
7	A	B	A	B	A	B
8	A	B	A	B	B	A
9	A	B	B	A	B	A

Below is a table showing the data using the parity value of the number 8

	Parity	Left Data							Right Data					Check Digit
Data String	8	0	0	3	7	7	3		5	0	0	0	0	7
Index		1	2	3	4	5	6		7	8	9	10	11	12
Parity		A	B	A	B	B	A		C	C	C	C	C	C
Result		0	a	3	h	h	3		F	A	A	A	A	H

How to put it together?
We have our final encoded data, now add our additional control characters.
Result taken from above 0 a 3 h h 3 F A A A A H
Start & Stop Characters is (or ASCII 40, Centre Character is – or ASCII 45,

Our Final Code look like this (0 a 3 h h 3 - F A A A A H (

Sequences
Valid ESCAPE sequences
These are the same for EAN and UPC

<027>(8Y<027>(s1p##v0s#b11002T
<027>(8Y<027>(s1p12v0s0b0T Bitmap Barcode Plus EAN/UPC 10 Mil
<027>(8Y<027>(s1p12v0s3b0T Bitmap Barcode Plus EAN/UPC 13 Mil

Notes:
is Multiple Symbol set
is variable point size
is variable for

0 – EAN13 Medium
1 – EAN13 Medium Text
2 – EAN13 High
3 – EAN13 High Text
4 – EAN13 Low
5 – EAN13 Low Text

Barcode Solutions – EAN Velocity

Description
This code is similar to EAN 8, the first digit must always be set to 0.

Barcode Solutions - UPC Version A

Description
UPC Version A consists of 11 numeric only data digits.

Check Digit
This is a simple format, lets look at some data. Our Data 98765432155
All odd numbers are multiplied by 3 and the even numbers multiplied by 1.

Example

Char Position	O	E	O	E	O	E	O	E	O	E	O	Total =155
Data	9	8	7	6	5	4	3	2	1	5	5	Modula 10 of 115 = 120
Multiply	3	1	3	1	3	1	3	1	3	1	3	Check Digit = 5
Results	27	8	21	6	15	4	9	2	3	5	15	

The total minus the modula 10 value of the total gives you the check digit number.

What is the layout of the Barcode?
Below is a simple Layout.

Start Char	Left Hand Data	Centre Bar	Right Hand Data	Check Digit	Stop Char
1 Digit	6 Digit	1 Digit	5 Digit	1 Digit	1 Digit

How to compile the Barcode?
Start with the first 4 characters which are simply kept as they are, example 987654
The remaining 5 and the check digits are encoded with parity set C, shown below

Parity Set C										
Font Character	A	B	C	D	E	F	G	H	I	J
Numeric Position	0	1	2	3	4	5	6	7	8	9

Below is a table showing the data encoded as EAN 8

	Left Data							Right Data					Check Digit
Data String	9	8	7	6	5	4		3	2	1	5	5	5
Parity Set	N	O	N	E				C	C	C	C	C	C
Result	9	8	7	6	5	4		D	C	B	F	E	F

How to put it all together?
We now have the final encoded data, now all we have to do is to add our additional control characters.
Result from Above 9 8 7 6 5 4 D C B F F F

Start Characters is (or ASCII 40, Centre Character is – or ASCII 45, Stop Character is) or ASCII 41

Our Final Code looks like this (987654-DCBFFF)

Barcode Solutions - UPC Version E

What is it?
UPC Version E is a zero suppressed code which compresses a ten-digit value to six digits.

Check digit
This is a simple format, lets look at some data. Our Data 1230000064
The manufacturers number is the first 5 digits. The item number is the last five digits.

How does it work?

Compressing the Barcode.
We use the manufacturers number as a key to the compression of the barcode. The digits that the number ends with are used in a series of calculations to make the final digit code.

Manufactures number coding with 000,100 or 200. E.g. 1210000064

First two digits taken from manufacturers number	12
Last three digits taken from item number	064
Third digit manufacturers number	1
Final Six digit number	120641

Manufactures number coding with 300,400,500,600,700,800 or 900. E.g. 1230000064

First three digits taken from manufacturers number	123
Last two digits taken from item number	64
Third digit is a "3"	3
Final Six digit number	123643

Manufactures number coding with 10,20,30,40,50,60,70,80 or 90. E.g. 1231000064

First four digits taken from manufacturers number	1231
Last digit taken from item number	4
Third digit is a "4"	4
Final Six digit number	123144

Manufactures number does not end in zero. E.g. 12311000064

All five digits of the manufacturers number	12311
Last digit from the item number	4
Final Six digit number	123114

Encoding the final data?
We now have to calculate the check digit. The check digit is used to define the parity of the barcode.

Calculating the check digit.
Our original data string is used to calculate the check digit which is 1230000064

Example

Parity	O	E	O	E	O	E	O	E	O	E	Total = 20
Data	1	2	3	0	0	0	0	0	6	4	Modula 10 of 28 = 30 Minus total = 2
Multiply	1	3	1	3	1	3	1	3	1	3	Check Digit = 2
Results	1	6	3	0	0	0	0	0	6	12	

The total minus the modula 10 value of the total, gives you the check digit number.
Now we have a check digit value, we use that to encode the data string 123643 using a parity table.

Zero Suppression Parity Table
The E represents Font Characters The O represents Font Characters 0-9

Font Character	a	b	C	D	e	f	g	h	i	j
Data Digits	0	1	2	3	4	5	6	7	8	9

Font Character	0	1	2	3	4	5	6	7	8	9
Data Digits	0	1	2	3	4	5	6	7	8	9

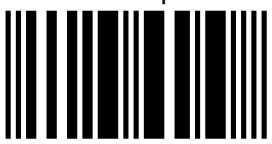
Check	Parity Values					
Digit	1	2	3	4	5	6
0	E	E	E	O	O	O
1	E	E	O	E	O	O
2	E	E	O	O	E	O
3	E	E	O	O	O	E
4	E	O	E	E	O	O
5	E	O	O	E	E	O
6	E	O	O	O	E	E
7	E	O	E	O	E	O
8	E	O	E	O	O	E
9	E	O	O	E	O	E

How it works
Check Digit = 2

Data	1	2	3	6	4	3	Our compressed data
Parity 2	E	E	O	O	E	O	Parity Taken from table above
Result	b	c	3	6	E	3	Encoded data using parity characters

Finishing Off
The UPC E uses the "(" for the start Character, and the ")" for the Stop character, there is no centre guard.
Using our final data. (bc36e3)

Barcode Example



Barcode Solutions – EAN / UPC Add-on 2 & 5

What is it?
Both Add-on 2 and Add-on 5 use the same barcode fonts, however they are encoded in other ways to generate the correct output.

Barcode Solutions - Interleaved 2 of 5

Description
Interleaved 2 of 5 consists of 99 characters for numeric data only.

How it works?
This Barcode works as follows, take the example data string. E.g. 1234567890
Please note the data must be an even set of numbers, if not add an extra 0 to the start of your data code.

Next the data is paired into two sets of numbers e.g. 12 34 56 78 90

This gives a new set of numbers, each number refers to a table, listed below, The numbers indicate the character which must be used, or simply add 128 to the paired number value to give the final ASCII font position.

For example

12	+	41	=	53
34	+	41	=	75
56	+	41	=	97
78	+	41	=	119
90	+	41	=	131

How to encode the data
Interleaved 2 of 5 is simple, for the final data string we have to include the start & stop characters, these are ASCII 60 for start character and ASCII 62 for the STOP character. A Layout is shown below using the data already processed above.

ASCII Character	Description	Data String
35 or #	Start	-
53	Data	12
75	Data	34
97	Data	56
119	Data	78
131	Data	90
36 or $	Stop	-

Final Result

Sequences
Valid ESCAPE sequences

<027>(7Y<027>(s1p##v0s0b11004T I 2of5
<027>(7Y<027>(s1p##v0s0b11006T I 2of5 HOST

Notes:
is Multiple Symbol set
is variable point size

Some Systems such as AS/400, or systems connected through certain protocol converters are unable to send High order characters, above ASCII 128. **Barcode 2000** has an additional Interleaved 2of5 font called I2of5 HOST, this contains all the high end characters, except they have been moved down to the lower half of the character table, this allows full access to ALL the characters using BOTH of I2of5 fonts by these systems.
You can achieve this by using the Shift-IN, Shift-OUT method.

Interleaved 2 of 5 Character Table

Char	Hex	Dec	Char	Hex	Dec	Char	Hex	Dec	Char	Hex	Dec
Start	23										
Stop	24										
00	29	41	32	49	73	64	69	105	96	89	137
01	2A	42	33	4A	74	65	6A	106	97	8A	138
02	2B	43	34	4B	75	66	6B	107	98	8B	139
03	2C	44	35	4C	76	67	6C	108	99	8C	140
04	2D	45	36	4D	77	68	6D	109			
05	2E	46	37	4E	78	69	6E	110			
06	2F	47	38	4F	79	70	6F	111			
07	30	48	39	50	80	71	70	112			
08	31	49	40	51	81	72	71	113			
09	32	50	41	52	82	73	72	114			
10	33	51	42	53	83	74	73	115			
11	34	52	43	54	84	75	74	116			
12	35	53	44	55	85	76	75	117			
13	36	54	45	56	86	77	76	118			
14	37	55	46	57	87	78	77	119			
15	38	56	47	58	88	79	78	120			
16	39	57	48	59	89	80	79	121			
17	3A	58	49	5A	90	81	7A	122			
18	3B	59	50	5B	91	82	7B	123			
19	3C	60	51	5C	92	83	7C	124			
20	3D	61	52	5D	93	84	7D	125			
21	3E	62	53	5E	94	85	7E	126			
22	3F	63	54	5F	95	86	7F	127			
23	40	64	55	60	96	87	80	128			
24	41	65	56	61	97	88	81	129			
25	42	66	57	62	98	89	82	130			
26	43	67	58	63	99	90	83	131			
27	44	68	59	64	100	91	84	132			
28	45	69	60	65	101	92	85	133			
29	46	70	61	66	102	93	86	134			
30	47	71	62	67	103	94	87	135			
31	48	72	63	68	104	95	88	136			

Barcode Solutions - Code 93

What is it?

Code 93 is an alphanumeric, variable length symbology. Each symbol includes two check digits.

Structure of Code 93.

Code 93 has the following structure.

Start Character Data Characters 1st check digit 2nd check digit Stop Character Termination Bar

Encoding Code 93.

Below is a table showing the **Code 93** Character Set. You may notice in the **Code 93** columns that some characters are preceded by **$ % / +** symbols. These symbols are used to access the **FULL ASCII** chart. By using these characters in your data string full use of the ASCII character set can be obtained.
To access the **$ % / +** symbols a key is shown below the character chart for your convenience.

Code 93 Character Table.

ASCII	Code 93	ASCII	Code 93	ASCII	Code 93	ASCII	Code 93
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
ENQ	$ 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
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
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

Keystroke Key.

$ = ALT + 0130
% = ALT + 0131
/ = ALT + 132
+ = ALT + 133
Start/Stop Character = ALT + 134
Termination Bar = ALT + 135

Calculating the checksums.
Take example data to work from. CODE 93.

Character	Value		Character	Value
0	0		R	25
1	1		S	26
2	2		T	27
3	3		U	28
4	4		V	29
5	5		W	30
6	6		X	31
7	7		Y	32
8	8		Z	33
9	9			34
A	10			35
B	11		-	36
C	12		.	37
D	13		Space	38
E	14		$	39
F	15		/	40
G	16		+	41
H	17		%	42
I	18		$ special	43
J	19		% special	44
K	20		/ special	45
L	21		+ special	46
M	22			
N	23			
O	24			
P	25			

This is modula 47 of the data character values (see left).
You take the Values against the character in your data and use that value in a chart, see below. Below shows a chart with C & K weights, you will notice that the numbers are reversed increment of one. K weight takes into account the C Check Digit.

Data	C	O	D	E	Sp	9	3	CK
Values	12	24	13	14	38	9	3	
C Weights	7	6	5	4	3	2	1	
K Weights	8	7	6	5	4	3	2	1

Checksum 'C'
Calculate the values multiply the C Weight.

Divide 484 by 47 to get 10 with remainder 14.
Use this value against the table on the left to obtain the checksum 'C' character. Which is 'E'.

Checksum 'K'
Calculate the values multiply the K Weight.
(1x14)+(2x3)+(3x9)+(4x38)+(5x14)+(6x13)+(7x24)+(8x12) = 611

Divide 611 by 47 to get 13, remainder 0. The check digit 'K' = '0'.

Printing your final code.
Now you have you check digits you can now print your barcode.

Your final string would be

(0134) CODE 93E0 (0134) (0135)

Sequences
Valid ESCAPE sequences
<027>(8Y<027>(s1p##v0s#b11009T

Notes:
is Multiple Symbol set
is variable point size
is variable for

0 – Code93	Medium
1 – Code93	Medium Text

Barcode Solutions - MSI/Plessey

What is it?

Plessey contains a full numeric character set, and uppercase alpha characters 'A' through 'F', Unique start and stop characters and a check digit. The complete set includes these characters

0123456789ABCDEF
< = start
> = stop

MSI contains a full numeric character set, unique start and stop characters and a check digit. The complete set includes these characters: 0123456789 (= start)= stop

Encoding MSI/Plessey

Plessey/MSI data characters are printed in the same format as human characters are. If the actual numbers to be printed are '102763490' then the data will be printed as 102763490 plus the check digit. Both MSI and Plessey barcodes are variable length.

Method 1
Example: Data: **82345**
Select the numbers that are in odd positions. **8 3 5**
Take this number as a whole, **835** and multiply it by **2**, which gives you **1670.**
Now, add the digits of this number **1670,** for example **1+6+7+0** gives you **14.**
Add this number to the sum of the even digits, **2 + 4 + 14** results in **20.**
Take this number and subtract it from the highest multiple of **10,** which is **20 - 20 = 0.**
The checksum is **0**

Final Data: **<823450>**
Final Data:

Method 2
Example: Data: **82345**
What is it???

Final Data: **<823450>**
Final Data:

Sequences
Valid ESCAPE sequences
<027>(9U<027>(s1p##v0s#b11007T

Method 3
Example: Data: **82345**
What is it???

Final Data: **<823450>**
Final Data:

Sequences
Valid ESCAPE sequences
<027>(9U<027>(s1p##v0s#b11007T

Notes:
is Multiple Symbol set
is variable point size
is variable for
0 – MSI Medium
1 – MSI Medium Text

Barcode Solutions - Codabar

Codabar contains sixteen data characters and four unique start and stop characters. This bar code does not need a check digit and can be variable in length. Data characters are used in the same format as human readable characters. The complete set includes the following characters:

0123456789 - $: . + /	as data
abcdtn*e	as Start & stop Characters

start:	a	b	c	d
stop:	t	n	*	e

Example: Data: 47462

Final prints can be any of the following:

Final Data: a47462t
Final Data: b47462n
Final Data: c47462*
Final Data: d47462e

Since any of the start/stop characters may be used on either end of the symbol, it is possible to use the sixteen combinations to identify label type or other information.

Final Data:

Sequences
Valid ESCAPE sequences
<027>(9U<027>(s1p##v0s#b11008T

Notes:
is Multiple Symbol set
is variable point size
is variable for

0 – Codabar	Medium
1 – Codabar	Medium Text

Euro Symbols

A font set containing Euro Symbols to match the styles for existing fonts, within an HP LaserJet 4.

Name:	EuroFont
Sequence	**<027>(19U<027>(s1p##v0s0b11010T** ## is scalable point size.
Albertus Extra Bold	A
Antique Olive	BCDE
CG Omega	FGHI
CG Times	JKLM
Clarendon	N
Coronet	O
Courier	PQRS
Garamond	TUVW
Arial	XYZ
Marigold	a
Univers Condensed	bcde
Univers	fghi
Times New Roman	jklm

Barcode Plus

Contains Barcodes, Code 3of9, EAN/UPC & USPS, and associated fixed pitch fonts that are often used with barcodes - Letter Gothic, OCR-A, OCR-B & Line draw. Barcode Plus is code and data compatible with the HP **"Barcodes & More"** and HP92286W and 92286X Font cartridges.

Contents and characteristics of Barcode Plus
Barcode Plus / "Barcodes and More" is a well establish data set, that is available in a number of software applications.
The fonts are bitmaps and are of a fixed size.

Barcode Plus			
Fonts	Char Sets	Point	Pitch
Letter Gothic	R8	9.5	16.66
Letter Gothic	R8	12	12
Letter Gothic	R8	14	10
OCR A		12	10
OCR B		12	10
Line Draw		12	10
USPS Bar Code		12	Prop
Code 3 of 9		12	4.6
Code 3 of 9		12	8.1
EAN/UPC 10 Mil (Medium)		12	Prop
EAN/UPC 13 Mil (Bold)		12	Prop

Barcode Plus Escape sequences

Letter Gothic 16.66	**<027>(8U**	**<027>(s0p16.6h9.5v0s0b6T**
Letter Gothic 12	**<027>(8U**	**<027>(s0p12h12v0s0b6T**
Letter Gothic 10	**<027>(8U**	**<027>(s0p10h14v0s0b6T**
Barcode 3 of 9 (4.6 Pitch)	**<027>(0Y**	**<027>(s0p4.6h12v0s0b0T**
Barcode 3 of 9 (8.1 Pitch)	**<027>(0Y**	**<027>(s0p8.1h12v0s0b0T**
Barcode EAN/UPC 10Mil	**<027>(8Y**	**<027>(s1p12v0s0b0T**
Barcode EAN/UPC 13Mil	**<027>(8Y**	**<027>(s1p12v0s0b0T**
OCR-A	**<027>(0O**	**<027>(s0p10h12v0s0b104T**
OCR-B	**<027>(0O**	**<027>(s0p10h12v0s0b110T**
Line Draw	**<027>(0B**	**<027>(s0p10h12v0s0b0T**
USPS	**<027>(15Y**	**<027>(s1p12v0s0b6T**

The information on how to encode any of these fonts is the same as in the previous information sections of **Barcode 2000**

Macros

The PCL printer language contains a method of printing Macros, or Overlays. Overlays are usually used as a method of overprinting letterheads, or forms such as Invoice sets, Import Export shipping documentation, or any data that need a fixed background.

A Macro/Overlay can contain any fixed information, using any available fonts, barcodes, logos etc, in conjunction with drawing objects such as horizontal and vertical lines, special graphic symbols, foreign language text, shading etc.

We are able to create forms overlays to match your documents as a service to you, or take your own existing output data, and then add this to your font and barcode sets in many formats.

How to use
An example of a soft printer macro can be located in the **MACRO** (folder), sub directory.

On a connected PC, and with a PCL Printer use the command prompt:

COPY/b A:\Macro\Macro.MAC LPT1:

This will send the macro to the printer and store it in memory, you should see data transmission activity. When the macro has finished downloading, send the trigger file:

COPY/b A:\Macro\Trigger.txt LPT1:

This will send the macro start-up sequence to the printer, and then print the page and data together.
This example shows how a page can be overlaid, and examples of different elements of the page.

This approach is often used, to reduce network loading, to improve printer output speed, to simplify user tasks and reduce errors.

Macros are a good way of applying form overlays from inside or outside your application.
Your application can be set-up to just do a simple task, and "Call" the Macro / Overlay using its ID number.

Other Services

We are able to offer a full customisation service for many types of electronic data. These services consist of:

Font Conversions, from and to many different formats:
TrueType, Postscript and PCL Bitmap, etc

Customisation of fonts into Logos, Signatures and Symbols in different formats:
PCL, PostScript, TrueType, etc
These can be Mono or colour.

Standard Fonts for many environments:
DOS, UNIX, Mainframe, Windows, OS/2, Web

Electronic Forms
Postscript, PCL, Prescribe

Other Barcodes formats available:

- Royal Mail 4 State
- PDF417 2D barcode
- Specialist modifications

Compatibility

Barcode 2000 contains the 'Barcode & More' product within it as additional data. The fonts are bitmap and remain with the original ESCAPE Sequences to maintain compatibility with existing applications that use them.

"Barcodes & More" exists in various software packages, sometimes as HP92268W, HP92268X font cartridge definitions.

Troubleshooting

The most common error will be, "unable to print the Barcode".
This error must be broken down into several parts, first the Barcode format supplied must be checked to ensure that the printer can "see" the barcodes by performing a Printer self test and printer PCL type list, See Manufacturers documentation.

If all is OK
It is useful to then send one of the test files to the printer, See "Testing the Installation."

If all is OK
It is useful to check the application, to test it is sending the correct information to switch in and out of the Barcode font.

If all is OK
It is now useful to check the checksums, and encoding information.

If all is OK, but you cannot scan the output.
Check the scanner and equipment tolerances.

Check if you can read some of our sample data.

Go back to basics.

Be sure to switch back out of the Barcode font. All of your other data will print out as barcode, unless this is done.

Be sure to check all your PCL control codes for the exact syntax, any error will cause unpredictable output errors.

Support & Contact Information

Fontware has many differing document technology solutions available, for more information please contact us by one of the following means:

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