



PCL Barcode Font Kit

for Legacy Systems

User Manual

*Downloadable barcode fonts for laser printers.
Compatible with applications designed for Hewlett-
Packard's "Bar Codes and More" Font Product.*



PCL Barcode Font Kit for Legacy Systems
Downloadable barcode fonts for laser printers
User Manual

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Introduction

Modern laser printers can print barcodes for legacy systems, even if the software was originally designed to use specific hardware that is now obsolete. This compatibility offers system administrators the option of upgrading to newer, more productive printers without making changes to the application software.

Early laser printers accepted plug-in font cartridges, including the “Bar Codes & More” cartridge from Hewlett-Packard that included several barcode fonts. The specific control codes required to print barcodes using this cartridge were embedded in many data processing applications. System administrators who want to upgrade to new printers must either restrict their choices to printers which can recognize the Bar Codes & More control codes or change the control codes embedded in their software.

This PCL Barcode Font Kit includes downloadable barcode fonts that emulate the “Bar Codes & More” font product. The fonts can be downloaded to most laser printers, multi-function printers, and PCL-5 compatible inkjet printers. The fonts respond to the same control codes used by the “Bar Codes & More” cartridge/SIMM/DIMM, so no changes to existing applications are needed.

Each kit includes the following fonts:

<u>Name of Font</u>	<u>File</u>
Code 3 of 9, 8.11 pitch	BC_3of9_8pitch.dsf
Code 3 of 9, 4.69 pitch	BC_3of9_4pitch.dsf
UPC 10 mil	UPC_10mil.dsf
UPC 13 mil	UPC_13mil.dsf
USPS ZIP	USPS_ZIP.dsf

End User License Agreement

YOU MAY:

1. Install and use each font kit on only one printer.
2. Make one additional copy of the complete font kit for back-up purposes.
3. Transfer the complete font kit package to someone else only if you assign all of your rights under this license, cease all use of the fonts, remove all copies of the fonts from your printer and computers, and if the person to whom the font kit package is transferred agrees to the terms of this license.

YOU MAY NOT:

1. Use or make copies of the fonts except as permitted by this license.
2. Rent, sell, lease, assign or transfer the font kit package or any of its components except as set out above.
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This license shall continue for as long as you use the product. However, it will terminate if you fail to comply with any of its terms or conditions. You agree, upon termination, to destroy all copies of the product.

We warrant that the storage media for the fonts will be free from defects in materials and workmanship for 90 days from the date you acquire it. If such a defect occurs, return the product to us and we will replace it for free. This remedy is your exclusive remedy for breach of this warranty. It gives you certain rights and you may have other legislated rights which vary from jurisdiction to jurisdiction.

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Downloading Fonts to the Printer

The fonts in this kit can be installed on your laser printer quickly and easily. All you have to do is send the font to the printer. There are several methods for sending a font to the printer:

- copy
- lpr
- cat
- ftp

Copy

If you are using MS-DOS or Windows, you can simply Copy the font file to the printer port. In Windows, open a MS-DOS command line window. Use the /b (binary) command line option:

```
C:\> COPY /B BC_3of9_4pitch.dsf LPT1:
```

Note: If your system does not support long filenames you will need to rename the files. For example: C39_4PIT.DSF.

If you are in a MS-DOS command prompt under Windows and the destination printer is on the network, using the printer's network name may not work depending on your version of Windows. For example, this command should send the font to the printer under Windows/98 and Windows/2000, but may simply make a copy of the file on disk with Windows/95:

```
C:\> COPY /B BC_3of9_4pitch.dsf \\MAIN\LASER
```

You may first have to assign the printer to a local printer port with the NETUSE command. The port does not have to physically exist, and you should not use a port that actually has a local printer attached to it. For example, if you have local printers attached to LPT1 and LPT2 and a network printer named "\\Main\Laser," you could assign LPT3 to the network printer:

```
C:\> NETUSE LPT3: "\\MAIN\LASER"  
C:\> COPY /B BC_3of9_4pitch.dsf LPT3:
```

cat

In Unix or Linux you can use the `cat` command to copy the file to the printer raw device. The “raw device” usually has the same name as the device you commonly use, but with an “r” on the end. Using the raw device avoids the possibility that a print driver or spooler will insert formatting codes into the font as it is sent to the printer:

```
# cat /usr/myfiles/BC_3of9_4pitch.dsf /dev/lpt1r
```

lpr

The `lpr` command can be an effective method for downloading fonts. Unix and Linux support `lpr`; Windows/NT, 2000, and XP also support `lpr`, but it may not be installed by default (`lpr` may be called Unix printing by the Windows setup process). The general form of the `lpr` command is:

```
# lpr -S<server> -P<printer> [-C<class>] [-J<job name>]
[-O<option>] <filename>
```

As an example, let’s assume that the destination printer is available at IP address 192.168.100.40 and the file `BC_3of9_4pitch.dsf` contains the downloadable PCL barcode font. We must use `-O` (option) followed by a lower case letter “L” to specify binary mode:

```
# lpr -S192.168.100.40 -P192.168-100.40 -OL
BC_3of9_4pitch.dsf
```

ftp

This method can be used on Unix, Linux, and Windows systems. At a command line prompt enter the `ftp` command and IP address of the printer:

```
C:\> ftp <IP address of printer>
```

You will be prompted for a user name and password; press the Enter key for each of these (no user name or password). Then use the PUT command to send each font file to the printer.

Here is a sample session:

```
C:\> ftp 192.168.100.40
Connected to 192.168.100.40
220 Laser Printer Model xxx FTP server ready.
User (xxx.xxx.xxx.xxx:(none)):_
331 Password required for (none)
Password: _
230 User (none) logged in.
ftp> put BC_3of9_4pitch.dsf
200 PORT command successful.
150 Opening ASCII mode data connection for
'BC_3of9_4pitch.dsf'
226 Transfer complete.
ftp: xxxxx bytes sent in xx.xSeconds
xxxx.xxKbytes/Sec.
ftp> bye
```

After you have transferred the files, use the printer's control panel to print a PCL Configuration Page to verify that the fonts have been successfully installed.

Troubleshooting

Data which should appear as a barcode prints as plain text:

- use the printer's control panel to print a configuration page and verify that the required fonts are installed.
- check the data being sent to the printer and verify that the font selection escape sequence is correct.

Data which should appear as a barcode prints as plain text along with extra characters, like (s0p4.69h12.0v0b0T:

- check the data being sent to the printer and verify that the font selection escape sequence is correct.
- if possible, print the report to a file and use a text editor to

verify that the escape code at the beginning of the font selection sequence has not been stripped off by the operating system.

The barcode prints, but does not scan:

- for Code 3 of 9 verify that the barcode data begins and ends with an asterisk.
- for other types of barcodes, verify that the start and stop characters are included, and that the checksum calculation is correct.

Getting Help

If you need further assistance with installation of these fonts on your laser printer, contact the dealer from whom you purchased the product or:

The Barcode Software Center
Telephone: 847-866-7940
Email: info@makebarcode.com

Technical Information

If you will be using your laser printer with application software that already uses the “Bar Codes & More” font cartridge/SIMM/DIMM, no further steps are required. Your new laser printer will produce the same output as your old printer.

The following pages include technical information and sample code to assist the programmer with modification of existing applications or creation of new ones.

Selecting Fonts with Escape Sequences

PCL-compatible printers understand and respond to Hewlett-Packard's Printer Command Language (PCL). The fonts in this kit are compatible with PCL Version 5 and higher (higher being PCL-6 as of this writing). PCL uses Escape Sequences to control the printer. An escape sequence always begins with the ASCII Escape code, which has a decimal numeric value of 27 (33 in octal). The Escape code (shown in the samples below as <esc>) is followed by a series of parameters which tell the printer what to do.

An escape sequence may include more than one parameter. Each parameter generally consists of a value followed by a letter which identifies the type of parameter. If the parameter letter is lower case, it means that another parameter follows it. If the parameter letter is upper case, it means that it is the last parameter and it marks the end of this particular escape sequence.

Once a barcode font has been downloaded to the printer, you can select it by embedding a PCL command in the data being sent to the printer. The following escape sequences select the various fonts by characteristic:

Code 39 8.11 pitch	<esc>(0Y<esc>(s0p8.11h12.0v0b0T
Code 39 4.69 pitch	<esc>(0Y<esc>(s0p4.69h12.0v0b0T
UPC 10 mil	<esc>(8Y<esc>(s1p12.0v0s0b0T
UPC 13 mil	<esc>(8Y<esc>(s1p12.0v0s3b0T
USPS ZIP	<esc>(15Y<esc>(s1p12.0v0s0b0T

To switch back to the printer's default font, send this command:

```
<esc>(3@
```

So we can print a barcode in our sample report just by adding a few simple escape sequences to the data we send to the printer:

```
Monthly Statement
Account No. 123456
<esc>(0Y<esc>(s0p4.69h12.0v0b0T*123456*<esc>(3@
```

The printed result should look something like this:

```
Monthly Statement
Account No. 123456

```

Here is a snippet of C program code to do this:

```
printf("Monthly Statement\n");
printf("Account No. %d\n", AccNo);
printf("\033(0Y\033(s0p4.69h12.0v0b0T*%d*\033(3@\n",
    AcctNo);
```

The `\033` is an octal representation of the escape code. In Basic, character codes are specified with their decimal value, so an escape can be printed with a `CHR(27)` function call.

Adding Readable Text

The barcode fonts in this kit do not include readable text characters. Adding the text with a separate print command is easy to do and gives the programmer complete freedom in choosing the style and position of the text.

The simplest way to print text below a barcode is to print the barcode, start a new line, and then print the data again using a plain text font. Here is an example in C that uses the `fprintf` function to send formatted data to the printer (`lp`). In practice, the programmer would probably write this as one or two lines of code; we have used several lines for clarity:

```
fprintf(lp, "\033(0Y\033(s0p4.69h12.0v0b0T");  
fprintf(lp, "*123456*");          /* data */  
fprintf(lp, "\033(3@");          /* default font */  
fprintf(lp, "\n");              /* new line */  
fprintf(lp, "123456");          /* text line */
```

By using PCL cursor positioning commands, selecting specific typefaces, and controlling type size and boldness the programmer can create virtually any finished appearance desired. Details on the PCL commands are beyond the scope of this manual, but are discussed at length in Hewlett-Packard's publication *PCL5 Printer Language Technical Reference Manual*.

Formatting Barcode Strings

Applications designed to use the Hewlett-Packard "Bar Codes & More" Font Product already perform the required formatting and checksum calculations. Use of the PCL Barcode Font Kit for Legacy Systems requires no changes to existing applications.

To assist with development of new software or modification of existing applications, this manual includes information and sample code that illustrates how to do the formatting.

Code 3 of 9

Code 3 of 9 (also known as Code 39) is a widely-used alphanumeric barcode. The character set includes the upper case letters A-Z, the digits 0-9, and several symbols: hyphen (-), period (.), dollar sign (\$), forward slash (/), plus sign (+), and percent (%). To print a barcode character that will be scanned as a space, use the underscore (_); to print a blank white space use the space character (ASCII 32)

Code 39 barcodes are variable length, and may include any number of characters. In practice, the number of characters in a single barcode is limited by the maximum physical space available on the document. Also, many barcode scanners in common use (CCD scanners) cannot read barcodes over a specific width, typically about 3 inches.

Each Code 39 barcode must begin and end with a special start/stop character which is represented by an asterisk (*). Formatting of the data prior to printing requires only that you add an asterisk at the beginning and at the end of the data. For example, let's say that the data to be encoded is:

PN334958

The finished string ready for printing as a Code 39 barcode would look like this:

PN334958

Here is a complete set of escape sequences to print the data as a barcode and then print the information again as text using the printer's default font below the barcode:

```
<esc>(0Y<esc>(s0p4.69h12.0v0b0T*PN334958*  
<esc>(3@PN334958
```

The result:



Here is a C function that illustrates how the escape sequences might be generated in code. The caller passes the data (partno) and a pointer to the output file or device (prn). The code \033 in C represents Octal 33 which is the escape character.

```
int SendBarcode(char *partno, FILE *prn)
{
    fprintf(prn, "\033(0Y\033(s0p4.69h12.0v0b0T");
    fprintf(prn, "%s*", partno);      /* part number */
    fprintf(prn, "\033(3@\n");      /* default font */
    fprintf(prn, "%s\n", partno);    /* text */
    return(0);                       /* all done */
}
```

Here is Visual Basic code that will return a string with similar results; Chr(27) is the escape code:

```
Function SendBarcode(partno as string) as String
    Dim MyString as String
    MyString = Chr(27) & "(0Y" & Chr(27) &
        "(s0p4.69h12.0v0b0T"
    MyString = MyString & "*" & partno & "*"
    MyString = MyString & Chr(27) & "(3@" & vbcrLf
    MyString = MyString & partno
    SendBarcode = MyString
End Function
```

Extended Code 39

In some applications it may be necessary to encode characters which are not part of the normal Code 39 character set. "Extended Code 39" (also known as "Full ASCII Code 39") is a method that allows encoding of all 128 ASCII characters. These barcodes must be read using a scanner which has been configured for Extended Code 39. Use of Extended Code 39 is not recommended if there is a possibility the barcodes will be read, and possibly misinterpreted, by scanners which have not been appropriately configured.

The letters A-Z, the digits 0 through 9, space, dash (-), and period (.) are encoded just like standard Code 39. All others are encoded

with a pair of barcode characters beginning with the percent sign (%), dollar (\$), slash (/), or plus sign (+). For example, the pair \$M will be scanned as a carriage return code. The scanner must be configured to read Extended Code 39.

<u>ASCII</u>	<u>C39</u>	<u>ASCII</u>	<u>C39</u>	<u>ASCII</u>	<u>C39</u>	<u>ASCII</u>	<u>C39</u>
NUL	%U	SP	_	@	%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	\$T	4	4	S	S	s	+S
DC4	\$T	4	4	T	T	t	+T
NAK	\$U	5	5	U	U	u	+U
SN	\$V	6	6	V	V	v	+V
ETB	\$W	7	7	W	W	w	+W
CAN	\$X	8	8	W	W	w	+W
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						

Modulo 43 Checksum for Code 39

A checksum is an extra character which is added to the end of a barcode just before the stop character. The value of the checksum is computed from the preceding characters in the barcode, so it will change depending on the data contained in the barcode. The software that creates the barcode is responsible for performing the calculation and adding the checksum character. The scanner reads the barcode, performs the same checksum calculation, and compares the result of this calculation to the checksum at the end of the barcode. If the two do not match, the scanner presumes that something is wrong and does not accept the scan.

In practice, the Modulo 43 checksum is seldom used. While it does provide an additional level of reliability, Code 39 has other checks built into its structure that assure a level of accuracy more than adequate for most applications. A Code 39 barcode is presumed not to include a checksum unless explicitly required.

To calculate a Modulo 43 checksum, first assign each character in the barcode a numeric value according to the following table.

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

Sum the numeric values of the characters in the barcode (exclude the start/stop characters) and divide the result by 43; the remainder is the checksum value. Convert this to a character using the table above and add that character to the end of the barcode, just before the stop character.

In programming parlance, dividing and taking the remainder as the result is a Modulo division. In Basic, it would be expressed as:

```
Checksum = MySum Mod 43
```

In C/C++ it would be:

```
Checksum = MySum % 43.
```

UPC-A

UPC-A is used in the United States and Canada to identify retail products for checkout scanning. The code is fixed-length (12 digits), numeric only. The Uniform Code Council (located in Dayton, Ohio) assigns identification numbers to manufacturers. The barcode begins with a leading “number system” digit followed by the manufacturer’s identification; both are assigned by the UCC. This is followed by digits, assigned by the manufacturer, which identify each of the manufacturer’s products. The final 12th digit is a check digit used to insure scanning accuracy. The barcode also includes left, center, and right guard characters.

The length of the manufacturer identification number assigned by the UCC may vary from 5 to 8 digits, depending on the anticipated number of products the manufacturer needs to identify. The longer the manufacturer ID, the fewer digits available for identifying products.

<u>Character Position</u>	<u>Function</u>
1	left guard
2	number system digit
3-7	5 digits (manufacturer ID)
8	center guard
9-13	5 digits (manufacturer ID/product ID)
14	check digit
15	right guard

The left guard and right guard characters are identical and can be printed using an asterisk or left and right parentheses or square brackets: * () []. The center guard character may be printed using a hyphen or a vertical “pipeline” symbol: - |.

The bar pattern for digits in the left half of the barcode is different from the pattern used on the right side. In the PCL font, left-side digits are represented in the normal way by the characters 0 through 9. Right-side digits are represented by the letters A through J. For a programmer, encoding the right-side digits is simply a matter of adding the numeric value of each digit to the ASCII value for the character A (41).

<u>Left</u>	<u>Right</u>
0	A
1	B
2	C
3	D
4	E
5	F
6	G
7	H
8	I
9	J

Let's say we wish to encode the number 0-00123-45678-4 (dashes are shown for clarity). Each of the following examples would produce the same result:

```
*000123-EFGHIE*
(000123-EFGHIE)
[000123|EFGHIE]
```

Applications designed to use the Hewlett-Packard "Bar Codes & More" Font Product already perform the required formatting and checksum calculation. Use of the downloadable UPC-A font requires no changes to existing applications.

To assist with the creation of new code or the modification of existing applications, sample code that illustrates how to calculate the checksum and format the data for a UPC-A barcode is provided on the following pages.

Note: The UPC-A font supports all of the common retail barcode symbols. For further information on formatting data for these symbols, contact the Lanier Support Center.

- UPC-A
- UPC-E
- EAN-13
- EAN-8
- 2-digit supplemental
- 5-digit supplemental

Format UPC-A with C

```
static char upc_string[20];
char *format_upc(char *instring)
{
    char      *cpin, *cpout;
    int       check, i;

    memset(upc_string, 0, sizeof(upc_string));
    check = upc_check(instring);    // check digit
    cpin = instring;                // point at instring
    cpout = upc_string;            // point at outstring
    *cpout++ = '*';                 // insert left guard
    for (i = 1; i <= 6; i++) // insert first 6 digits
        *cpout++ = *cpin++ - '0';
    *cpout++ = '-';                 // insert center guard
    for (i = 1; i <= 5; i++) // insert next 5 digits
        *cpout++ = 'A' + (*cpin++ - '0');
    *cpout = '*';                 // insert right guard
    return(upc_string);            // return to caller
}

int upc_check(char *instring)
{
    int      mysum, mycheck;
    char     *cp;

    mysum = 0;                    // start with a zero
    cp = instring;                // point at start
    while (*cp != '\\0') {        // go to end of string
        mysum += *cp - '0';       // add numeric value
        cp += 2;                 // next odd position
    }
    mysum = mysum * 3;            // multiply sum by 3
    cp = instring;                // start again
    cp++;                          // first even position
    while (*cp != '\\0') {        // go to end of string
        mysum += *cp - '0';       // add numeric value
        cp += 2;                 // next even position
    }
    mycheck = 10 - (mysum % 10); // calculate Modulo 10
    if (mycheck == 10)           // force 10 to 0
        mycheck = 0;
    return(mycheck);             // return the result
}
```

Format UPC-A with Basic

```
Function format_upc(instring As String) As String
    Dim check As Integer
    Dim i As Integer
    Dim MyString as String
    Dim MyChar as Integer

    MyString = "*"           ` left guard
    MyString = MyString & Left$(instring, 6)
    MyString = MyString & "-" ` center guard
    for i = 7 to 11         ` next 5 digits
        MyChar = Val(Mid(instring, i, 1))
        MyChar = MyChar + Asc("A")
        MyString = MyString & Chr(MyChar)
    next i
    MyChar = upc_check(instring) + Asc("A")
    MyString = MyString & Chr(MyChar)
    MyString = MyString & "*" ` right guard
    format_upc = MyString    ` return to caller
End Function
```

```
Function upc_check(instring As String) As Integer
    Dim MySum As Integer
    Dim i As Integer

    mysum = 0                ` start with a zero
    for i = 1 to 11 Step 2   ` add odd positions
        mysum = mysum + Val(Mid(instring, i, 1))
    next i
    mysum = mysum * 3        ` multiply result by 3
    for i = 2 to 10 Step 2   ` add even positions
        mysum = mysum + Val(Mid(instring, i, 1))
    next i
    MySum = MySum Mod 10     ` calculate Modulo 10
    MySum = 10 - MySum       ` subtract from 10
    if MySum = 10 then       ` force 10 result to 0
        MySum = 0
    endif
    upc_check = MySum
End Function
```

USPS ZIP

The USPS ZIP barcode (also known as “Postnet”) is the row of tall and short bars that often appear below or above an address on a letter. USPS ZIP encodes the Zip Code so that it can be read by automatic sorting equipment. A USPS ZIP barcode can include the 9-digit Zip+4 code or the 11-digit Delivery Point Code, which is the same as Zip+4 with two extra digits to define the destination in more detail. Each digit is represented by five bars, two tall and three short, and the complete barcode is constructed as follows:

- Guard bar (represented by an asterisk or vertical pipe symbol)
- Numeric data (5 , 9, or 11 digits)
- Check Digit
- Guard bar

For example, the following text string will produce a complete USPS ZIP barcode. The data (Zip+4) is 123456789 and the check digit is 5:

1234567895

It will look like this when printed:



The check digit is used to insure accuracy when the barcode is scanned. The check digit is calculated using the 5, 9, or 11 digits of Zip Code data and must be calculated for each barcode. When the barcode is read, the scanning equipment performs the same calculation and compares its result with the check digit that was read from the barcode. If the two do not match, the scanner knows that there is something wrong with the data and can eject the letter for manual sorting.

Applications designed to use the Hewlett-Packard “Bar Codes & More” Font Product already perform the required formatting and checksum calculation. Use of the downloadable USPS ZIP font requires no changes to existing applications.

Here is the general method for calculating the checksum. Starting from the left, sum all of the digits in the barcode. Using the example above:

$$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 = 45$$

For the next step, we need the units column of the sum. You can extract this information using Modulo 10 division, which is the same as dividing by 10 and taking the remainder.

$$\begin{array}{ll} \text{Basic:} & 45 \text{ MOD } 10 = 5 \\ \text{C:} & 45 \% 10 = 5 \end{array}$$

Subtract this result from 10 to obtain the check digit; if the final result is 10, change it to zero. In the example above, the check digit would be 5. Here is a bit of sample code written in Basic:

```
ZipString = "123456789"  
Sum = 0  
FOR x = 1 to LEN(ZipString)  
    Sum = Sum + VAL(MID$(ZipString, x, 1))  
NEXT x  
Check = 10 - (Sum MOD 10)  
IF Check = 10 THEN  
    Check = 0  
ENDIF  
PrintString = "L"+ZipString+Str$(Check)+"R"
```

Here is the same function in C:

```
char ZipString[20], PrintString[20], *cp;  
int Sum, Check;  
  
strcpy(ZipString, "123456789");  
Sum = 0;  
cp = ZipString;  
while (*cp != '\\0')  
    Sum += (*cp++) - '0';  
Check = 10 - (Sum % 10);  
if (Check == 10)  
    Check = 0;  
sprintf(PrintString, "L%s%1dR", ZipString, Check);
```

FIM (Facing Identification Marks)

Facing Identification Marks (FIM) are patterns of vertical bars printed in the upper right portion of reply mail pieces. The FIM tells automatic sorting equipment how to handle the piece and speeds up routing. There are four FIMs:

<u>Name</u>	<u>Print</u>	<u>Intended use</u>
FIM A	A	Courtesy reply mail (CRM) and Meter reply mail (MRM)
FIM B	B	Business reply mail without ZIP+4 Postnet barcode
FIM C	C	Business reply mail with ZIP+4 Postnet barcode
FIM D	D	Information based indicia (IBI) postage

To print any of the FIMs just select the USPS ZIP font and print the an upper case A, B, C, or D as appropriate.

Business Reply Mail Horizontal Bars

Business reply mail must include a series of horizontal bars below the “no postage necessary” endorsement. A single horizontal bar can be printed using the pound sign (#) with the USPS ZIP font.

