



# UPC Barcodes

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Web site: <http://www.fytek.com>

## Introduction

The UPCA barcode font is supplied as a TrueType font which may be used with any application capable of working with TrueType fonts. This includes many Windows based programs such as Word or Excel along with applications such as FyTek's PDF Report Writer. These fonts are provided free of charge and without warranty so be sure to test them thoroughly with your environment and barcode equipment.

The UPCA symbol set consists of encodings for the numbers 0 through 9 as well as special start and stop codes. You don't need to concern yourself with the conversion section if you are using this font with PDF Report Writer. There is a special tag called BARCODE you can use to convert the number for you. You will need to understand the conversion section if you want to use this font with other programs.

FyTek provides the font in 5 aspect ratios. A sample of each size is shown here:



Each of the 5 fonts are designed to be the same width at the same point size. An average size is around 36 points. You'll need to test the printed barcode with the equipment you intend to scan it with to make sure it works.

# UPC Barcodes

## Conversion Table

### Conversion Table

This section is mostly for writing your own code for the conversion. There is an Excel spreadsheet included you may use to simply plug in the value to code and it will display the correct character sequence.

UPCA barcodes consist of a start character, 5 odd parity numbers, a guard bar, 5 even parity numbers and an end character. Technically, the start and end characters are separate entities from the first and last number of the UPC code. It's easier here to simply count them as the first and last characters since the font file has these digits coded together with the actual start and end bars. For example, if you're UPC code begins with the number 0, the chart character A shown below includes the start bar together with the encoded 0 as one symbol.

There may also be a 2 or 5 digit supplement preceded by a special start character. The following table lists each digit and the corresponding character in the font:

Number	Base UPC					Supplemental			
	Start	5 Left (Odd Parity) Digits	Guard	5 Right (Even Parity) Digits	Stop	Guard	Odd Parity	Separator	Even Parity
0	A	0	!	a	K	. (Period)	k	:	#
1	B	1		b	L		l		\$
2	C	2		c	M		m		%
3	D	3		d	N		n		&
4	E	4		e	O		o		(
5	F	5		f	P		p		)
6	G	6		g	Q		q		*
7	H	7		h	R		r		+
8	I	8		i	S		s		,
9	J	9		j	T		t		-

## Conversion Process

UPCA barcodes are 12 digits in length (11 digits for the UPC code and a checksum digit). As an example, we'll convert the code 012762451907.

Start with the left most digit and determine the start character. From the chart on the previous page, 0 is the letter A. The next 5 numbers simply map to themselves. Appending them to the start string gives us A12762. The guard bar (the !) goes after the 6th character to give us A12762!.

The remaining digits are to the right of the guard bar and are the even parity numbers. The first digit to map is the number 4. It maps to the letter e. The next digit, 5, maps to the letter f and so on. These five numbers map to the string efbja. Append this string to our UPC code and the result is A12762!efbja.

The last digit is the stop character or checksum value. The digit, 7, maps to the letter R. The final result is A12762!efbjaR.

## Checksum

The 12th digit in a UPCA barcode is the checksum. It's a value based on the previous 11 digits. We'll use the example UPC code of 01276245190 to determine the checksum.

Start by assigning each digit of the UPC code an odd or even parity. The first digit is odd, the second even, and so on.

0 1 2 7 6 2 4 5 1 9 0  
O E O E O E O E O E O

Take the sum of the odd parity numbers and multiply by 3. For this example,  $0 + 2 + 6 + 4 + 1 + 0 = 13$ ,  $13 * 3 = 39$ .

Next, take the sum of the even parity numbers and add to the result.  $1 + 7 + 2 + 5 + 9 = 24$ ,  $24 + 39 = 63$ .

Take the one's position value (also the remainder when dividing by 10) of the number. In this case, the number is 3. If the value is not 0, subtract this number from 10. In this case,  $10 - 3 = 7$ . This number is the checksum.

## Supplemental

UPCA barcodes may contain a 2 or 5 digit supplement. These are translated and appended to the barcode result. A space and a period precede the supplement when appending. In addition, each digit in the supplement is separated by a : (colon).

### 2-Digit Supplemental

The 2-digit supplement is computed by first determining the parity pattern. There are 4 patterns for 2-digit supplements as shown in the following table.

Value	Parity Pattern
0	OO
1	OE
2	EO
3	EE

Determine which pattern to use by dividing the sum of the supplemental digits by 4. The remainder is what value to use in the table above. The pattern is then used to determine what character maps to each of the numbers based on the [conversion table](#). For example, we'll compute the string for the supplement 46.

$$4 + 6 = 10$$

$$10 / 4 = 2 \text{ with a remainder of } 2.$$

Use parity pattern 2 which is EO.

Using the conversion table, 4 maps to the character ( in the odd parity column and 6 maps to the letter q in the even parity column.

Add a space and . (period) to the front of the string and separate the digits with a colon.

Result is .(:q which, when appended to the earlier barcode example, gives us A12762!efbjR .(:q as the final result.

## Supplemental

### 5-Digit Supplemental

The 5-digit supplement is computed by first determining a parity pattern. There are 9 patterns for 5-digit supplements as shown in the following table.

Value	Parity Pattern
0	EEOOO
1	EOEEO
2	EOOEO
3	EOOOE
4	OEEEO
5	OOEEO
6	OOOEE
7	OEOEO
8	OEOOE
9	OOEOE

Start by assigning each digit of the supplement code an odd or even parity. The first digit is odd, the second even, and so on.

5 1 2 9 6  
O E O E O

Take the sum of the odd parity numbers and multiply by 3. For this example,  $5 + 2 + 6 = 13$ ,  $13 * 3 = 39$ .

Next, take the sum of the even parity numbers and add to the result.  $1 + 9 = 10$ ,  $10 + 39 = 49$ .

Take the one's position value (also the remainder when dividing by 10) of the number. In this case, the number is 9.

The pattern for 9 is OOEOE. We now lookup each digit in the conversion table under the odd or even parity supplemental section.

5 1 2 9 6  
p l % t \*

Place a colon between each value, a space and a period at the front and append to the UPC string. Using the earlier barcode example, gives us A12762!efbjaR .p:l:%:t:\* as the final result.