# Retail Bar Coding Basics
# a Tutorial

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# Introduction

UPC stands for Universal Product Code. This code is typically used to record point of sale transactions for consumer goods throughout the grocery industry and is also used for other consumer products.

## *Who needs this booklet?*

Are you a manufacturer?  Do you make a product you want to sell?  Are you unfamiliar with the process of bar coding your products for sale?  Then this booklet is for you. Here you will find:

**Step by step instructions for the novice.**
- How to register your company with the Uniform Code Council
- How to format your product bar codes
- How to create bar code labels inexpensively

## *Do I need UPC bar codes?*

If you want to use bar codes inside your business – for applications such as inventory, document management, asset tracking, or any other application that does not involve selling products through retail establishments, you do not need to register your bar codes or obtain any special permit or permission. You can freely use bar codes for your own uses. You can select the symbology that's right for you.  You don't need to register your codes or join any organization.

If, however, you are required by your sales channel or customer to bar code your products or you want your bar codes to be used by retail stores, you will need to get a formal UPC number.

For this special case, you may need to become a member of the Uniform Code Council, Inc. (UCC). When you become a member, your company will be assigned an identification number licensed for your company's use (UCC Company Prefix). You will use this number to create your own 12-digit UPC bar codes. (see A Cheaper alternative)

# History

While it may seem like bar codes have been with us forever, bar codes didn't really make an impact until the 1970's. It wasn't until 1974 that the first bar code scanner was employed and the first product bar coded.

But the idea had been around for quite awhile.   In 1932, Wallace Flint suggested that an automated retail checkout system might be feasible.  While his concept was deemed unworkable, Flint continued to support the idea of automated checkout throughout his career.  In fact, Flint, who went on to

become the vice-president of the association of food chains some 40 years later, was instrumental in the development of the UPC code.

During the 40's, 50's and 60's several code formats were developed including a bull's-eye code, numeral codes, and various other formats. Retail applications drove the early technological developments of bar coding, but industrial applications soon followed.

## Initial Uses of Bar Codes

In 1948, a local food chain store owner approached Drexel Institute of Technology in Philadelphia asking about research into a method of automatically reading product information during checkout.  Bernard Silver, a graduate student at Drexel Institute, along with fellow graduate student Norman Joseph Woodland, teamed together to develop a solution.

Woodland first proposed using ultraviolet light sensitive ink. A working prototype was built but rejected as being too unstable and expensive. On October 20, 1949, Woodland and Silver succeeded in building a working prototype describing their invention as "article classification…through the medium of identifying patterns".  On October 7, 1952, they were granted a patent (US Patent #2,612,994) for their "Classifying Apparatus and Method". Efforts to develop a working system accelerated in the 1960's.

Bar coding was first used commercially in 1966, but to make the system acceptable to the industry as a whole there would have to be some sort of industry standard. By 1970, Logicon Inc. had developed the Universal Grocery Products Identification Code (UGPIC). The first company to produce bar code equipment for retail trade using (using UGPIC) was the American company Monarch Marking (1970), and for industrial use, the British company Plessey Telecommunications (1970).

In 1972, a Kroger store in Cincinnati began using a bull's-eye code.  During that same timeframe, a committee was formed within the grocery industry to select a standard code to be used in the industry. IBM proposed a design, based upon the UGPIC work and similar to today's UPC code. On April 3, 1973, the committee selected the UPC symbol (based on the IBM proposal) as the industry standard. The success of the system since then has spurred on the development of other coding systems. George J. Laurer is considered the inventor of U.P.C. or Uniform Product Code.

In June of 1974, the first U.P.C. scanner was installed at a Marsh's supermarket in Troy, Ohio. The first product to have a bar code was Wrigley's Gum.

## Bar Codes Demystified

There is nothing really complicated about bar codes.  Think Morse Code.  When Samuel Morse invented the Morse Code back in 1835, it revolutionized long distance communications.   Morse's code described a way of encoding text suitable for transmission via electric current over a wire.  Each letter of the alphabet was reduced to a specific pattern of dots and dashes as shown in the following table.

| dit | 1 unit of time |
|---|---|
| dah | 3 units of time |
| pause between letters | 3 units of time |
| pause between words | 7 units of time |

So the letter 'S' for example, was decoded as dit dit dit.  The letter 'O' became dah dah dah.  These dits and dahs are often represented as dots and dashes.   SOS then becomes:



Bar codes likewise have an alphabet of dots and dashes.  These are represented as thin bars and wide bars separated by white space.   UPC bar codes are one type of code.   There are many others.  A specific code is called a symbol set or symbology.  In the UPC code, only the digits 0-9 are represented.  Letters are not allowed.  Each digit is represented as a specific pattern of thin and wide bars.   (See UPC Specification)


UPC-A Bar Code

Bar codes are "read" by a device called a "reader" or "scanner".  These devices use reflected light off the bar code symbol to measure the widths of the bars and spaces.

## How it all comes together

You're at the supermarket.  You've just finished your shopping and your items are being scanned at the checkout counter.  You ask yourself how they get all that information from that little bar code.   The short answer is they don't.

That bar code has three pieces of information in it.  It does not contain, as many believe, the name or description of the product, its price, or any specific product detail.  What it has encoded into it is:

> 1. The manufacturer's U.C.C membership identification number
> 2. The product's identifier number
> 3. A calculated check digit to ensure the scanner read it correctly

Taken together, these parts comprise the elements of a UPC bar code.  More recently, a new global standard has emerged which incorporates the UPC into sometimes referred to as the GTIN or Global Trade Item Number.   We'll discuss GTIN's in some detail in a later section. In the meantime, we'll refer to the product UPC as a GTIN.

When the item is scanned, the bar code scanner decodes the bar code, producing the GTIN number.  The GTIN is used to do a product lookup in the store's products database.   The GTIN is just a database record number. The database has all the information the store personnel has entered into it about that particular GTIN which often includes Manufacturer, product name, description, price, color, size, etc.

The database software then supplies the necessary information back to the point-of-sale system (the checkout register) so your total can be calculated and your receipt printed.

Of course this is a simplistic view of it but essentially, that's how it works.

## What if two manufacturers use the same GTIN?

That's where the U.C.C. comes in.   Each manufacturer within a given industry is given a unique identification number.  So, for example, within the automobile windshield wiper blade industry, there will be no two manufacturers given the same identifier number.  That means a store could carry windshield wiper blades from thousands of different manufacturers without risking a duplicate number.

# Uniform Code Council and the EAN.UCC

The U.C.C. is a member organization of the EAN.UCC system, an international, voluntary organization that essentially does what the U.C.C. does but on a global scale (EAN is an acronym for European Article Numbering).   Member organizations around the globe can issue company prefixes and there is a system by which your company prefix will be recognized by foreign retailers.  Simply put, you can sell your trade items in other countries and your UPC information is still valid.

That said you may have to create different labels for foreign retailers.  EAN-13 symbology bar codes are very similar to UPC bar codes but are the de facto standard in much of Europe.  Conversion is fairly straight forward.

> **NOTE:**  The American U.C.C has recently adopted the European 13-bit standard.  Technically, you could start using the EAN-13 bar codes right away but in reality it will take time for the new standard to be fully adopted into the American supply chain.  The best advise, if you are a small manufacturer, is to communicate with your trading partners to ascertain their schedule in adopting the new standard.  The old standard will continue to be viable for some time.

To convert your UPC bar code number into an EAN-13 bar code number you simply affix a leading zero onto your company prefix.  An EAN-13 bar code is 13 digits, unlike the UPC which is 12 digits.  Most bar code software products, bar code printers, and label design packages are capable of formatting both UPC and EAN-13 bar code symbologies.

# Global Trade Identification Numbers

The GTIN is essentially a part number for your product or service (referred to in the system as a trade item) which can be used anywhere. It identifies your company and your trade item.  Its purpose is to ensure that your products can be sold, delivered, warehoused, and billed throughout the retail and commercial distribution channels worldwide.

If you follow the rules, a checkout counter in France is going to be able to ring up your product as easily as a register in Poughkeepsie.  It provides an accurate

and efficient means of controlling commerce through the use of an all-numeric identification system.

The most commonly recognized and used GTINs are the U.P.C. and EAN-13 symbols. But it also utilizes the EAN-128 and ITF-14 symbologies for packages, cases and shipping containers.

# Data Structures

A GTIN (Global Trade Item Number) is defined as a 14-digit number.  Part of this number identifies the company or manufacturer.  Another part identifies the trade item.
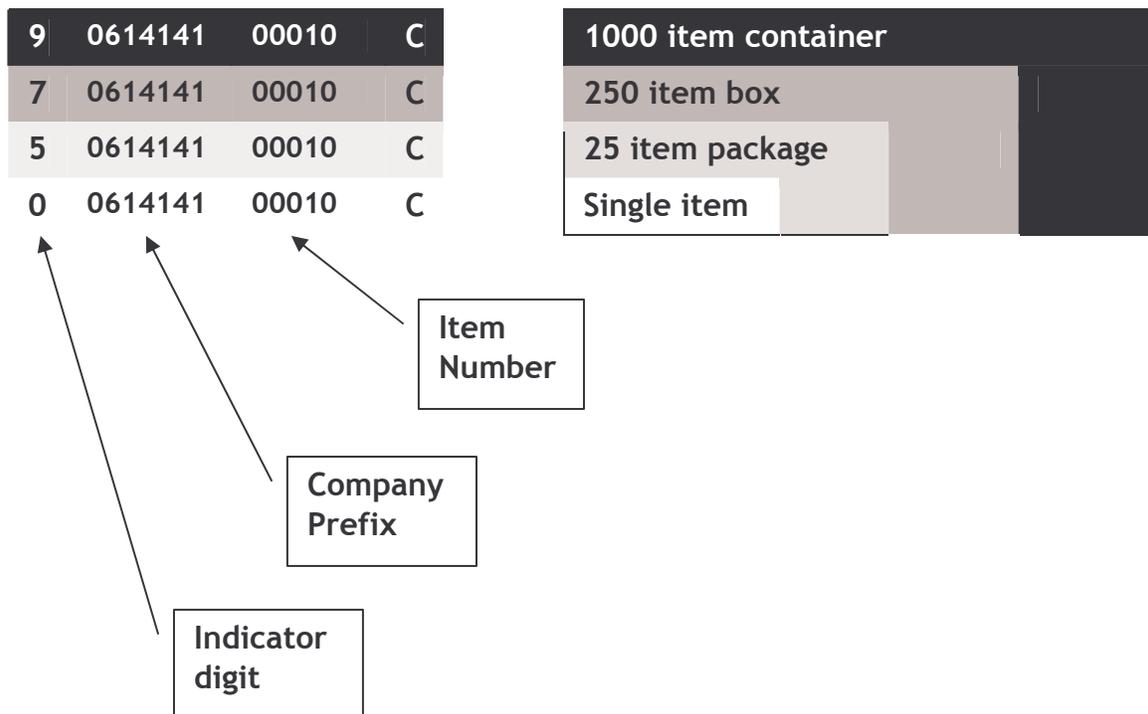
The UCC standard to encompass earlier standards, such as the UPC number in the United States, and the EAN-13 number in Europe,

There are four data structures for the GTIN; each provides unique numbers when right-justified in a 14-digit number.

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UCC-12 (UPC) | 0 | 0 | D | D | D | D | D | D | D | D | D | D | D | C |
| EAN/UCC-13 | 0 | D | D | D | D | D | D | D | D | D | D | D | D | C |
| EAN/UCC-8 | 0 | 0 | 0 | 0 | 0 | 0 | D | D | D | D | D | D | D | C |
| EAN/UCC-14 | D | D | D | D | D | D | D | D | D | D | D | D | D | D |

**D = digit       0 = leading 0 or not used     C = checkdigit**

The extra digits available can be used in an EAN/UCC-128 or ITF-14 bar code symbol to indicate other information such as packaging options quantity or weight. Example:

| | | | |
|---|---|---|---|
| 9 | 0614141 | 00010 | C |
| 7 | 0614141 | 00010 | C |
| 5 | 0614141 | 00010 | C |
| 0 | 0614141 | 00010 | C |

| |
|---|
| 1000 item container |
| 250 item box |
| 25 item package |
| Single item |

**Item Number**

**Company Prefix**

**Indicator digit**

# Step by Step

Now that you know what UPC bar codes are, you've got to decide whether or not you need them and how best to implement them.   Here are some important steps,

## *Identifying the need*

The first step in the process is to determine if you really need UPC bar codes, a bar code symbology other than UPC, or bar codes at all.

### Here are some reasons why you may need UPC bar codes.
- You want to sell your products via retail stores.
- Your products are sold at checkout counters.
- Your product is a food item or consumer retail item
- Your boss told you that you do.

### Here are some reasons why you may NOT want UPC codes
- Your bar codes are only for internal use such as inventory
- Your products are not sold via retail stores.
- Your products are not sold at checkout counters

## *U.C.C membership*

U.C.C. membership fees are based upon the size of your company and the number of products you have.  This is an annual fee.  Consult their website for more details on other member benefits. (http://uc-council.org)
You can apply online (https://catalog.webec.uc-council.org/application/) and receive your U.C.C membership ID number almost immediately.   Your membership number will supply the first digits of your new product bar codes.

## *A Cheaper Alternative*

Becoming a member of the U.C.C., while having many advantages, can be expensive for the small entrepreneur.  If you are a small business and have a single product, you may want to avail yourself of the services of a barcode reseller.  Essentially, a barcode reseller buys many memberships in the U.C.C in a variety of industries.  For example, they may acquire a membership ID for certain types of software products.  Remember, the membership ID represents the first half of the barcode.  The remaining  digits in the barcode are assignable by the owner and can represent different products.  So the reseller sells one specific 11-digit number to you at a reduced price.  This barcode is only good for a single product but if you only have one product then it's a viable alternative to a more expensive membership. Here is a website that sells one-off barcodes. (www.aureamedia.com)

## Numbering Scheme

As discussed earlier, the first part of your label consists of your U.C.C membership ID number. This number can be 6, 7, 8 or 9 digits long.  The U.C.C. will decide the appropriate number for your company.  The remaining digits (except for the final digit) identify your product.  The U.C.C. recommends that you simply start numbering your products 1, 2, 3, etc.

So, for example, if your U.C.C. number is 614141, your first product would have a bar code value of 61414100001, the next 61414100002, followed by 61414100003 and so on. (The 12$^{th}$ digit – the checkdigit- has been omitted for clarity).

But you can have a more informative scheme if you desire.

For example, you might have your 1000, 2000, and 3000 series product families, each with variation.  Let's say that you want to incorporate product color and size.  Consider the following:

| Product number | Description |
|----------------|-------------|
| 1000 | Small widget |
| 2000 | Medium widget |
| 3000 | Large widget |

| Product color number | Color |
|----------------------|-------|
| 1 | Red |
| 2 | Green |
| 3 | Blue |

**Using the above tables:**
The bar code label for a medium red widget would be 61414102000.
The bar code label for a small blue widget would be 614141001000.

Remember, it is important to match your scheme with the actual way you package and sell your products.  It doesn't make sense to have a different UPC code for each color crayon if you always package and sell them in a box of mixed colors.

## Sizing the job

There are two factors you need to consider and plan for when deciding to bar code your products.  How many products you have, and how many labels you'll need.

Once you settled on your product numbering scheme, you should have a pretty good idea how many bar codes you will need.  Consider that you will have a

unique UPC number for each product variant as discussed in the previous section.  You will also have to estimate the volume of each label you will need.

If you only have one product UPC, the task is pretty simple.  It's just deciding how to make the label and how to make quantities of it. If you think you will need thousands of identical labels, the most inexpensive solution may be to have them professionally printed.  Many commercial printers can also provide preprinted adhesive backed labels using your label design and incorporating your UPC bar code.

If you have many different product variations, each needing a different UPC code, you may decide the volume of each UPC label does not warrant the expense of professional printing.  You may want to explore the option of printing your own labels as you need them.

## Labeling issues

Before you jump in, you might want to test the waters.  Here are a few issues you might want to consider before you get started.

### Packaging vs. Application

There are several ways to get your bar code on your product.  If your sales volume is sufficient and your finances allow it, you may want to consider integrating your bar code into your package design.  You'll need to supply your package designer and your printer with a camera-ready (hi-resolution) image of your bar code.  Typically, you will need an image file in encapsulated Postscript format (eps) or some other format supported by your package designer's software and your printer's equipment.  This can be an adventure for PC users since most package designers and most printers use Apple Macintosh computers.  JASC's Paintshop Pro supports many image formats including eps.

If your projected sales volume or your budget doesn't support a new package design, you may want to consider stickers.   Adhesive bar code labels can be made for pennies with your own office computer and printer.  Avery Dennison offers a plethora of label sizes to match almost any requirements and the label stock is available through most office supply stores and online.

### Style vs. functionality

However you decide to incorporate bar codes you'll want to make sure the codes are readable.   Package designers are typically driven by aesthetics. Make sure the designer doesn't undo all your hard work by creating unreadable bar codes.

## Don't sacrifice bar code readability for style

Contrast is important.  Obtain the best possible contrast between the bars and spaces of your bar codes.  This will ensure that the scanner receives a clear strong signal making it easier for the scanner to decode your bar code. You'll get less interference from the surrounding text and graphics, higher accuracy and fewer misreads. Good contrast also increases the ability to read at longer distances.

Respect the quiet zone. The quiet zone is the space preceding the first bar and trailing the last bar in a bar code. As a general rule, this space needs to be a minimum of 10 times the width of the narrow bar in your bar code.  Your bar code will be harder to read if text or any other mark encroaches into this area.  This is the most frequently violated principle when applying a bar code.  You must avoid this at all cost.

Avoid using an inkjet printer. If you are making your own labels using adhesive stock such as those made by Avery, try and use a good quality printer.  You should not use a printer with a resolution of less than 300 dpi (dots per inch).  Use a laser printer if at all possible.  The higher quality and resolution printer you use, the easier it will be to read your labels.

Remember, an unscannable bar code can cause unnecessary expense and delays to critical business processes.

### Wear and tear

Products that are handled a lot before purchase, or those stocked outdoors, may need special weather resistant labels.  You can have labels preprinted on vinyl or other weather resistant materials.  (See next section).

## *Doing it yourself vs. outsourcing*

If you decide to use a commercial printer, here is something to consider.  Make sure you test your label.  It's best to have your own scanner to test the readability of your label before you incur the expense of preprinting thousands of bad labels.  You can acquire a bar code scanner for as little as $100.

It's not enough to just proofread the text or the bar code number under the bar code.  You need to test it with a scanner.   Make a sample label and send it to one of your retail stores to make sure they can read it with their equipment.

Of course the same goes if you make your own.  Always test your bar codes for readability.  You'll save yourself money in the long run.

While your local commercial printer may be able to provide bar coded labels, if you have special requirements you may have to use a company that specializes in bar code labels.  From these companies you can get weather-resistant bar codes on vinyl or even metal.

<table>
<tr><td>

## Outsource

- Large quantities
- Special materials
- Color, coated, durable
- Large budget
- High quality, hardware verifier required

</td><td>

## Do it yourself

- Small quantities
- Std. paper labels
- B/W, stock labels
- Small/No budget
- Reasonable quality, standard scanner verification

</td></tr>
</table>

### How do I find a bar code specialty label supplier?

Now days you can almost always find what you're looking for on the internet. There are a couple of very good omnibus sites that have anything and everything you're looking for relating to bar codes.  Try **www.adams1.com** You can also find a copy of ID Word magazine at your local library and check the ads.  You can order a copy of the **ID World Buyers Guide** via email.

## *Software vs. hardware*

If you decide to make your own bar codes, you have numerous options.  The "automatic identification" industry is very large and has many suppliers of bar code solutions.

### *Hardware …*

If your label volume warrants it, you may want to purchase a bar code printer.  These can be acquired for as little as $500, or for well over $5000.  These printers use adhesive label stock in rolls and can print hundreds of labels per minute.  These printers are optimized to print bar codes to a high degree of accuracy.

If you choose this option, you will also need to purchase a bar code label design software product.  These can sell for between $100 and $1500.

### *Or Software …*

If your volume does not support the expense of a dedicated bar code printer and label design software solution, you may opt to use one of the numerous bar code software solutions the industry has to offer.  These applications use your office printer and computer to print bar code labels.  Applications, such as **Bars & Stripes**, a bar code software product from The Small Business Depot, make very readable bar codes for modest sized jobs, and start at less than $40.

## Do you need a scanner?

The long answer is "yes".   Whether you make your own labels, or use a commercial printer, you'll want to test your codes for readability before you go through the time, effort, and expense of making your labels.  Commercial bar code scanners are inexpensive and easy to use.   They start at $100 and connect directly to your computer using a special "wedge" interface which does not require any software drivers.  You just plug them in and start scanning.  If you're a belt and suspenders type or burdened with too much money, you may opt for a bar code verifier.  These units are expensive but they'll tell you if your codes are even the slightest bit off-standard.

## Work with your customer.

The retailer who will be scanning these codes at the checkout counter may have other requirements that you haven't thought of.  They may also have a compliance document you must follow. For example, you may ship your products on pallets.  It may be useful to have a bar code label designated for a pallet quantity of goods.  This may simplify the job or receiving your products into their inventory.  The food industry typically uses UCC/EAN 128 or ITF-14 symbology bar codes for case or pallet quantities.  Here are some examples:

| Item | Level | Bar Code | Item ID | GTIN |
|---|---|---|---|---|
| Single | Consumer | U.P.C. | 614141666652 | 00614141666652 |
| 3 Pack | Consumer | U.P.C. | 614141000777 | 00614141000777 |
| 6 Pack | Consumer | U.P.C. | 614141000883 | 00614141000883 |
| 12 Pack | Consumer | U.P.C. | 614141000999 | 00614141000999 |
| 24 Units | Case | UCC/EAN-128 | 10614141000101 | 10614141000101 |
| 48 Units | Case | UCC/EAN-128 | 30614141000303 | 30614141000303 |
| 96 Units | Palette | ITF-14 | 50614141000512 | 50614141000512 |

In the preceding examples, the company prefix is 614141.  The remaining digits indicate the trade item number.  This number is assigned by you.



For case quantities, UCC/EAN-128 bar codes are used instead of UPC.



For shipping containers, an ITF-14 bar code is used.  Note the same company prefix.



As mentioned before, it is always a good idea to have your retail store involved from the process of creating your product numbering scheme, to the testing of your product labels.

# UPC-A Specification

UPC-A format requires an 11 digit string. The first digit is the classifications number and the following 10 digits are product identifiers. Typically, the first 5 (five) digits are assigned by request by the Uniform Code Council (U.C.C.). The remaining 6 (six) digits are assigned by you. The encoding for the left and right halves of the regular symbol, including UPC characters, number system character and module check character, is given in the following chart. Note that the left-hand characters always use an odd number (3 or 5) of modules to make up the dark bars, whereas the right-hand characters always use an even number (2 or 4). This provides an "odd" and "even" parity encodation for each character and is important in creating, scanning and decoding a symbol.

- The first 6 digits are your Company Prefix (number assigned and licensed by the Uniform Code Council).

- The next 5 digits are your Item Reference Number (Identifies your individual products).

- The last digit is the Check Digit (Validates the accuracy of the number).



| Decimal Value | Left Characters | Right Characters |
|---|---|---|
| . | (Odd Parity—O) | (Even Parity—E) |
| 0 | 0001101 | 1110010 |
| 1 | 0011001 | 1100110 |
| 2 | 0010011 | 1101100 |
| 3 | 0111101 | 1000010 |
| 4 | 0100011 | 1011100 |
| 5 | 0110001 | 1001110 |
| 6 | 0101111 | 1010000 |
| 7 | 0111011 | 1000100 |
| 8 | 0110111 | 1001000 |
| 9 | 0001011 | 1110100 |
| 0 | 0001101 | 1110010 |

The human readable character identifying the encoded check character is shown in the right-hand margin of the symbol.

## Check Digit Calculation

**Step 1:** Designate the least significant digit position as odd.

3  1  4  5  7  9  0  1  2  5  8
O  E  O  E  O  E  O  E  O  E  O

**Step 2:** Sum all the digits in the odd (o) positions

3 + 4 + 7 + 0 + 2 + 8 = 24

**Step 3:** Multiply the result by 3

24 * 3 = 72

**Step 4:** Sum all the digits in the even (E) positions.

1 + 5 + 9 + 1 + 5 = 21

**Step 5:** Add the result of Step 2 with the result of Step 4.

72 + 21 = 93

**Step 6:** Subtract from the next higher multiple of 10.

100 - 93 = 7.

In this example, the check digit is 7.

## Other symbologies

Other symbologies used in the retail industries are listed below:

### UCC/EAN-128

Code 128, so called because it can encode all 128 ASCII characters, is the preferred symbology for many barcode applications.  It also is considered the most easily read barcode with the highest message integrity. This symbology is one of the data structures used in the GTIN system and is used to bar code cases, pallets and other larger quantity bundles.

### EAN-13

International Article Numbering Association (EAN International) Code is the international version of the UPC. It contains one digit more than the UPC, requiring a total of 13 printed characters. The EAN-13 symbol is one of the data structures used in the GTIN system.

### EAN-8

This symbology is a shortened version of EAN-13. It consists of seven characters and an automatically inserted check digit. The EAN-8 symbol is one of the data structures used in the GTIN system.

### Interleaved 2 of 5

Interleaved 2 of 5 (ITF) is an all numeric symbology. This symbology creates highly compressed strings of digits and for this reason is ideal for applications with narrow space available for barcode placement such as on shipping cartons or narrow labels. The encoded data must contain an even number of characters. A 14-digit ITF bar code is used in the GTIN system.

### UPC (UPC-A)

UPC stands for Universal Product Code. This code is typically used to record point of sale transactions for consumer goods throughout the grocery industry. UPC-A format requires an 11 digit number. Typically, the first 6 digits are assigned by request by the Uniform Code Council. The remaining digits are assigned by the user.

## Other Technologies

Other technologies are starting to make inroads in the retail trade arena with the long term goal of perhaps replacing the old reliable bar code.  Leading the pack is RFID (Radio Frequency Identification Tags).  RFID tags are already being used widely in the retail apparel industry and bookstores. RFID is fast, reliable, and does not require physical sight or contact between reader/scanner and the tagged item.

These miniature devices emit a radio frequency signal when requested by the "reader".   The reader receives the signal and decodes the data, sending it to the host computer.

RFID tags are thumbnail sized devices and can be attached to a wide range of products.

- Pallets or cases of product
- Vehicles
- Company assets or personnel
- Items such as apparel, luggage, laundry
- People, livestock, or pets
- High value electronics such as computers, TVs, camcorders

RFID tags can be mass produced for about $.50.  As costs continue to decrease, RFID tags will find their way into traditional bar coded applications.
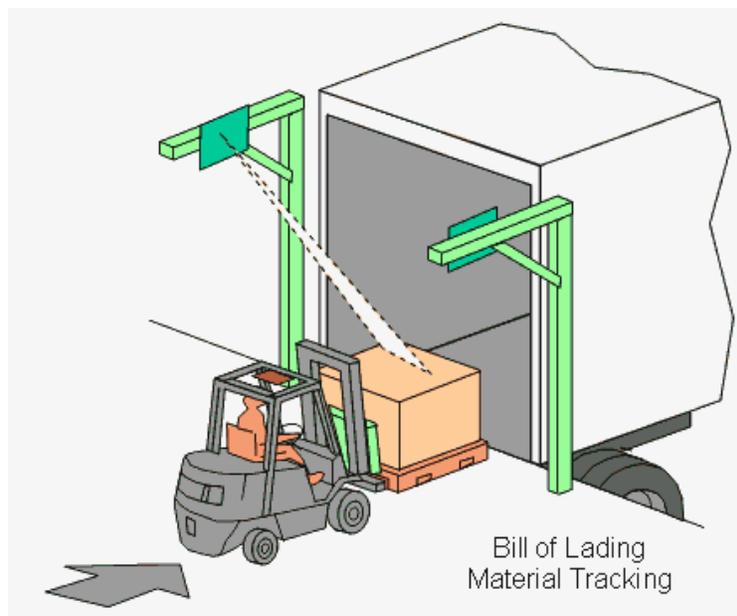


Here is an example of RFID tags identifying
a pallet of trade items automatically.

# Resources

## *Useful websites*

Here is a list of websites you may find useful while you plot your course to UPC bar coding.  At these sites you can find information regarding the applicable standards, suppliers, application software, scanners and printers.

| Uniform Code Council | uc-council.org | This is the organization that will issue you your Company Prefix number |
|---|---|---|
| Barcode 1 | www.adams1.com | A good omnibus site with lots of useful information about bar coding |
| Bars & Stripes | www.barsnstripes.com | This site offers a very good, inexpensive bar coding solution. |
| Barcodes & Beyond | www.barcodetech.com | This site offers very good prices on a wide range of bar code scanners and printers |
| ActiveXBarcodes | www.activeXbarcodes.com | If your data is in an Excel spreadsheet or Access database, this software easily makes bar codes. |

## *Useful Online Documents*

Here is a short list of valuable documents you can download for free.

To access these documents, user the following when prompted:
Username: appguide
password:  barcode

| www.barsnstripes.com/docs/GTIN.pdf | This document describes in some detail the Global Trade Identification Number system and the EAN.UCC |
|---|---|
| www.barsnstripes.com/docs/RFIDprimer.ppt | This PowerPoint slide provides a good overview of RFID tag technology |
| www.barsnstripes.com/docs/abc_of_ucc.pdf | The ABCs of UCC Standards.  An overview of the UCC system in a PDF presentation format. |

# Glossary

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| **Active Tag** | An RFID tag that has a battery used to run the microchip's circuitry and broadcast a signal to a reader. These tend to be more costly than passive tags. |
| **AIM** | Automatic Identification Manufacturers, Inc., the trade association of manufacturers of automatic identification systems. |
| **ANSI** | The American National Standards Institute. A non-governmental organization responsible for the coordination of voluntary national (United States) standards. |
| **ASCII** | American Standard Code for Information Interchange: a computer code, as described in ISO standard 646, consisting of 128 alphanumeric and control characters, each encoded with 7 bits (an 8th bit may or may not be used to include a parity check), used for the exchange of information between computerized systems. |
| **Bar Code** | An array of parallel rectangular bars and spaces arranged according to the encodation rules of a particular symbol specification in order to represent data in machine readable form. e.g., Code 39. |
| **Bar Code Character** | A single group of bars and spaces which represent an individual number, letter, punctuation mark or other symbol. |
| **Bar Code Density** | The number of characters which can be represented in a linear unit of measure. Bar code density is often expressed in characters per inch (CPI). |
| **Bar Code Label** | A label which carries a bar code and is suitable to be affixed to an article. |
| **Bar Code Printer** | A printer used to produce bar-codes on labels, tags and other paper materials. A bar code printer can be a simple dot-matrix report printer or a sophisticated, dedicated device that uses thermal printing technology. |
| **Bar Code Reader** | A device used to read a bar code symbol. |
| **Bar Code Symbol** | The combination of symbol characters and features required by a particular symbology, including quiet zones, start and stop characters, data characters, check characters and other auxiliary patterns that together form a complete scannable entity. |
| **Bar Height** | The dimension of the individual bars in a bar code symbol or in a row of a multi-row two-dimensional symbol, measured perpendicular to the scanning direction. |
| **Check Character** | A character included within a symbol whose value is used for the purpose of performing a mathematical check to ensure the accuracy of the read. |
| **Check Digit** | See Check Character |
| **EAN** | Abbreviation of EAN International. |
| **EAN International** | EAN International, based in Brussels, Belgium, is an organisation of EAN Member Organisations that jointly manages the EAN.UCC System with the Uniform Code Council (UCC™). |

| EAN Member Organization | A member of EAN International that is responsible for administering the EAN.UCC System in its country (or assigned area) and for managing the correct use of the EAN.UCC System by its member companies. |
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| EAN.UCC Check Digit Calculation | An EAN.UCC System algorithm for the calculation of a Check Digit to verify accuracy of data decoded from a bar code symbol. |
| EAN.UCC Common Currency Coupon Code | An identification number for coupons issued in a common currency area (e.g., the euro currency) that uses the EAN/UCC-13 Data Structure. |
| EAN.UCC Company Prefix | Part of the international EAN.UCC System data structures consisting of an EAN.UCC Prefix and a Company Number, both of which are allocated by either the Uniform Code Council (UCC™) or an EAN International Member Organisation. |
| EAN.UCC Coupon Code | An identification number for coupons issued in a national currency that uses the EAN/UCC-13 Data Structure. |
| EAN.UCC Prefix | A number with two or more digits, co-administered by EAN International and the Uniform Code Council (UCC™), denoting the format and meaning of a particular Element String. |
| EAN.UCC System | The specifications, standards, and guidelines co-administered by EAN International and the Uniform Code Council (UCC™). |
| EAN/UCC-13 Data Structure | The 13-digit EAN.UCC System data structure composed of an EAN.UCC Company Prefix and Check Digit as well as an Item Reference, Location Reference, or Asset Type. |
| EAN/UCC-13 Identification Number | The EAN.UCC System identification number comprising 13 digits; used to identify trade items, locations, and special applications (e.g., coupons). |
| EAN/UCC-14 Data Structure | The 14-digit EAN.UCC System data structure composed of an Indicator, EAN.UCC Company Prefix, Item Reference, and a Check Digit. |
| EAN/UCC-14 Identification Number | The EAN.UCC System identification number comprising 14 digits; used to identify trade items. |
| EAN/UCC-8 Data Structure | The eight-digit EAN.UCC System data structure composed of an EAN/UCC-8 Prefix, Item Reference, and Check Digit. |
| EAN/UCC-8 Identification Number | The EAN.UCC System identification number comprising eight digits used to identify trade items and special applications. |
| EAN/UCC-8 Prefix | A one-, two-, or three-digit index number, co-administered by EAN International and the Uniform Code Council (UCC™), denoting the area of distribution of trade items identified by an EAN/UCC-8 Identification Number. |
| EAN/UPC Composite Symbology Family | A family of bar code symbols comprised of the UPC-A Composite Symbology™, UPC-E Composite Symbology™, EAN-8 Composite Symbology™, and EAN-13 Composite Symbology™. |
| EAN/UPC Symbology | A family of bar code symbols including EAN-8, EAN-13, UPC-A, and UPC-E. Although UPC-E Bar Code Symbols do not have a separate Symbology Identifier, they act like a separate symbology through the scanning application software. See also EAN-8 Bar Code Symbol, EAN-13 Bar Code Symbol, UPC-A Bar Code Symbol, and UPC-E Bar Code Symbol. |

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| **EAN-13 Bar Code Symbol** | A bar code symbol of the EAN/UPC Symbology that encodes EAN/UCC-13 Identification Numbers. |
| **EAN-13 Composite Symbology** | The Composite Symbology™ that utilises an EAN-13 Bar Code Symbol as the linear component. |
| **EAN-8 Bar Code Symbol** | A bar code symbol of the EAN/UPC Symbology that encodes EAN/UCC-8 Identification Numbers. |
| **EAN-8 Composite Symbology** | The Composite Symbology™ that utilises an EAN-8 Bar Code Symbol as the linear component. |
| **EANCOM** | The international Electronic Data Interchange (EDI) standard provided by EAN International, conforming to the UN/EDIFACT standard. |
| **EDI** | Electronic Data Interchange. Intercompany, computer-to-computer communication of data that permits the receiver to perform the function of a standard business transaction and is in a standard data format. |
| **Electronic Commerce** | The conduct of business communications and management through electronic methods, such as Electronic Data Interchange (EDI) and automated data collection systems. |
| **Inventory Control** | Applications where bar coding and other forms of AIDC are used to add items or delete items from inventory with 100% item accuracy |
| **Logistic units** | Physical units established for transport and storage of goods of any kind that need to be tracked and traced individually in a supply chain (Serialized Shipping Container Code/**SSCC**). |
| **Package Level Indicators** | Individual items marked with U.P.C. are frequently packaged in standard quantities of intermediate packs and shipping containers. Each different standard package quantity for each standard product is assigned a "package level" and assigned a unique number. |
| **Passive Tag** | An RFID tag that doesn't use a battery. Instead, the tag draws power from the reader, which sends out electromagnetic waves that induce a current in the tag's antenna. |
| **PLU - Price Lookup** | The process by which a price is looked up in a data base, based on information decoded from a bar code. |
| **Print Quality** | The measure of compliance of a bar code symbol to the requirements of dimensional tolerance, edge roughness, spots, voids, reflectance, PCS, quiet zone, and encodation. |
| **Quiet Zone** | A clear space, containing no dark marks, which precedes the start character of a symbol and follows the stop characters. |
| **Radio Frequency Identification (RFID)** | The use of small radio transponders which are activated by a reading transmitter. The transponder can carry a unique ID code or other information in its memory, and can be read at a distance without line of sight. |
| **Radio Frequency Tag** | An electronic tag capable of receiving/storing and/or transmitting digital information. |
| **Scanner** | An electronic device that optically converts optical information into electrical signals. |

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| **Shipping Container Symbol** | The 14-digit number applied to intermediate packs and shipping containers containing U.P.C. marked items. It is always encoded in the Interleaved 2 of 5 symbology. |
| **Trade items** | Products and services upon which there is a need to retrieve pre-defined information at any point in the supply chain (Global Trade Item Number/**GTIN**). |
| **UCC -- Uniform Code Council** | The organization that administers the UPC and other retail standards. |
| **Verifier** | A device that makes measurements of the bars, spaces, quiet zones and optical characteristics of a symbol to determine if the symbol meets the requirements of a specification or standard. |
| **Wedge** | A device that plugs in between a keyboard and a terminal. It allows data to be entered either by keyboard or by various types of scanners. |