BAR CODE SUCCESS IN BLACK AND WHITE:

Secrets we've learned from Printing Billions of Bar Codes

A CYBRA White Paper to Help You Make the Move to Bar Code

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CYBRA Knows Bar Code

Introduction

CYBRA Corporation has been helping businesses print bar code labels and tags for the last 15 years. We've helped thousands of companies print countless numbers of bar codes. While helping our customers integrate our bar code software, MarkMagic, we've encountered just about any bar code printing challenge you could imagine. Many of the questions we've answered hundreds of times.

To help you sort out the many choices you have when choosing a bar code printing solution, we decided to publish this guide.

We hope you'll find this document helpful.

Sheldon R. Reich
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CYBRA is the developer of MarkMagic 5 Bar Code Label, RFID EPC tag, and SM@RT Forms Software for the IBM iSeries, an award-winning, ServerProven by IBM middleware solution. Featuring a choice of four interfaces, MarkMagic customers design and print bar code labels, RFID tags, laser forms, and other media, using live data, with little or no programming. MarkMagic includes at no charge JMagic, a Java-based WYSIWYG designer. MarkMagic 5 is the "Bar Code Print Engine Inside" leading application software from SSA Global, Manhattan Associates, ABS, VAI, and other developers.

Why bar code?

Bar code systems have spread far from the supermarket checkout counter. In hospitals, blood banks, warehouses and automobile assembly lines, bar code systems enter data at speeds, efficiency and accuracy levels far beyond human ability.

According to industry estimates:

- One in every 300 manual entries are entered incorrectly. When entries are bar coded, the error ratio is reduced to one in three million.
- A skilled operator can keystroke 600 entries per hour, while a handheld bar code scanner can read 6,000 entries. A high-speed fixed scanner can read *hundreds of bar codes per second.*
- Each keystroke error costs $27 — $12 for management and $15 for clerical time to reconcile the error. These numbers are always rising.

It's no wonder that bar coding, a mature, proven technology, is attracting interest from businesses looking to improve productivity and cut costs.

Capable of decoding 2,000 scans per second in real time, the MicroScan MS-911 is the world's fastest compact fixed position bar code scanner.

Compliance Marking

You may be installing a bar code system to take advantage of these benefits in your organization. Or you may be integrating bar code technology into your operations in response to a customer request — i.e. your customers have already installed scanning systems to read bar code labels and tags.

Types of customer requests include bar code item marking labels (using UPC codes), bar coded forms, such as pick tickets, and special shipping labels developed by industry trade associations. Some of these include:

- AIAG (Automobile Industry Action Group)
- EIA (Electronics Industry Association)
- HIBC (Health Industry Bar Code Council)

Another type of customer, the Federal government, publishes specifications such as LOGMARS (Logistics, Marking & Reading Symbols), the bar code specifications for the Department of Defense.

The biggest request for compliance marking is labels for Electronic Data Interchange (EDI). If your customers are mandating EDI compliance, they will be mandating bar code labels.

Bar code scanning, automatic data collection, and EDI complete the Quick Response (QR) loop, which helps retailers reduce their inventory financing costs, and helps you forecast production requirements more precisely.

If you are asked to supply bar code labels for EDI you will be given explicit instructions defining how the label is to be printed, how it is supposed to look, what data should appear on the label, and how the bar code information is presented.

> *If you are responding to a customer's mandate for compliance labels, your choice of printer type may have been made for you. Compliance specifications often state: "labels must be produced on a thermal transfer label printer."*

Although the Uniform Code Council (UCC) has released specifications for standard EDI shipping label bar codes (such as the UCC-128 Serial Shipping Container Code) and standard Application Identifiers (formatting instructions that greatly improve inter-company bar code use by allowing one label to serve both internal and external purposes), each of your customers will require a different EDI shipping label to complement their different inventory or purchasing systems.

Just as EDI trading partners must "map" EDI transactions to correctly update their respective in-house systems, you will need to print different bar code labels depending on your partners' requirements.

> *CYBRA's MarkMagic allows you to have a virtually unlimited number of bar code labels and plain paper electronic forms available for your use. Whatever your reason for "going bar code," MarkMagic will reduce the time required for you to develop an in-house system or respond to a customer's mandate for compliance.*

Bar Code Basics

Whether you are developing an in-house system or a compliance marking system, it's a good idea to understand the basics of bar code technology.

Bar code is a family of languages. The white spaces, black bars and the ratio of spaces to bars represent encoded information that can be read with an optical device. The device converts the bars and spaces into an electrical signal which is then decoded into standard alphanumeric characters.

The same way in which there are numerous words for the number 25 (Italian, German, English, Japanese, etc.), there is more than one bar code type ("symbology") that will encode the digits 2 and 5. Each encodes the digits differently.

More importantly, not all bar code types can encode variable length, alphanumeric or extended ASCII characters. Universal Product Code (UPC), for example, must be a 12-digit numeric string. Which bar code symbology should you use? If you are developing a compliance marking system this decision is made for you. Your customer, or EDI trading partner, will tell you which bar code type to use.

If you are developing an in-house system, you are free to choose the bar code symbology which best suits your requirements.

Whichever route you take, be aware of the special requirements and limitations of bar code printing and scanning.

Sample Symbologies

Here are a few of the more than 300 bar code types in use today.

Code 128a	
Code 93a	
EAN	
Interleaved 2 of 5	
MSI	
UPC-a	

Life in the “X” Dimension

Two Code 39 bar codes, each encoding 10 digits, but one needs more space due to its larger x-dimension.

The width of the narrowest element (either a black bar or a white space) in a bar code is called the “X” dimension.

In general, the larger the “X” dimension, the more forgiving the bar code will be — a scanner will more likely signal “good read.” How-ever, less data per inch will be encoded, and more label area will be required to present the same information as a code with a smaller “X” dimension.

The larger the "X" dimension, the wider the bars and white spaces.

This ratio, also known as density — the characters per inch encoded — will be specified in a compliance marking mandate, but is a variable to contend with when developing an in-house system.

For example, if you will be marking warehouse shelving that is 30-feet high, you will require a label with a low density bar code — a less compact bar code — unless you can bring the scanning device to the label. Or, if your production line will be moving at a brisk pace, a bar code with a larger “X” dimension is more likely to be read accurately as the cartons travel along high speed conveyor belts past a fixed scanner.

Alternatively, if you will be working with small items, such as test tubes or printed circuits, you will require a label with a high density bar code where more data per unit of measure will be encoded, and less label area will be required.

The larger the "X" dimension, the fewer characters are encoded per inch.

Choosing a Bar Code Type

Bar code technology recently celebrated its silver anniversary. Advances in printing and scanning capabilities have led to advances in the ability of bar code types to encode greater amounts of information in less and less space.

The Universal Product Code (UPC) and its European cousin, European Article Numbering (EAN), were created in the early seventies. Though used throughout the retail world, they are limited to 12 digits, all numeric.

CODABAR is a bar code type that was also introduced in the early seventies. It, too, is limited to numeric characters. CODABAR is used primarily by air express companies who use impact printers to produce multipart airbills with variable bar code airbill numbers.

Another circa 1972 bar code type, Interleaved 2 of 5, is also limited to a numeric string.

UPC, CODABAR, and Interleaved 2 of 5 are limited to numeric data

Unless mandated by a retail customer, trading partner, or shipping company, these codes should not be considered for an in-house application. Their limitations outweigh their benefits.

The first bar code type to be widely accepted in industry is Code 39. One of the benefits of this bar code type is the ability to encode alphanumeric data as well as strings of various lengths. The downside of this type is its relative density — it requires a greater amount of label real estate to encode an equivalent string of data.

Code 39 requires the MOST label real estate to encode an equivalent string of alphanumeric data.

The bar code type of choice (developed in the nineties) is Code 128. It also can encode alphanumeric data as well as strings of various lengths, but due to the use of special characters called function codes, it encodes data in different densities depending on whether the data is alpha only, numeric only, or alphanumeric. Thus Code 128 requires the *least* label real estate (for a linear, 1D bar code) to encode an equivalent string of data. The only downside to Code 128 is that special printers may be

required to print data at its highest density (16 characters per inch) and special scanners may be needed as well.

Code 128 requires the LEAST label real estate among 1D bar codes to encode an equivalent string of alphanumeric data.

Got 2D Good

The newest bar code types (RSS , PDF 417) are called “stacked” 2D bar codes because they encode data by layering a series of bars and spaces instead of having bars and spaces that are scanned in one pass. A special scanner reads each line of bars and spaces in sequence. Stacked 2D bar codes can encode as much as 3,000 characters in the space of a postage stamp.

Another 2D bar code family includes “matrix” codes. Samples include UPS MaxiCode and DataMatrix.

Because these symbologies are “portable data files,” able to encode entire packing lists or shipping label addresses, 2D bar codes are now specified by a number of carriers for their labels. Compliance with FedEx Ground and UPS is the biggest reason the acceptance of these symbologies is growing despite the added expense of special scanners.

Keep in mind

Factors that affect readability include:

- *Quiet zone* — each bar code field on a label should have 1/4" of white space before and after the bar code. This “quiet zone” signals the scanner to start and stop reading. Though you may find a label with a box or border aesthetically pleasing, a scanner might get confused. Avoid the borders.

Bar codes should have 1/4" of white space before and after the code

- *Contrast* — a scanner's optical ability to convert bars and spaces into an electrical signal is directly related to the contrast between the bars and the spaces. In short, the higher the contrast, the better the readability. It is for this reason that compliance specifications call for black on white marking, and call for thermal transfer printing. In a thermal transfer printer, a high carbon-content wax is melted off a ribbon and fused onto white paper, assuring high contrast. A dot matrix printer, which uses a multi-strike ribbon, will not consistently produce high contrast bar codes, especially as the inked fabric ribbon nears the end of its life. If your in-house printing requires colored stock (or colored bar codes) consult with a qualified source to verify that your labels and ribbons can produce high contrast, scannable bar codes.

  The higher the contrast, the better the readability.

- *Bidirectional reading* — If your labeled carton was stored in inventory upside down, could your scanner still read the bar code? If your bar code includes start and stop codes, and check digits it could. The check digit is a verification scheme that is the result of a weighted calculation of the data as read from right to left. How does the scanner (and decoding electronics) know bar code right from bar code left? It uses special start (left) and stop (right) codes — characters that permit the scanner to orient the data properly.

  CYBRA's MarkMagic automatically inserts start and stop codes and will optionally calculate check digits as needed.

Upfront work

By now you should be aware of the unique requirements of bar code labels, and you should have selected the bar code types you will be using. Now it's time to look at your application.

Questions to ask:

- *Is your current system efficient, and will bar codes increase your throughput?* — If your current bottleneck is data entry at specific, identifiable locations or processes, then bar code-assisted data entry will indeed improve throughput and accuracy. For example, a landlord needed a way to speedily credit rent checks from 16,000 tenants. The landlord supplies each tenant with bar code labels to apply to their rent checks. As

the checks arrive in the mail, they are scanned and the correct tenant account is retrieved for updating.

- *Is your workplace organized the best way possible?* — Many companies have discovered during bar code preparations, dead merchandise that was not only taking up valuable warehouse space, but also it often didn't exist as far as their manual inventory system was concerned.

- *Is your workflow organized the best way possible?* — Be sure your workflow is organized, and your work force doesn't have to constantly retrace steps to complete a task. Otherwise, bar coding will not improve efficiency.

- *Is your numbering system unique enough to give you an accurate picture of the state of your project?* — A warehouse rack can easily be identified with a unique location, Row A, Shelf 2, etc. But, what about the cartons on the shelf? Can you define a system that can identify each carton? In some industries you may have to track lots and batches. The best way to identify a carton is by using a serialized bar code "license plate." This sequential number, which you generate, is used as a look up key. Then, when scanned during a physical inventory count, the "license plate" can automatically update the inventory system. Order fulfillment works the same way: as a carton is picked, it is scanned, and the "license plate" keys your inventory system to update stock levels. If you decide to develop a new numbering system in addition to a serial "license plate" system, keep in mind the label real estate requirements of the various bar code types — a 20-digit alphanumeric Code 39 bar code will need 12 inches of label!

- *Is your data processing batch or interactive?* — Do you currently print order slips overnight for picking the next day? Or do your pickers process the next available order? Do you want to print shipping labels in advance because you know exactly how many cartons each order requires? Or do you need to generate shipping labels on demand as an order is packed? Your bar code requirements should not twist your data processing department into a pretzel. Depending upon your application requirements, some programming may be necessary to integrate bar code into your data processing environment. Generally, if you process in batch, the programming required is usually less than if you process interactively. For effective interactive operations you must present your operator with a screen for selecting which records to print.

After your program has written records to a file, MarkMagic does the printing. The included application builder will automatically create a screen for your operator to select records to print. MarkMagic Jobs can be defined for batch or interactive processing.

- *What information, bar code and human readable, do you need on your label?* — In addition to a "license plate" bar code, or an item number or stock keeping unit bar code, you might want to have a purchase order number encoded. It is also sound practice to have a human readable equivalent field for every bar code field on a label as an aid in picking, and should a bar code not scan, for keyboard data entry. Often this human readable information is printed in oversized text to make it easier to read from a distance. Other text fields, though not practical for bar code might include supplier name, item description, or handling information. The only time a human readable equivalent of a bar code field is *not* preferred is in a security application or time and attendance applications — to prevent, for example, one worker signing in, or out, for another.

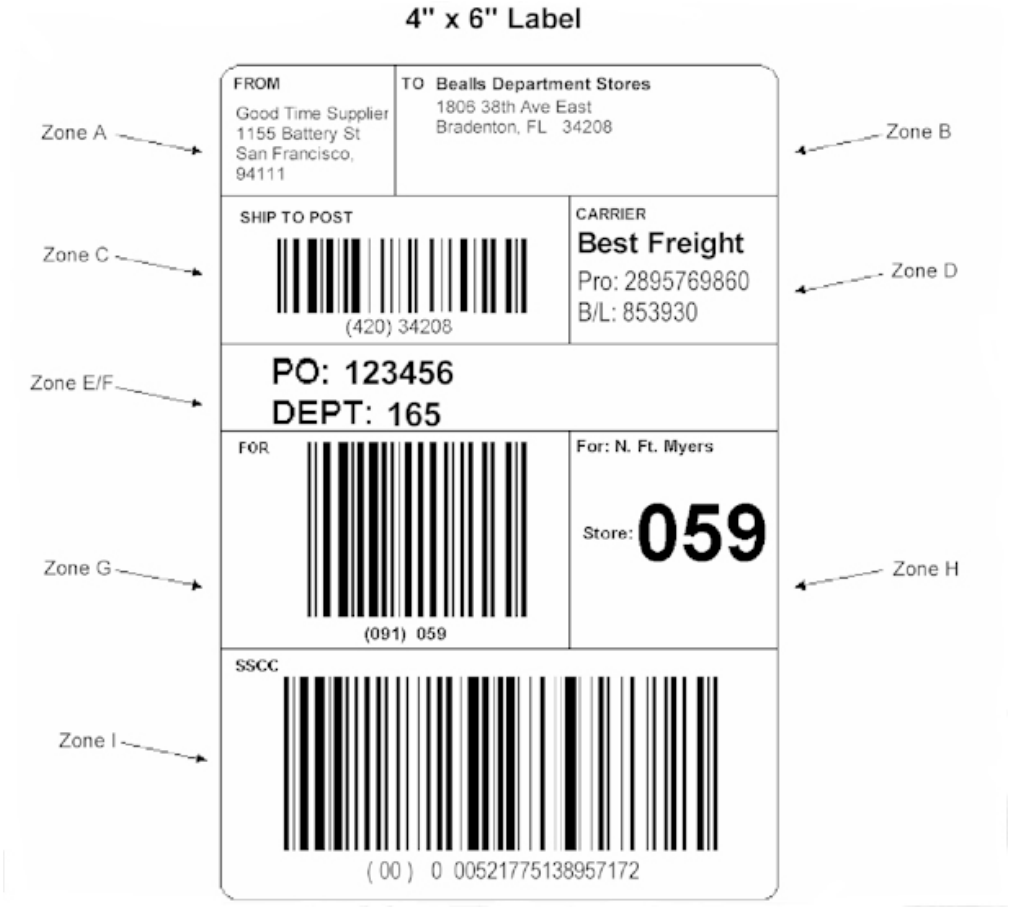
- *How is the encoded information to be processed?* — Once the data is prepared for bar code printing and the labels are printed and applied, the bar code enabled portion of your operations may be finished. However, if you are printing EDI UCC-128 shipping labels, you will need to maintain records of each carton (by serial number) for ASN (Advanced Ship Notice) transmission to your trading partner. Item marking applications require the printing and application of labels, but not much subsequent processing before the goods need to be scanned by your customer. If you are developing an in-house inventory control system, or a Work In Process (WIP) system, you subsequently will be scanning the labels you print, and you will quickly have a pretty good idea if you are printing bar codes with the correct information encoded. But what if you are integrating an EDI compliance or item marking system? How can you tell if the bar codes contain correct information? Correct encoded information is only one part of a functioning bar code scheme. Anyone can randomly scan labels and see if the data is correct. More importantly, the bar code labels must meet published specifications for contrast, adequate quiet zones, reflectivity, and density. To check these physical properties, you will need to have your labels "verified." Most trading partners do test sample labels for correct encoding and verify that the bar codes are "in spec." Penalties for bar codes that fail to meet specifications can be severe (as much as $25 per misread!) because of the tremendous impact a poor bar code can have on a high speed receiving line. A recommendation: if you will be printing EDI or item marking labels for someone else, it is good advice to invest in a bar code verifier and integrate verification into your quality control process.

It is good advice to invest in a bar code verifier and integrate verification into your QC (quality control)process.

Sample UCC-128 Compliance Label

Bealls Department Stores requires the following human readable information for a direct to store shipment:

- Vendor name and address (Zone A)
- Store number (Zone G, H)
- Store address (Zone B, C)
- Carrier name, Pro number, Bill of Lading (Zone D)
- Department number (Zone F)
- Purchase Order number (Zone E)
- Human readable translation of the UCC-128Shipping Container Bar Code (Zone I)



All systems go

The upfront work is complete. Certain processes have been reengineered if necessary, and the workplace is as organized as is practical. You've chosen the data to encode, the bar code types to use, and the human readable information that will appear. You've sketched a rough layout of the label on paper. You've interviewed system users, and have flowcharted the application logic.

Hard code, or software?

The last preparatory step is deciding whether you will “hard code” custom bar code printing commands, or if you will use an off the shelf bar code software package.

A software package will make it much easier for you to develop your application, and maintain it.

Software, such as MarkMagic, works as follows:

1) You design a label — defining bar code and text fields, line, box, and graphic fields — or use a pre-designed label format.
2) MarkMagic creates a label file — a file with variable fields that correspond to the variable bar code and text fields you have defined in your label format.
3) You can select records to print using MarkMagic copy or edit functions.
4) MarkMagic then prints the label file with the records you selected.

Any variable field can be defined in MarkMagic simply by selecting the corresponding field in your application data or spooled output files.

Barcode Label Printing Technology Overview

Dedicated label printers let you generate bar codes and print them on to paper or synthetic labels or tags. The wide range of bar code label printers on the market can be used in a variety of different applications.

> *The latest bar code label printers can even encode an RFID chip as they print bar codes. These new printers are essential for customers who need to comply with RFID EPC (Electronic Product Code) compliance mandates.*

Advantages of Dedicated Barcode Label Printers

Although it is possible to print bar codes on a standard laser printer there are a number of disadvantages. Laser printed output is limited to an entire sheet at a time, while a dedicated bar code label printer can print as many or as few labels as needed, saving you time and money.

Laser printers are allergic to dusty warehouse environments. Due to the technology involved in laser printing (electrically charged drum), special enclosures are needed if you plan to use a laser printer on the plant floor or loading dock.

In addition, laser toner costs could become prohibitive because bar codes require the printing of 100% black elements. Typical images and graphics are screened on a laser printer, and never require 100% toner coverage. If you choose to use a laser printer in a bar code production environment, be prepared to replace toner cartridges far more often than when the printer is used for standard office production.

> *If you choose to use a laser printer in a bar code production environment, be prepared to replace toner six times more often than when the printer is used for standard text documents.*

Specialized bar code label and tag printers output at much higher speeds than a desktop laser printer and in retail and logistics applications this is a clear advantage. Barcode labels that have been printed on thermal transfer printers are of a much higher quality and are generally much more robust. They also have a better scan rate and can be read more efficiently.

Barcode Printer Technology

Barcodes can be printed with almost all kinds of printing technologies, but it is no accident that thermal label printers are the tool of choice for the job. They were developed to print bar code labels and tags 24 hours a day, 7 days a week. Most

printer types make very small marks using round dots (inkjet for example). Thermal label printers use square or rectangular shapes to build up an image and this means that the lines within a printed bar code are very sharply defined and can be read reliably. Bar codes must be produced within exacting tolerances, with the bar code elements measured in mils (thousandths of an inch). Error free reading is paramount in bar code systems, and so what may seem a minor detail is in fact crucial. Also these printers tend to print onto rolls of labels and can print on demand - either a single label or a thousand.

Thermal Label and Tag Printers

Thermal label printers are efficient, fast and reliable. Small footprint desktop printers, mobile printers and high-output industrial printers are all available using thermal printing technology. Available printer options include label peelers, cutters, stackers and rewinders.

What is the difference between direct thermal label printers and thermal transfer label printers? Which type better suits your needs?

Here is a guide to the technologies involved, with the pros and cons of the various systems.

Direct thermal printing

In this method the print head heats the label material itself. The paper has been chemically treated and responds to heat by darkening. One of the main advantages of printers which use this method is that they require no extra consumables (ink cartridges, ribbons, etc.) However some label materials can be slightly abrasive and eventually lead to wearing of the print head itself which may need replacement after heavy use. The other disadvantage is that Thermal Direct labels are not recommended for long-term use. The labels have a tendency to fade after some months of exposure to light (sunlight, UV, or fluorescent lighting). In general, direct thermal label printers are an economical choice for certain applications.

Conclusion

Direct thermal printers require the use of heat activated thermal papers, but require no ribbon. The print color is limited to black, and the printing is not as crisp as that of thermal transfer ribbon printing. Over time the labels will turn brown, particularly when subjected to heat and sunlight. A dedicated direct thermal label printer utilizes a print head that is made of thicker glass, for print head durability. Direct thermal printing is popular in the food industry, since most items are stored away from heat and sunlight, and the labeled items have a relatively short shelf life of less than one year.

At a glance…. Direct thermal		
How it works:	Pros:	Cons:
Chemically treated paper stock is passed over rows of tiny heating elements which switch on and off, turning the paper black and creating an image. Direct thermal printers are mainly used industrially for printing large numbers of labels in the grocery industry.	Fast and quiet output. Simple to use, requiring low maintenance. Print on demand with no wastage. Precise readable bar codes.	Labels are prone to fading after a few months. They can also darken in contact with some chemicals. Printheads wear quickly due to abrasive print stock. Printer can only print labels.

Thermal transfer printing

Similar to direct thermal printing, except that a ribbon containing pigment is placed between the print head and the label. Heat causes wax or resin on the ribbon to melt and deposit pigment on the label in the desired image. This eliminates wear to the print heads but adds cost in terms of the replacement of consumables. However labels produced this way are much more durable. Many different kinds of materials can be used in these machines making them suitable for producing a wide range of labels.

To help decide whether to select a direct thermal printer or thermal transfer printer (or whether you should use thermal transfer or direct thermal labels), consider the following questions:

- Will you ever need to print labels in colors other than black?
- Do the labels need to be scanned or have a shelf-life of over 1 year?
- Will you be printing high density bar codes (i.e. limited space)?
- Will the labels be subjected to heat or sunlight?
- Will you be printing on a variety of different materials (i.e. papers, films and foils)?
- Are you are responding to a UCC 128 compliance label requirement?

If you answered "yes" to any of the above questions then you need thermal transfer printing.

Conclusion

Thermal transfer printers use a carbon wax or resin ribbon which gets transferred onto the substrate via heat, hence the name "thermal transfer." The ribbons can be different colors, so you are not limited to black print. The printing is very crisp and durable. This method is excellent for high density bar-codes and labels that require longevity. The other benefit is that thermal transfer printers can print on paper, film, and even foil.

At a glance…. Thermal Transfer		
How it works:	Pros:	Cons:
Uses the same process as direct thermal printing except that the printhead heats a ribbon to deposit wax or resin onto the label, forming the image. They are a good option if you need a dedicated label printer.	Fast and quiet output. Print on demand with no wastage. Precise bar codes. Print on various kinds of paper and synthetic media. Durable long-life labels. Can use color ribbons.	Can be very expensive. Costly ribbon replacement. Can only print labels or tags.

The proper selection and match of label stock and ribbon is critical to the overall quality and performance of printed bar code labels and tags.

Other technologies

Here are other printing technologies that can be used to print bar codes. These are rarely recommended for production label systems, but can be used to print bar codes on bills of lading, pick tickets, statements, and other forms.

Laser	Pros:	Cons:
A laser beam removes static charge from a roller within the printer. Toner sticks to the charged areas and is printed onto the paper. Commonly found in office environments, not recommended for dusty warehouses or dirty plant floors.	Very high resolution. Very fast after first page. Can be used for other tasks. Can print in color. Can print large format labels and can print bar codes on forms.	Not good for synthetic media. Expensive color printers. Complex paper feed can cause problems with peeling labels. Need special enclosures for use on plant floors or loading docks.
Desktop Inkjet	Pros:	Cons:
Tiny droplets of ink are shot onto the surface of the print media. Desktop inkjet printers are very common printers in small businesses, and they are suited to small outputs of bar code labels and forms	High resolution. Can be used for other tasks. Low cost. Economical color printing.	Slow printing. Inks not water-resistant. Expensive ink cartridges. Need special enclosures for use on plant floors or loading docks.
Inkjet Coding Machines	Pros:	Cons:
Tiny droplets of ink are shot onto the surface of the print media. Inkjet coders are specialized devices for spraying bar codes directly onto packaging	Prints directly on packaging. Requires no label. Can print bar codes at very high speed.	Low resolution. Expensive equipment, ink cartridges, and maintenance.
Matrix	Pros:	Cons:
Very small points hammer onto a ribbon which deposits ink onto the paper. Older dot or line matrix printers are not recommended for bar codes due to unreliable print quality.	Models range from small, low-cost units to system printers. Can be used for other tasks. Can print large labels. Can print one label at a time. Can print multi-part forms.	Low resolution. Noisy printing. May have to print at slower than rated speed when printing bar codes. Fading ribbons produce unreadable bar codes.

How to Choose the Correct Thermal Bar Code Printer Model

How many labels do you need? The volume of bar codes that can be printed per day is crucial if you are producing large batches of very similar labels. If you need to print small numbers of labels on demand with complex graphics the time it takes to print the first label will be more important.

Your printer choices are:

- **Desktop Printers** (good for up to hundreds per week) Representative printer: Zebra LP2844-Z
- **Mid Range Printers** (good for thousands per week) Representative printer: Monarch 9825
- **Industrial Printers** (good for thousands of labels per day) Representative printer: Zebra Z170Xi

How wide (and long) does your label need to be? Thermal Transfer Label Printers come in various sizes (widths) of print head: 2," 3", 4", 6", 8", or 10." The printers become more expensive the wider the head is. We generally recommend that you select a 4" printer, unless you need a wider label.

If you require extra large labels, a wide-web printer may be the only option. Extra-long label lengths may require memory cards installed in the printer.

In how many locations will you be printing labels? Will you be printing labels in a central machine room, or printing them closer to the point of application? If you have multiple packing stations, you may need multiple on demand printers.

What kind of labels do you need? When you know what type of bar codes you are using check which printing system supports it. For example some printers may not be able to deal with very dense 2D bar code symbologies. If you need to print a company logo, perhaps in color, alongside the bar code this must be taken into account at the planning stage. Or if you need to print extra-large labels you may need to choose a specialized wide web printer.

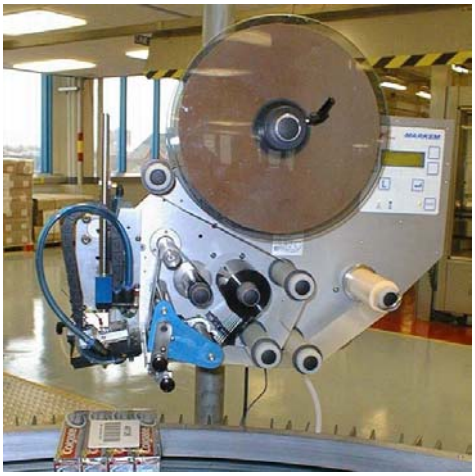
What resolution printing do you require?

- **200dpi** is standard resolution; fine for most requirements. This enables crisp bar codes and text. Replacement print heads are relatively inexpensive.
- **300dpi** heads are preferable if small graphics are to be printed.
- **400dpi** heads would be needed for small graphics and 2D bar codes
- **600dpi** heads are available for only certain printers. Fantastic fine resolution for tiny bar codes on circuit boards and tiny 2D codes. Replacement print heads are very expensive.

Where will your labels be used? If you need to make weatherproof labels for extended outdoor use you will need to print onto a sturdy material, and only thermal transfer bar code printers can accommodate this. Also thermal transfer bar code printers are better suited to producing labels with long lifetimes. If your product must still be readable in years to come this is of high importance. Some uses require printing onto metal or ceramic tags and it might be worth considering sourcing this bar code printing project to outside suppliers.

Where will you be printing labels? Many industrial contexts will require sturdy equipment for prolonged use. Temperatures, too, will affect your choice of equipment and supplies. Alternatively you might need to print labels on the fly from a portable printer as you move around a warehouse.

Are there special paper handling requirements? Will you require a knife and stacker to cut tags? Do you need a rewinder for unattended batch processing of labels? Will you need a peeler for on demand label printing? Would an automatic print and apply machine (right) save you time and money? These devices automatically print and apply a label on hundreds of cartons an hour.



How easy is it to reload supplies? Think about how easy it is to replenish consumables in your printer and how often you might need to do this.

What kind of supplies will you need? There are dozens of label types, ribbon types, adhesives, and other components that have different performance characteristics. Your application requirements will help you determine which supplies to use. See “Guide to Media and Supplies” later in this document to help you choose the right supplies.

Barcode Label Printer Manufacturers

It can be confusing trying to buy bar code label printers for your business. Our software MarkMagic supports more than 300 printer types. We've encountered just about every bar code printer on the market. To make things a little easier here is a list of our favourite manufacturers of bar code label printers and why we've had success working with them:

Monarch A division of the Paxar Corporation, Monarch offers the most comprehensive solution for bar code label, ticket, and RFID tag production. CYBRA customers choose Monarch because the company offers printers, labels, tags, ribbons, and first rate, on-site service all from one source.
Particular models we've had success with include:

- 9855; reliable and affordable and ideal for shipping and item labels as well as tags.
- 9860 (printer shown, withcutter, stacker and verifier); offers a great overall solution for garment tickets.
- 9855 RFID Printer; an up-to-date complete solution for RFID needs. The RFID printer, RFID tags, and maintenance are an integrated solution.

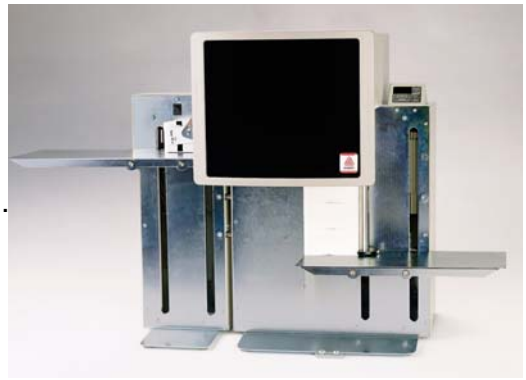
Zebra offers a wide array of printers for all applications including RFID. Particular models we've had success with include:

- Zebra Z4M Plus Printer (right) is ideal for shipping labels as well as smaller labels. Economical and reliable.

- Zebra 140 XI III Plus Printer is a heavy duty, reliable and fast printer. Can handle 24 hour duty cycles of labels and tags.

- Zebra 105SL Printer is a rugged and fast printer well -suited for all sizes of labels.

Avery Dennison Printer Systems are very well regarded in the apparel marking arena. Avery Dennison produces high performance label printers, specialized care label printers, and the world's only single ticket printer, the Avery Dennison TDI (right).



Datamax Corporation provides a range of desktop and industrial thermal printers, from low-priced but efficient models to robust yet sophisticated printers for challenging business environments. Datamax Printers include the W Class Datamax W-6208, which features an all-metal chassis for rough environments, the I Class Datamax I-4208, the E Class Datamax E-4203, and the S Class, which includes the Datamax ST-3210 for admission ticket and tag printing.

IBM Printing Systems bar code capable printers range from dedicated specialized thermal transfer printers (the IBM 4400 family) to high speed page printers. We've worked with IBM workgroup laser printers (up to 45 pages per minute), cutsheet production printers (up to 110 impressions per minute), and continuous form production printers (up to 1220 ipm). IBM maintenance and support are second to none.

Intermec Technologies Corporation can supply a total solution of bar code printers, scanners, terminals, RF networks, supplies and services. Once known as a proprietary provider, Intermec now increasingly supports open standards. Intermec EasyCoder label printers are solid industrial label performers.

Established nearly 30 years ago, Printronix is a leading manufacturer of industrial and back-office enterprise printing solutions for customers the world over. The long-term market leader in line matrix printers, Printronix has earned an outstanding reputation for its full selection of thermal, laser and network solutions technologies, all supported by unsurpassed service. Thermal models include the Printronix T5000 family.

In 1979, SATO developed the world's first thermal transfer bar code printer, and their current line is excellent — and easy to load and maintain.

Part of the Toshiba Group of companies, TEC manufactures very small portable printers, competitively priced mid-range printers, and affordable desktop printers. TEC Models include: B-SX4, B-SX5, B-852 (right) and B-882 printers.

Guide to Media and Supplies

Direct Thermal Labels and Tags

Materials that are used with direct thermal printers have a special coating that, over time, will darken if the material is exposed to UV or sunlight.

Thermal labels come in base weights from 15-50 lbs. (6.8-22.7 kg.) and 40-120 lbs. (18.2-54.6 kg.) for tags. These materials generally have top coating that protects the materials from water, chemicals and ultraviolet light.

Some grades of thermal tags and labels are specifically designed to be read by scanners that read in infrared light range.

The advantage of direct thermal label materials and thermal label printing is high quality printing at lower cost than thermal transfer materials (including ribbons).

Disadvantage of direct thermal label materials is short label life especially when exposed to sun light, ultraviolet light, or heat as well as the limited selection of substrate when compared to thermal transfer substrates. Also, the printheads tend to wear fast because of the contact with the rough surfaces of the thermal papers and tag materials.

Thermal Transfer Labels and Tags

Thermal transfer substrates do not require top coating for the image to be transferred from the ribbon onto the substrate.

Thermal transfer substrates are available with some of the following face sheets:

- Uncoated thermal transfer paper
- Clay coated thermal transfer paper
- High gloss coated paper
- Coated Tyvek (synthetic material)
- Kimdura (synthetic vinyl)
- Polyolefin film
- Top coated and non-top coated polyesters
- Gloss coated mylar
- Polypropylene
- Polyethylene

The ribbon is in physical contact with the substrate, resulting in a stable high quality image unaffected by temperature up to 250°F (121 °C) or exposure to ultraviolet light.

The advantages of thermal transfer printing are the variety of label materials that can be printed on, the quality and stability of the printed image both for indoor and outdoor applications, and longer printhead life because the thermal transfer ribbon provides a buffer between the label and the printhead.

Thermal Transfer Ribbons

There are three basic formulas of thermal transfer ribbons, wax, wax/resin and premium resin. Listed below is an explanation of each ribbon type and where the ribbon can be used.

Wax Ribbons

- For normal and high speed 4" (102 mm) to 10" (254mm) per second print speed applications
- Good edge definition
- Good quality rotated bar codes
- Good abrasion resistance
- Heat resistance of printed image to 100 °F (38 °C)
- Good static resistance
- Low price

Recommended applications and uses

- Coated and uncoated labels and tags
- All general purpose labeling
- Shipping labels
- Carton labeling
- Address labels
- Retail tags and labels
- Print and apply applications
- Small character and graphics labels

Wax/Resin Ribbons

- For normal and high speed printing up to 10" (254mm) per second
- Excellent edge definition
- Good quality rotated bar codes
- High abrasion resistance
- Solvent resistance to petrochemicals and isopropyl alcohol
- Heat resistance of printed image to 200 °F (100 °C)

Recommended applications and use

- High gloss labels, coated labels and tags, and synthetic labels and tags
- High speed print and apply applications
- Shelf and bin labeling, materials management labeling, drum labeling, parts marking labeling

Polyester Resin Ribbons

- Super high gloss paper labels and synthetic labels (i.e. polyester, kapton, polyolefin, vinyl, mylar)

Recommended applications and use

- Used in extreme environmental applications such as hazardous drum labeling
- Used in printed circuit board applications, rating plate labels, engine component labels, labels requiring long life (5-8 years) and all types of outdoor labeling that requires durability.

How to Purchase the Correct Thermal Supplies

When you contact a label manufacturer, these are the kinds of questions you'll be asked to ensure the supplies you order perfectly match your application.

What size tags and labels do you need?

- Tags and labels are available from 1" to 10" wide and from 3/8" to 40" long.

What ribbon length do you need?

- Ribbons are available from 1.5" up to 10" wide and from 91 meters to 600 meters long. The size of the ribbon will depend on the model of printer you are using.

What type of adhesive do you need?

- Permanent adhesive
- Removable adhesive
- Tag (no adhesive)

What will you be applying the labels on?

- Glass
- Plastic
- Metal
- Corrugated cartons
- Painted surfaces
- Paper

What special properties do the labels need?

- Steam resistant
- Tamper evident
- Tear resistant
- Water resistant
- Outdoor use
- Infra Red printing and scanning

What will be the print speed?

- 1-4 inches per second
- 1-6 ips
- 6–12 ips

What will be maximum temperature the label will be exposed to?

- 120°F
- 200°F
- 220°F
- 250°F
- 300°F
- 500°F

What color ribbons will you be printing with?

- Black
- Red
- Green
- Blue
- Yellow

Pitfalls to avoid as you make the move to bar code

- Although we have stated here that thermal transfer printers were designed for bar code label printing, the trend in the industry is to mix and match printer types so you have the best printer for each bar code job. More and more data is required on shipping labels. Combining packing list and shipping labels onto one large document is becoming more common.

- You may need to print bar code shipping labels on a Zebra printer, bar code tickets on a Monarch printer, and bar coded forms on a laser printer. Bar code software will reduce the time required to develop these applications no matter how many different printer types you will be using.

- If you will be printing thousands of labels per day, it may be more productive to purchase multiple desktop printers as opposed to one industrial printer. This will depend on where you will be doing your labeling. If you have multiple packing lines, each station should have a label printer.

- Printer configuration errors and quirky connections to host servers can cause lost data and/or character translation problems.

- It's important to know the difference between the Code 128 subsets (A, B, and C). Code 128 has three subsets of characters. There are 106 printing characters in each set. Therefore, each character can have three different meanings, depending on the character subset used.

- Learn the different Function Codes. Function (FNC) codes define instructions for a bar code reader decoding Code 128 bar codes. FNC 1, for example, is a required component of the UCC-128 specification. FNC 2 tells the reader to store the data read and transmit it with the next symbol. FNC 3 is reserved for code reader intializing and other reader functions. FNC 4 is reserved for future use. The compliance specification will document if a Function Code is required. CYBRA's MarkMagic software will include FNC1 automatically if you select bar code type, UCC-128.

- Learn when you need to supply Check Digits, and when you don't. Some bar code types require a Check Digit (UPC-A, for example), while others do not. If your data does not include a Check Digit, CYBRA's MarkMagic software will calculate one automatically for you.

- Human Readable text fields can have spaces but the data in the bar code fields almost always should not.

- One point is 1/72 of an inch. If you need a ½" high number on a label, specify 36 points.

- 2D bar code types require special field separators intermixed with the variable data. UPS MaxiCode is not just a bar code symbology, it is a specification as well. There are required fields that must be in the data for the bar code to be valid for UPS. Contact your UPS Account Executive directly for more information regarding required bar codes and routing codes that help ensure accurate routing and prompt delivery of your shipments.

Glossary of Bar Code Terms

Accuracy
A bar code verification term. The determination of whether any element width, or intercharacter gap width, differs from its nominal width by more than the printing tolerance.

Aspect ratio
A bar code verification term. In a bar code symbol, the ratio of bar code symbol height to symbol length.

Autodiscrimination
The ability of bar code scanning and decoding equipment to recognize more than one symbology.

Average Background Reflectance
A bar code verification term. Expressed as a percent. See Reflectance.

Background
The white spaces and quiet zones surrounding a printed bar code.

Bar Code
A technology that uses white spaces and black bars to represent encoded information. This encoded information can then be read with an optical device that converts the bars and spaces into an electrical signal, which is then decoded into the original characters.

Bar Code Character
A single group of bars and spaces that represents a specific individual number, letter, punctuation mark, or other symbol. This is the smallest subset of a bar code symbol that contains data.

Bar Code Reader
A device (light pen, laser gun, fixed scanner, etc.) used to read a bar code field.

Bar
The darker element of a printed bar code field.

Bar Width
The thickness of an individual bar measured from edge to edge of the same bar.

Bi-directional
A bar code symbol capable of being read successfully if scanned in either direction.

Black Mark
Sensor mark usually printed on the reverse (non-printing) side of tag stock, or on the liner (backing paper) of label stock.

Butt Cut
Form of label stock used in continuous operations. Butt cut stock usually yields an additional 10% more individual labels than die cut stock.

CCD
Charge Coupled Device. Type of bar code scanner that uses LEDs (not lasers) to flood the bar code with light.

Character Set
Characters available for encodation in a particular bar code type. Not all bar code types can encode the entire ASCII character set.

Computer Integrated Manufacturing.
Factory automation term where information is shared between computer aided design programs, materials resource planning (MRP) programs, and machine tools on the shop floor. Bar code data collection is an important part of a successful CIM implementation.

Clear Area
See Quiet Zone.

CODABAR
A numeric-only bar code type, in which each character is composed of seven elements: four bars and three spaces. CODABAR is currently used in a variety of applications such as libraries, medicine, and overnight package delivery. Also known as USD-4 code, NW-7, and 2 of 7 code, it was originally developed for retail price-labeling use.

Code 39
A full alphanumeric bar code type composed of five bars, four spaces, and an intercharacter gap for each character. Code 39 is the standard for many industries, including adoption by the U.S. Department of Defense for its LOGMARS specification. Also known as USD-3 code and 3 of 9 code, it is one of three symbologies identified in the ANSI standard MH10.8M-1983.

Code 49
An extremely compact, multi-row, continuous variable bar code type capable of encoding the full 128 ASCII character set. It is ideally suited to applications where large amounts of data are required in a small space. The code consists of 2 to 8 rows. A row consists of a leading quiet zone, 4 symbol characters encoding 8 code characters, a stop pattern, and a trailing quiet zone. Rows are separated by a one module high separator bar. Each symbol character encodes two characters.

Code 128
A high density, variable length, full alphanumeric bar code type capable of encoding all 128 ASCII characters. It was designed for complex encoded product identification and is the basis of the UCC-128 marking specification. Code 128 has three subsets of characters. There are 106 printing characters in each set. Therefore, each character can have three different meanings, depending on the character subset used. Each Code 128 character consists of six elements -- three bars and three spaces.

CPI
Characters Per Inch. A common measurement for bar code density.

Cutter
Also called a knife. An integrated mechanism used to cut individual tickets from a roll of tag supply.

Data identifier
A compliance marking term. Message prefixes in a bar code that define the general category or intended use of the data that follows.

DC
Distribution Center. When goods are shipped to a distribution center, the container marking specifications are usually different from those required when shipping directly to a store.

Decoder
As part of a bar code reading system, the electronics that process the signals from the scanner, interpret the signals into meaningful data, and control the interface to other devices.

Depth of Field
The distance between the maximum and minimum surface in which a scanner is capable of reading bar codes of a specified X dimension.

DI
A compliance marking term. See Data Identifier.

Die Cut
Type of label supply used in on demand applications. See also butt cut.

Diffuse Reflection
A bar code verification term. The component of reflected light that emanates in all directions from the reflecting surface (as opposed to the focused light of the scanner laser reflected back to the scanner).

Dot Matrix
A system of impact printing where individual dots are printed by tiny wires striking the supply through an inked ribbon.

DPI
Dots Per Inch. Used in comparing relative printing resolution of thermal printheads and laser print engines.

DSD
Direct Store Delivery. When goods are shipped directly to a store, the container marking specifications are usually different from those required when shipping to a distribution center.

EAN
European Article Numbering system. The international standard bar code for retail food packages. The EAN-13 bar code type has 12 data characters, one more data character than the UPC-A code. An EAN-13 symbol contains the same number of bars as the UPC-A but encodes a 13th digit into a parity pattern of the left-hand six digits. This 13th digit, in combination with the 12th digit, represents a country code. The JAN-13 (Japanese Article Numbering system) is a special application of EAN-13.

EDI
Electronic data interchange. Intercompany, computer-to-computer business transactions.

EDIFACT
The international standard that supports EDI transactions across national boundaries.

Element
A single bar or space in a bar code.

FACT
Federation of Automated Coding Technologies. Because of the large number of groups that have been independently developing bar code standards, FACT was formed to foster interindustry communications and coordination. An "association of associations," FACT maintains a database of specifications and data identifiers.

First Read Rate
A bar code verification term. The ratio of the number of successful reads to the number of attempts. Commonly expressed as a percentage. Abbreviated as FRR.

Fixed beam scanner
A visible light or laser scanner that requires a more exact positioning of a bar code than a moving beam scanner.

FRR
See First Read Rate

Function code
Function (FNC) codes define instructions for a bar code reader decoding Code 128 bar codes. FNC 1, for example, is a required component of the UCC-128 specification. FNC 2 tells the reader to store the data read and transmit it with the next symbol. FNC 3 is reserved for code reader intializing and other reader functions. FNC 4 is reserved for future use.

Guard Bars
The bars that are at both ends and center of a UPC and EAN bar code type. They provide reference points for reading, serving a function similar to start/stop codes.

HeNe Laser
A helium neon laser commonly used in bar code scanners.

Horizontal bar code
A bar code type presented in such a manner that its overall length dimension is parallel to the horizon. The bars are presented in an array which looks like a picket fence.

ILD
Infrared laser diode. Used in some hand laser scanners to project a light beam.

Infrared
The band of light wavelengths too long to be seen by the human eye. Used in access control and security applications where bar code fields must not be visible by human eye -- only to an infrared scanner.

Interleaved 2 of 5
A high density, self-checking, continuous numeric bar code type in which each character is composed of five elements: five bars or five spaces. Of the five elements, two are wide and three are narrow. The bar code is formed by interleaving characters formed with all spaces into characters formed with all bars. Total number of digits must be even.

Label gap
The space between adjacent labels on continuous form, die cut supply.

Ladder
A bar code field printed in a rotation perpendicular to the horizon so that the individual bars appear as rungs on a ladder. Also referred to as a vertical bar code.

Laser
Light Amplification by the Stimulated Emission of Radiation. A focused light source (as opposed to LEDs used in wands and CCD readers) used in fixed, moving beam, and handheld scanners.

LED
Light-emitting diode. The light source often used in light pens.

Light pen
Also known as a wand. A scanning device which is used as a hand held bar code reader. Requires direct contact with the printed bar code field.

LOGMARS
A compliance marking term. Logistics of Marking and Reading symbols. A Department of Defense marking specification.

mil
One one-thousandth of an inch (0.001"). Unit of measurement used in bar code specifications.

Misread
A condition which occurs when the data output of a reader/decoder does not agree with the data encoded in the bar code field.

Module
The width of the narrow bars in a bar code.

Moving beam scanner
A device where scanning is achieved by mechanically moving a light beam through the bars of a bar code field.

Nanometer
A bar code verification term. Unit of measure used to define the wavelength of light.

Net Data Density
A bar code verification term. The net data density of a linear bar code symbol is determined by dividing the number of characters in the symbol by the overall symbol length, measured from the leading edge of the start code to the trailing edge.

Nominal
A bar code verification term. The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.

On demand
A printing mode where one label at a time is printed. The label is presented to the operator, separated from the backing paper. When the label is taken from the printer, the next label is printed and presented. Also known as Demand mode.

Opacity
A bar code verification term. 1).The optical property of a substrate material that measures the show through from the back side or the next sheet. 2).The ratio of the reflectance with a black backing to the reflectance with a white backing. 3).Ink opacity is the property of an

ink that prevents the substrate from showing through.

Optical throw
The minimum distance a bar code can be away from a scanner and still be read.

Orientation
Two possible bar code field orientations are horizontal with vertical bars and spaces (picket fence) and vertical with horizontal bars and spaces (ladder).

Overhead
The bars and spaces representing the start, stop, function codes and check characters required by some symbologies. These increase the length of the bar code but do not affect the message content.

PCS
A bar code verification term. Print contrast signal. A measurement of the ratio of the reflectivity between the bars and spaces of a bar code field, commonly expressed in percent.

Picket fence
A bar code type whose length is printed horizontally so that the bars are presented in an array which looks like a picket fence.

PLU
Price Look-Up. In a retail POS (Point Of Sale) system, the UPC bar code field is a key field in a price file that when scanned, retrieves a price for the encoded item.

Postnet Code
A bar code symbology used primarily by the U.S. Postal Service for mail sortation. All bars and spaces are the same width. ZIP Code information is encoded into the particular arrangement of tall and short bars.

Print Quality
A bar code verification term. 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.

QR
Quick Response. A retail industry initiative to improve inventory turnaround through the use of EDI, bar code scanning, and the sharing of merchandise movement data with vendors.

Quiet zone
A clear space, containing no machine readable marks, which precedes the start character of a bar code field and follows the stop characters. Sometimes called the "clear area."

Read rate
A bar code verification term. The ratio of the number of successful reads to the total number of attempts.

Reflectance
A bar code verification term. The ratio of the amount of light which is reflected back from the white spaces of a bar code during scanning to the amount of light reflected under similar illumination conditions.

Resolution
The narrowest element dimension which can be recognized by a particular scanning device or printed with a particular device or method.

Ribbon
A synthetic tape with several layers of material, one of which is thermal wax, that when melted, produces the visible marks on the labels installed on a thermal transfer printer.

Scanner
An electro/optical device that converts the bars and spaces of a bar code field into electrical signals.

SER
A bar code verification term. Substitution error rate. The rate of occurrence of incorrect characters.

Show Through
A bar code verification term. Generally undesirable property of a supply that permits underlying markings to be seen.

SKU
Stock Keeping Units. In a distribution/retail environment, a generic term for item number.

Space width
A bar code verification term. The thickness of a space measured from the edge closest to the symbol start character to the trailing edge of the same space.

Spectral Response
A bar code verification term. The variation in sensitivity of a test surface to light of different wavelengths.

Stacked code
PDF417, 16K and Code 49 are examples where a long bar code field is broken into sections and "stacked" one upon the other, resulting in codes that are extremely compact.

Stacker
An optional electromechanical accessory that is invaluable for unattended, organized, printing and cutting of multiple batches of tags.

Standard
A compliance marking term. A set of rules, specifications, instructions and directions to use a bar code or other automatic identification system. Usually issued by a trade organization.

Start-stop character
A special bar code character that provides the scanner with start and stop reading instructions as well as scanning direction indicator.

Substrate
The surface on which a bar code field is printed. Can be a label, tag, or paper supply.

Supply
See substrate.

Symbol
A combination of bar code characters, including start/stop characters, quiet zones, data characters, and check characters required by a particular symbology, which form a complete, scannable entity.

Symbol Length
The distance between the outside edges of the quiet zones on the two ends of a bar code field.

Symbology
Bar code type.

T&A
Time and Attendance. An application using bar code employee badges and bar code slot reading terminals to enter employee start/stop data.

Thermal direct
A printing method where dots are selectively heated and cooled and dragged upon heat-sensitive paper. The paper turns dark in the heated areas.

Thermal transfer
A printing method like thermal direct except a onetime ribbon is used and common paper is used as a supply. This eliminates the problems of fading or changing color inherent in thermal direct printing.

UPC
Universal Product Code. The standard bar code type for retail products in the United States. See also UPC-A and UPC-E.

UPC-A
A fixed length, numeric, continuous bar code type used primarily in the retail industry for labeling packages. The UPC-A symbol encodes a number system character, 10 digits of data, and a Mod 10 check digit for error correction.

UPC-E
A UPC symbol encoding six digits of data in an arrangement that occupies less area than a UPC-A symbol. The UPC-E bar code type is a shortened version of the UPC-A bar code type in which zeroes are suppressed, resulting in codes that require less printing space. Used for labeling small items.

UPCC
A compliance marking term. Uniform Product Carton Code, a standard administered by the UCC.

Verifier
A device that makes measurements of the bars, spaces, quiet zones and optical characteristics of a bar code field to determine if the code meets the requirements of a specification or standard.

Vertical bar code
A bar code field printed in a rotation perpendicular to the horizon so that the individual bars appear as rungs on a ladder.

Visible laser diode
Used in some hand laser scanners to project a beam of light visible to the human eye, simplifying the scanning process.

Void
A bar code verification term. An undesirable absence of ink in a bar.

Wand
See Light pen.

Wedge
A device that plugs in between a keyboard and a terminal or PC. Allows data to be entered either by the keyboard or an attached scanner.

WINS
A compliance marking term. Warehouse Information Network Standard. Defines EDI transaction types for the warehouse industries.

WIP
Work-In-Progress/Process. An application using bar code totes and bar code scanners to track lots through a manufacturing operation.

X-dimension
The width of the narrow bars and spaces in a bar code type; usually measured in mils.

Conclusion

We hope you found some answers to your bar code printing questions in this White Paper.

Would a similar publication on Bar Code Scanning be helpful to you? Or, would you be interested in an RFID White Paper? Write to us at info@cybra.com.

If you have any further questions, please feel free to call CYBRA Corporation at +1 914-963-6600 or PSS Limited on +44 1993 881 584.

CYBRA is the developer of MarkMagic 5 Bar Code Label, RFID EPC tag, and SM@RT Forms Software for the IBM iSeries, an award-winning, ServerProven by IBM middleware solution. Featuring a choice of four interfaces, MarkMagic customers design and print bar code labels, RFID tags, laser forms, and other media, using live data, with little or no programming. MarkMagic includes at no charge JMagic, a Java-based WYSIWYG designer. MarkMagic 5 is the "Bar Code Print Engine Inside" leading application software from SSA Global, Manhattan Associates, ABS, VAI, and other developers.

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