

Zint Barcode Generator and Zint Barcode Studio User Manual

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1. Introduction

The Zint project aims to provide a complete cross-platform open source barcode generating solution. The package currently consists of a Qt-based GUI, a CLI command line executable and a library with an API to allow developers access to the capabilities of Zint. It is hoped that Zint provides a solution which is flexible enough for professional users while at the same time takes care of as much of the processing as possible to allow easy translation from input data to barcode image.

The library which forms the main component of the Zint project is currently able to encode data in over 50 barcode symbologies (types of barcode), for each of which it is possible to translate that data from either UTF-8 (Unicode) or a raw 8-bit data stream. The image can be rendered as a

- Windows Bitmap (BMP),
- Enhanced Metafile Format (EMF),
- Encapsulated PostScript (EPS),
- Graphics Interchange Format (GIF),
- ZSoft Paintbrush (PCX) image,
- Portable Network Graphic (PNG) image,
- Tagged Image File Format (TIF), or a
- Scalable Vector Graphic (SVG).

Many options are available for setting the characteristics of the output image including the size and colour of the image, the amount of error correction used in the symbol and the orientation of the image.

1.1 Glossary

Some of the words and phrases used in this document are specific to barcoding, and so a brief explanation is given to help understanding:

symbol

A symbol is an image which encodes data according to one of the standards. This encompasses barcodes (linear symbols) as well as any of the other methods of representing data used in this program.

symbology

A method of encoding data to create a certain type of symbol.

linear

A linear or one-dimensional symbol is one which consists of bars and spaces, and is what most people associate with the term 'barcode'. Examples include Code 128.

stacked

A stacked symbol consists of multiple linear symbols placed one above another and which together hold the message, usually alongside some error correction data. Examples include PDF417.

matrix

A matrix symbol is one based on a (usually square) grid of elements called modules. Examples include Data Matrix, but MaxiCode and DotCode are also considered matrix symbologies.

composite

A composite symbology is one which is made up of elements which are both linear and stacked. Those currently supported are made up of a linear 'primary' message above which is printed a stacked component based on the PDF417 symbology. These symbols also have a separator which separates the linear and the stacked components. The stacked component is most often referred to as the 2D (two-dimensional) component.

X-dimension

The X-dimension of a symbol is the size (usually the width) of the smallest element. For a linear symbology this is the width of the smallest bar. For matrix symbologies it is the width of the smallest module (usually a square). Barcode widths and heights are expressed in X-dimensions. Most linear symbologies can have their height varied whereas most matrix symbologies have a fixed width-to-height ratio where the height is determined by the width.

GS1 data

This is a structured way of representing information which consists of 'chunks' of data, each of which starts with an Application Identifier (AI). The AI identifies what type of information is being encoded.

Reader Initialisation (Programming)

Some symbologies allow a special character to be included which can be detected by the scanning equipment as signifying that the data is used to program or change settings in that equipment. This data is usually not passed on to the software which handles normal input data. This feature should only be used if you are familiar with the programming codes relevant to your scanner.

ECI

The Extended Channel Interpretations (ECI) mechanism allows for multi-language data to be encoded in symbols which would usually support only Latin-1 (ISO/IEC 8859-1 plus ASCII) characters. This can be useful, for example, if you need to encode Cyrillic characters, but should be used with caution as not all scanners support this method.

Two other concepts that are important are raster and vector.

raster

A low level bitmap representation of an image. BMP, GIF, PCX, PNG and TIF are raster file formats.

vector

A high level command- or data-based representation of an image. EMF, EPS and SVG are vector file formats. They require renderers to turn them into bitmaps.

2. Installing Zint

2.1 Linux

The easiest way to configure compilation is to take advantage of the CMake utilities. You will need to install CMake and `libpng-dev` first. For instance on apt systems:

```
sudo apt install git cmake build-essential libpng-dev
```

If you want to take advantage of Zint Barcode Studio you will also need to have Qt and its component "Desktop gcc 64-bit" installed, as well as mesa. For details see "README.linux" in the project root directory.

Once you have fulfilled these requirements unzip the source code tarball or clone the latest source

```
git clone https://git.code.sf.net/p/zint/code zint
```

and follow these steps in the top directory:

```
mkdir build
cd build
cmake ..
make
sudo make install
```

The CLI command line program can be accessed by typing

```
zint [options]
```

The GUI can be accessed by typing

```
zint-qt
```

To test that the installation has been successful a shell script is included in the "frontend" sub-directory. To run the test type

```
./test.sh
```

This should create numerous files in the sub-directory "frontend/test_sh_out" showing the many modes of operation which are available from Zint.

2.2 BSD

The latest Zint CLI, `libzint` library and GUI can be installed from the `zint` package on FreeBSD:

```
su
pkg install zint
exit
```

and on OpenBSD (where the GUI is in a separate `zint-gui` package):

```
su
pkg_add zint zint-gui
exit
```

To build from source see "README.bsd" in the project root directory.

2.3 Microsoft Windows

For Microsoft Windows, Zint is distributed as a binary executable. Simply download the ZIP file, then right-click on the ZIP file and "Extract All". A new folder will be created within which are two binary files:

- `qtZint.exe` - Zint Barcode Studio
- `zint.exe` - Command Line Interface

For fresh releases you will get a warning message from Microsoft Defender SmartScreen that this is an 'unrecognised app'. This happens because Zint is a free and open-source software project with no advertising and hence no income, meaning we are not able to afford the \$664 per year to have the application digitally signed by Microsoft.

To build Zint on Windows from source, see "win32/README".

2.4 Apple macOS

The latest Zint CLI and `libzint` can be installed using Homebrew.¹ To install Homebrew input the following line into the macOS terminal

```
/bin/bash -c "$(curl -fsSL \
  https://raw.githubusercontent.com/Homebrew/install/HEAD/install.sh)"
```

Once Homebrew is installed use the following command to install the CLI and library

```
brew install zint
```

To build from source (and install the GUI) see "`README.macos`" in the project root directory.

2.5 Zint Tcl Backend

The Tcl backend in the "`backend_tcl`" sub-directory may be built using the provided TEA (Tcl Extension Architecture) build on Linux, Windows, macOS and Android. For Windows, an MSVC6 makefile is also available. See [Annex C. Tcl Backend Binding](#) for further details.

¹See the Homebrew website <https://brew.sh>.

3. Using Zint Barcode Studio

Zint Barcode Studio is the graphical user interface for Zint. If you are starting from a command line interface you can start the GUI by typing

```
zint-qt
```

or on Windows

```
qtZint.exe
```

See the note in section [2.3 Microsoft Windows](#) about Microsoft Defender SmartScreen.

Below is a brief guide to Zint Barcode Studio.

3.1 Main Window and Data Tab

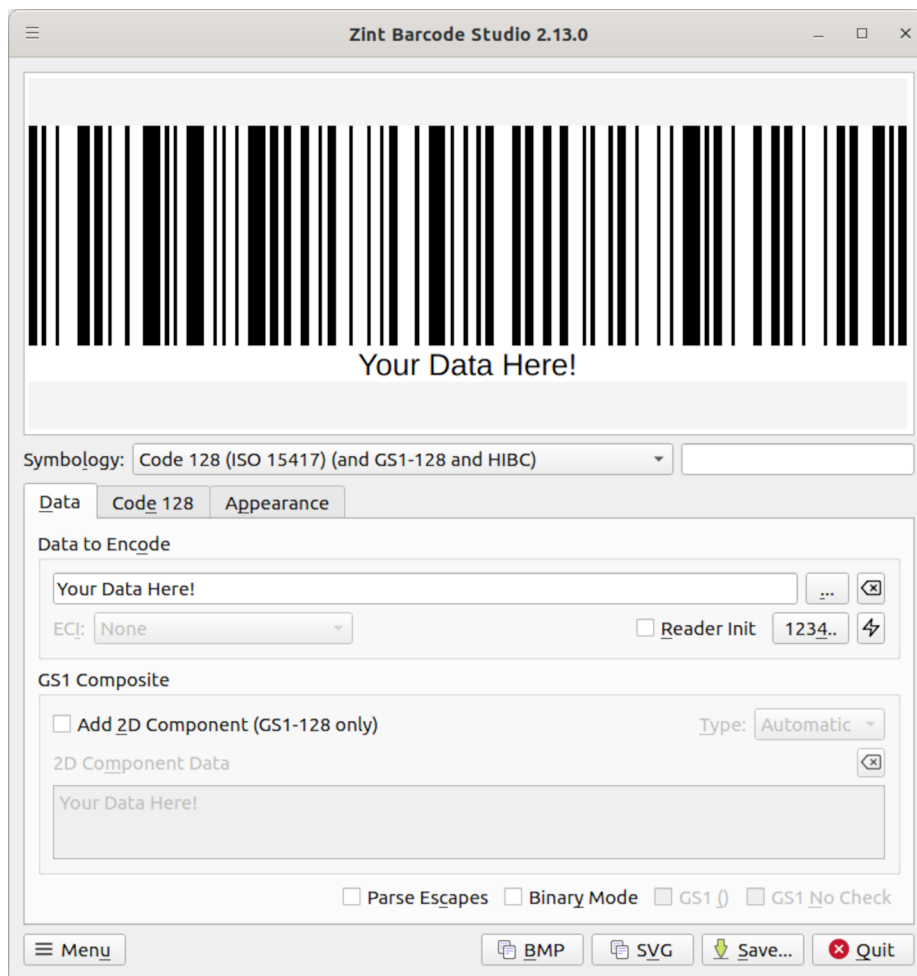



Figure 1: Zint Barcode Studio on startup - main window with Data tab

This is the main window of Zint Barcode Studio. The top of the window shows a preview of the barcode that the current settings would create. These settings can be changed using the controls below. The text box in the "Data to Encode" groupbox on this first Data tab allows you to enter the data to be encoded. When you are happy with your settings you can use the "Save . . ." button to save the resulting image to a file.

The "Symbology" drop-down box gives access to all of the symbologies supported by Zint shown in alphabetical order. The text box to its right can filter the drop-down to only show matching symbologies. For instance typing "mail" will only show barcodes in the drop-down whose names contain the word "mail". Each word entered will match. So typing "mail post" will show barcodes whose names contain "mail" or "post" (or both).

The ellipsis button ". . ." to the right of the data text box invokes the Data Dialog - see [3.7 Data Dialog](#) for details. The delete button  next to it will clear the data text box and the ECI (Extended Channel Interpretations) drop-down if set.

To set the barcode as a Programming Initialisation symbol click the "Reader Init" checkbox. The "1234..." button to its right invokes the Sequence Dialog - see [3.8 Sequence Dialog](#). The zap button ⚡ will clear all data and reset all settings for the barcode to defaults.

The "BMP" and "SVG" buttons at the bottom will copy the image to the clipboard in BMP format and SVG format respectively. Further copy-to-clipboard formats are available by clicking the "Menu" button, along with "CLI Equivalent...", "Save As...", "Factory Reset...", "Help", "About..." and "Quit" options. Most of the options are also available in a context menu by right-clicking the preview.

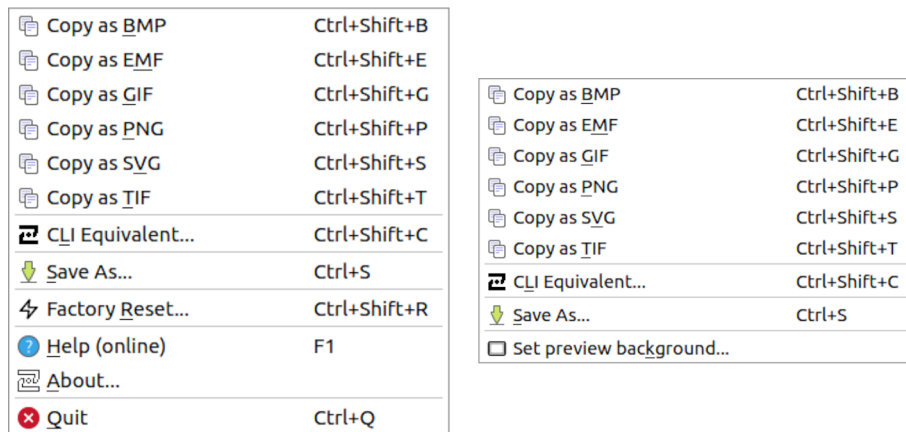


Figure 2: Zint Barcode Studio main menu (left) and context menu (right)

3.2 GS1 Composite Groupbox

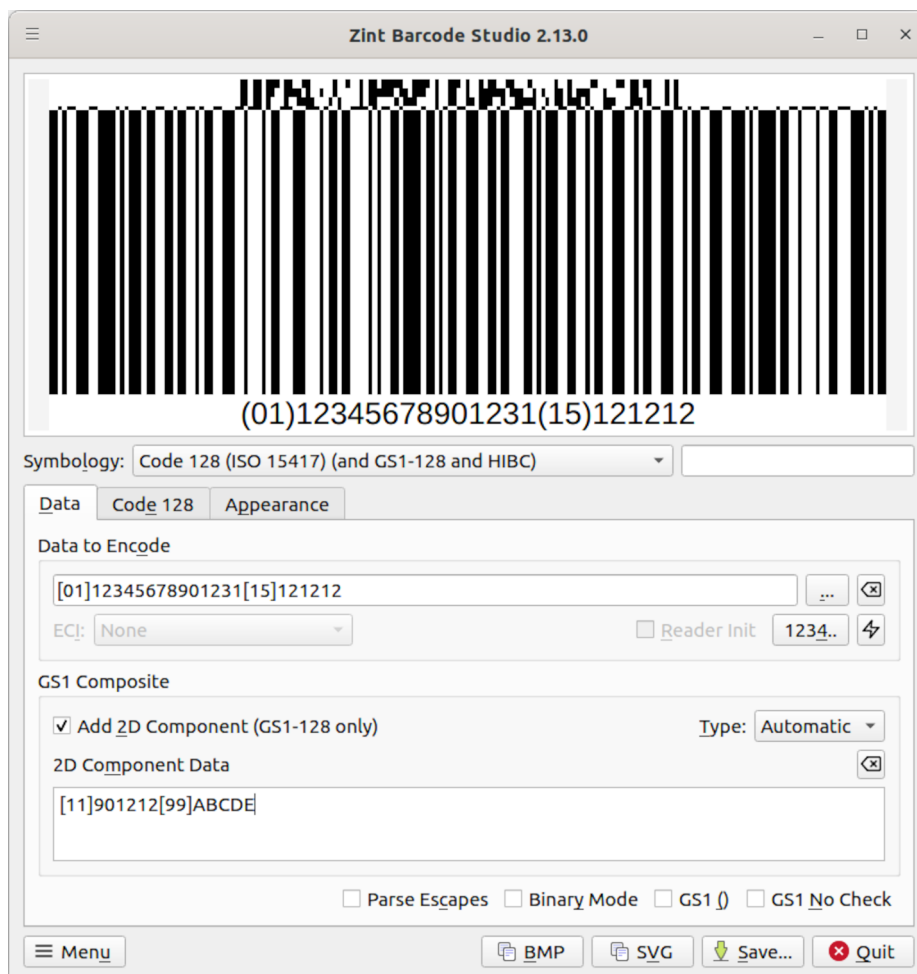


Figure 3: Zint Barcode Studio encoding GS1 Composite data

In the middle of the Data tab is an area for creating composite symbologies which appears when the currently selected symbology is supported by the GS1 Composite symbology standard. GS1 data can then be entered with square brackets used to separate Application Identifier (AI) information from data as shown here. For details, see [6.3 GS1 Composite Symbols \(ISO 24723\)](#).

3.3 Additional ECI/Data Segments Groupbox

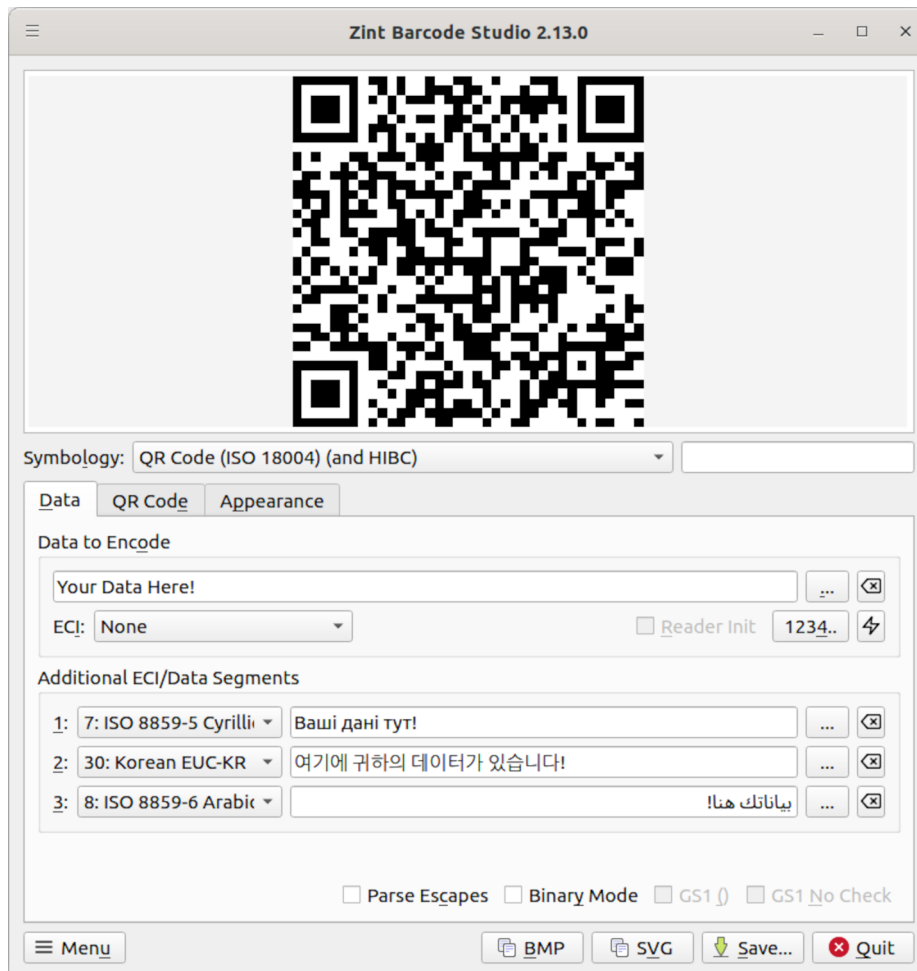


Figure 4: Zint Barcode Studio encoding multiple segments

For symbologies that support ECIs (Extended Channel Interpretations) the middle of the Data tab is an area for entering additional data segments with their own ECIs. Up to 4 segments (including the main "Data to Encode" as segment 0) may be specified. See [4.16 Multiple Segments](#) for details.

3.4 Symbology-specific Groupbox

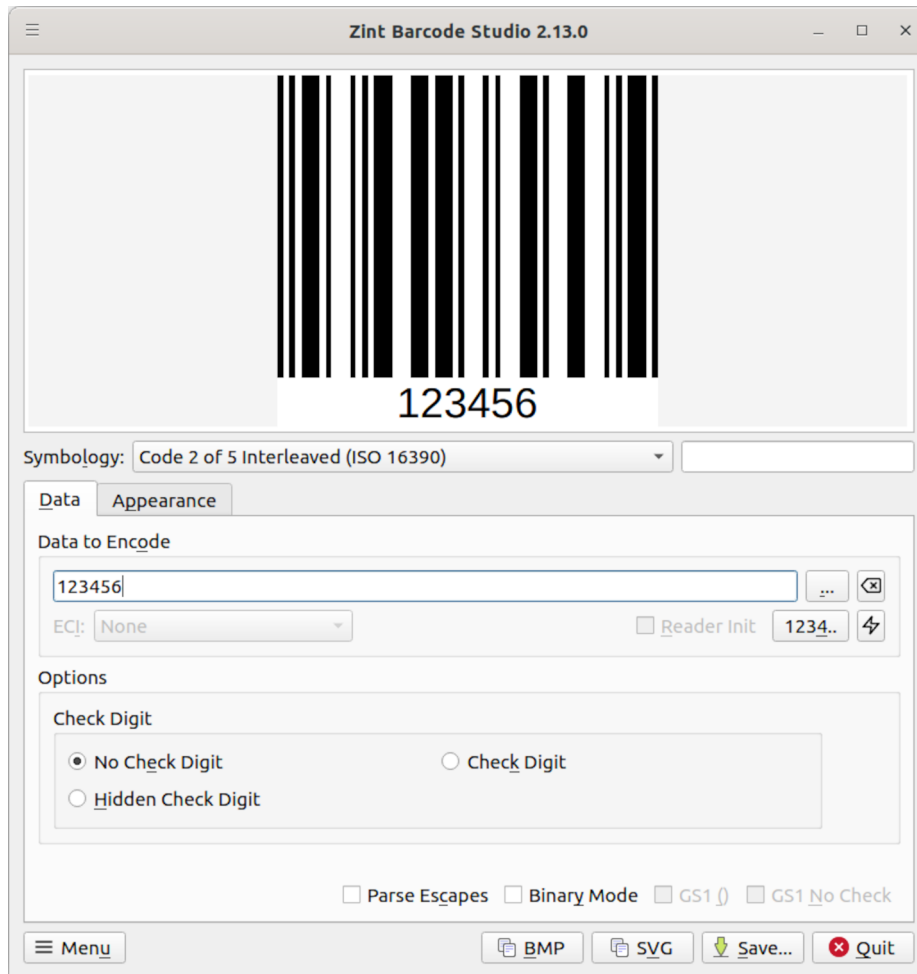


Figure 5: Zint Barcode Studio showing Code 2 of 5 Interleaved settings

Many symbologies have extra options to change the content, format and appearance of the symbol generated. For those with few additional options (and no support for GS1 data or ECIs), the middle of the Data tab is an area for setting those options.

Here is shown the check digit options for an Interleaved Code 2 of 5 symbol (see [6.1.2.4 Interleaved Code 2 of 5 \(ISO 16390\)](#)).

Symbologies with more than a few options (or support for GS1 data or ECIs) have a second Symbology-specific tab, shown next.

3.5 Symbology-specific Tab

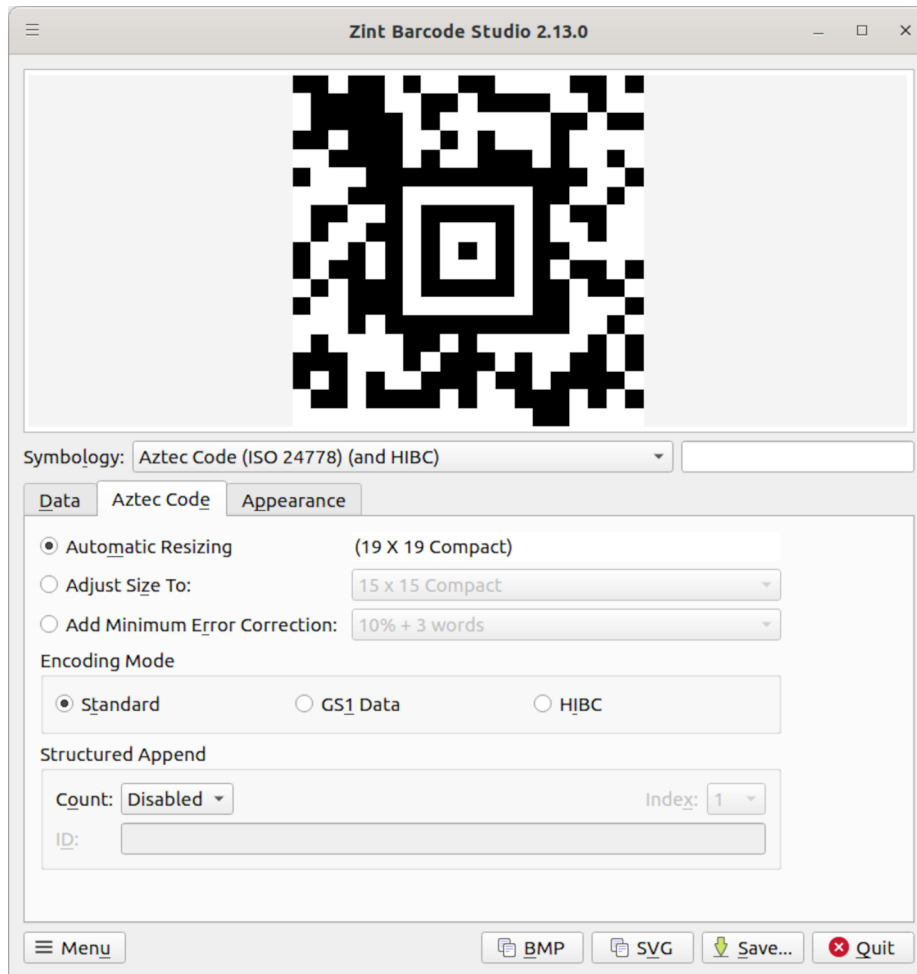


Figure 6: Zint Barcode Studio showing Aztec Code options

A second tab appears for those symbolologies with more than a few extra options.

Here is shown the options available for an Aztec Code symbol.

You can adjust its size or error correction level (see [6.6.8 Aztec Code \(ISO 24778\)](#)), select how its data is to be treated (see [4.11 Input Modes](#)), and set it as part of a Structured Append sequence of symbols (see [4.17 Structured Append](#)).

3.6 Appearance Tab

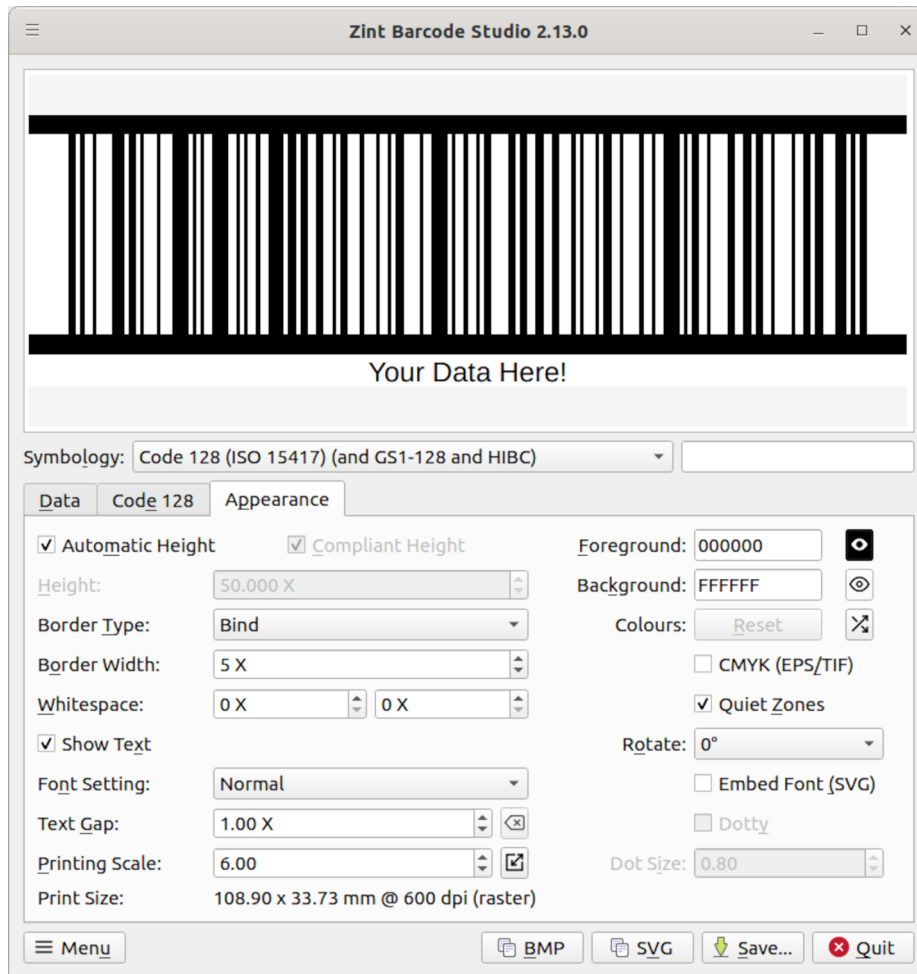


Figure 7: Zint Barcode Studio showing Appearance tab options

The Appearance tab can be used to adjust the dimensions and other properties of the symbol.

The "Height" value affects the height of symbologies which do not have a fixed width-to-height ratio, i.e. those other than matrix symbologies. For such symbologies the "Automatic Height" checkbox will be enabled - uncheck this to manually adjust the height. The "Compliant Height" checkbox applies to symbologies that define a standard height - see [4.4 Adjusting Height](#).

Boundary bars can be added with the "Border Type" drop-down and their size adjusted with "Border Width", and whitespace can be adjusted both horizontally (first spinbox) and vertically (second spinbox), and also through the "Quiet Zones" checkbox if standard quiet zones are defined for the symbology.

The size of the saved image can be specified with "Printing Scale", and also by clicking the  icon to invoke the Set Printing Scale Dialog - see [4.9 Adjusting Image Size \(X-dimension\)](#) for further details.

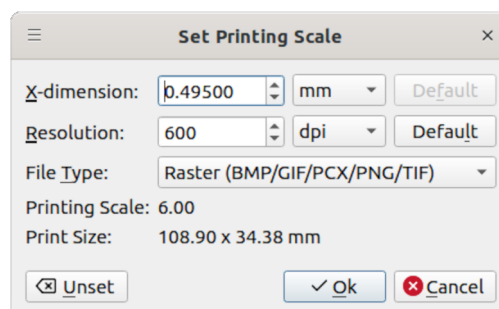




Figure 8: Adjusting the Print Size

The foreground and background colours can be set either using the text boxes which accept "RRGGBBAA" hexadecimal values and "C, M, Y, K" decimal percentage values, or by clicking the foreground eye  and background eye  buttons which invoke a colour picker.

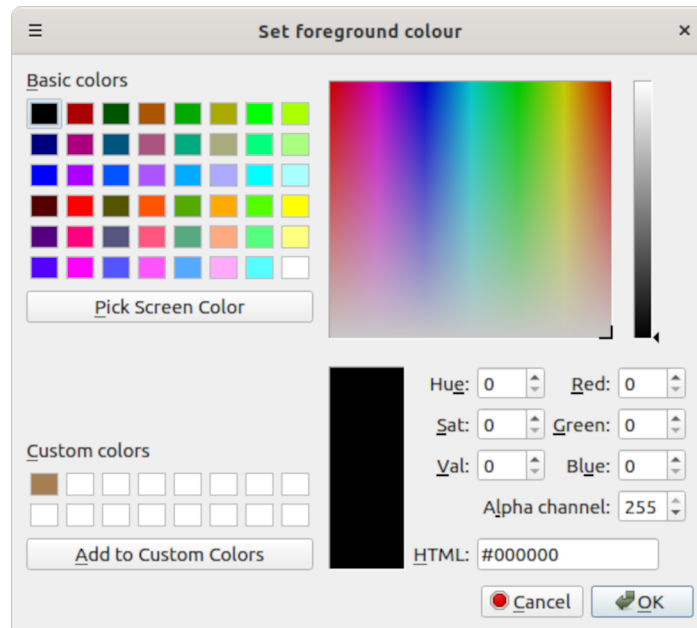


Figure 9: The colour picker tool

(Note that to change the colours visually, the luminence slider, the long narrow column on the right, must be adjusted.) The color picker only deals in RGB(A), and will overwrite any CMYK values with RGB(A) values once "OK" is selected.

Back in the Appearance tab, the colours can be reset to black-on-white using the "Reset " button, and exchanged one for the other using the swap  button next to it.

3.7 Data Dialog

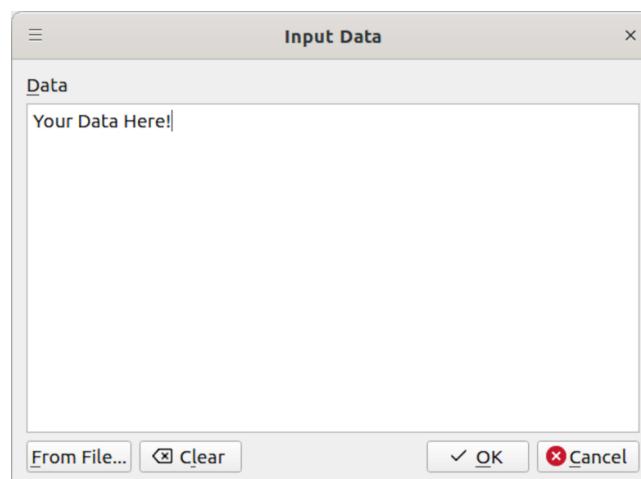


Figure 10: Entering longer text input

Clicking on the ellipsis "... " button next to the "Data to Encode" text box in the Data tab opens a larger window which can be used to enter longer strings of text. You can also use this window to load data from a file.

The dialog is also available for additional ECI/Data segments by clicking the ellipsis button to the right of their data text boxes.

Note that if your data contains line feeds (LF) then the data will be split into separate lines in the dialog box. On saving the data back to the main text box any separate lines in the data will be escaped as '\n' and the "Parse Escapes" checkbox will be set. This only affects line feeds, not carriage returns (CR) or CR+LF pairs, and behaves the same on both Windows and Unix. (For details on escape sequences, see [4.1 Inputting Data](#).)

3.8 Sequence Dialog

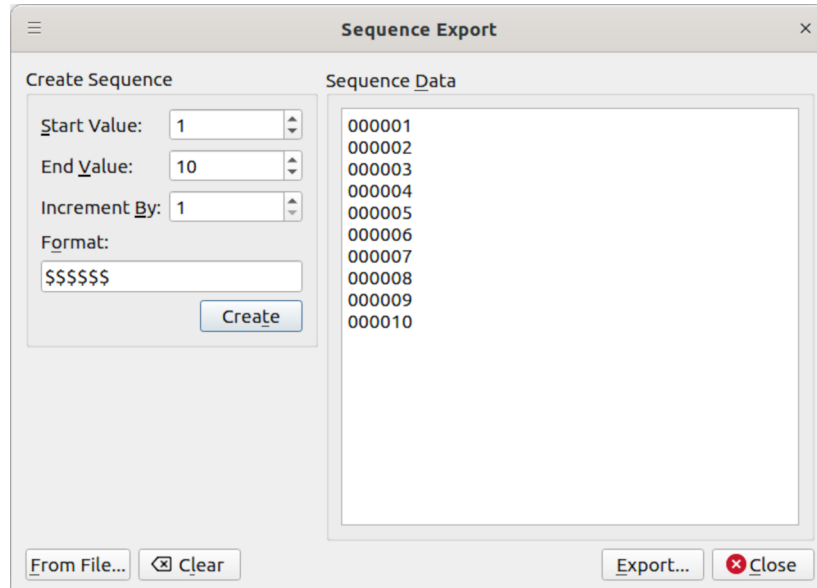


Figure 11: Creating a sequence of barcode symbols

Clicking on the sequence button (labelled "1234 . .") in the Data tab opens the Sequence Dialog. This allows you to create multiple barcode images by entering a sequence of data inputs in the right hand panel. Sequences can also be automatically generated by entering parameters on the left hand side or by importing the data from a file. Zint will generate a separate barcode image for each line of text in the right hand panel. The format field determines the format of the automatically generated sequence where characters have the meanings as given below:

Table : Sequence Format Characters

Character	Effect
\$	Insert leading zeroes
#	Insert leading spaces
*	Insert leading asterisks
Any other character	Interpreted literally

Once you're happy with the Sequence Data, click the "Export . . ." button to bring up the Export Dialog, discussed next.

3.9 Export Dialog

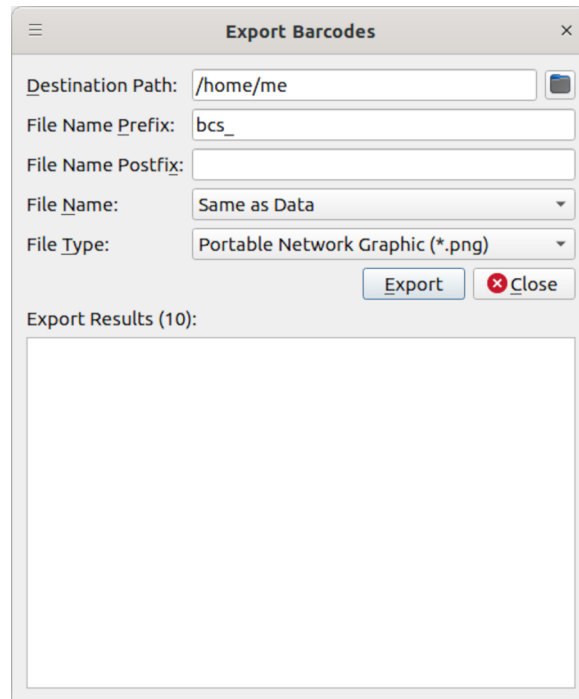


Figure 12: Setting filenames for an exported sequence of barcode symbols

The Export Dialog invoked by pressing the "Export . . ." button in the Sequence Dialog sets the parameters for exporting the sequence of barcode images. Here you can set the output directory, the format of the output filenames and what their image type will be. Note that the symbology, colour and other formatting information are taken from the main window.

3.10 CLI Equivalent Dialog

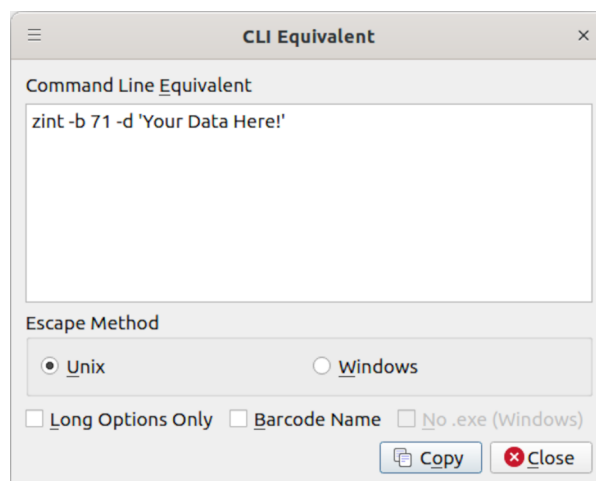


Figure 13: CLI Equivalent Dialog

The CLI Equivalent Dialog can be invoked from the main menu or the context menu and displays the CLI command that will reproduce the barcode as currently configured in the GUI. Press the "Copy" button to copy the command to the clipboard, which can then be pasted into the command line.

4. Using the Command Line

This section describes how to encode data using the command line frontend (CLI) program. The examples given are for the Unix platform, but the same options are available for Windows - just remember to include the executable file extension if ".EXE" is not in your PATHEXT environment variable, i.e.:

```
zint.exe -d "This Text"
```

For compatibility with Windows the examples use double quotes to delimit data, though on Unix single quotes are generally preferable as they stop the shell from processing any characters such as backslash or dollar. A single quote itself is dealt with by terminating the single-quoted text, backslashing the single quote, and then continuing:

```
zint -d 'Text containing a single quote '\'' in the middle'
```

Some examples use backslash (\) to continue commands onto the next line. For Windows, use caret (^) instead.

Certain options that take values have short names as well as long ones, namely -b (--barcode), -d (--data), -i (--input), -o (--output) and -w (--whitespace). For these a space should be used to separate the short name from its value, to avoid ambiguity. For long names a space or an equals sign may be used. For instance:

```
zint -d "This Text"
zint --data="This Text"
zint --data "This Text"
```

The examples use a space separator for short option names, and an equals sign for long option names.

4.1 Inputting Data

The data to encode can be entered at the command line using the -d or --data option, for example

```
zint -d "This Text"
```

This will encode the text "This Text". Zint will use the default symbology, Code 128, and output to the default file "out.png" in the current directory. Alternatively, if libpng was not present when Zint was built, the default output file will be "out.gif".

The data input to the Zint CLI is assumed to be encoded in UTF-8 (Unicode) format (Zint will correctly handle UTF-8 data on Windows). If you are encoding characters beyond the 7-bit ASCII set using a scheme other than UTF-8 then you will need to set the appropriate input options as shown in [4.11 Input Modes](#) below.

Non-printing characters can be entered on the command line using backslash (\) as an escape character in combination with the --esc switch. Permissible sequences are shown in the table below.

Table : Escape Sequences

Escape Sequence	ASCII Equivalent	Name	Interpretation
\0	0x00	NUL	Null character
\E	0x04	EOT	End of Transmission
\a	0x07	BEL	Bell
\b	0x08	BS	Backspace
\t	0x09	HT	Horizontal Tab
\n	0x0A	LF	Line Feed
\v	0x0B	VT	Vertical Tab
\f	0x0C	FF	Form Feed
\r	0x0D	CR	Carriage Return
\e	0x1B	ESC	Escape
\G	0x1D	GS	Group Separator
\R	0x1E	RS	Record Separator
\\	0x5C	\	Backslash
\dNNN	NNN		Any 8-bit character where NNN is decimal (000-255)
\oNNN	0oNNN		Any 8-bit character where NNN is octal (000-377)
\xNN	0xNN		Any 8-bit character where NN is hexadecimal (00-FF)

Escape Sequence	ASCII Equivalent	Name	Interpretation
\UNNNN			Any 16-bit Unicode BMP ² character where NNNN is hexadecimal (0000-FFFF)
\UNNNNNN			Any 21-bit Unicode character where NNNNNN is hexadecimal (000000-10FFFF)

(Special escape sequences are available for Code 128 only to manually switch Code Sets - see [6.1.10.1 Standard Code 128 \(ISO 15417\)](#) for details.)

Input data can be read directly from file using the `-i` or `--input` switch as shown below. The input file is assumed to be UTF-8 formatted unless an alternative mode is selected. This command replaces the use of the `-d` switch.

```
zint -i somefile.txt
```

To read from stdin specify a single hyphen "-" as the input file.

Note that except when batch processing (see [4.12 Batch Processing](#) below), the file (or stdin) should not end with a newline (LF on Unix, CR+LF on Windows) unless you want the newline to be encoded in the symbol.

4.2 Directing Output

Output can be directed to a file other than the default using the `-o` or `--output` switch. For example:

```
zint -o here.png -d "This Text"
```

This draws a Code 128 barcode in the file "here.png". If an Encapsulated PostScript file is needed simply append the filename with ".eps", and so on for the other supported file types:

```
zint -o there.eps -d "This Text"
```

The currently supported output file formats are shown in the following table.

Table : Output File Formats

Extension	File format
bmp	Windows Bitmap
emf	Enhanced Metafile Format
eps	Encapsulated PostScript
gif	Graphics Interchange Format
pcx	ZSoft Paintbrush image
png	Portable Network Graphic
svg	Scalable Vector Graphic
tif	Tagged Image File Format
txt	Text file (see 4.19 Other Options)

The filename can contain directories and sub-directories also, which will be created if they don't already exist:

```
zint -o "dir/subdir/filename.eps" -d "This Text"
```

Note that on Windows, filenames are assumed to be UTF-8 encoded.

4.3 Selecting Barcode Type

Selecting which type of barcode you wish to produce (i.e. which symbology to use) can be done at the command line using the `-b` or `--barcode` switch followed by the appropriate integer value or name in the following table. For example to create a Data Matrix symbol you could use:

```
zint -b 71 -o datamatrix.png -d "Data to encode"
```

²In Unicode contexts, BMP stands for Basic Multilingual Plane, the plane 0 codeset from U+0000 to U+D7FF and U+E000 to U+FFFF (i.e. excluding surrogates). Not to be confused with the Windows Bitmap file format BMP!

or

```
zint -b DATAMATRIX -o datamatrix.png -d "Data to encode"
```

Names are treated case-insensitively by the CLI, and the `BARCODE_` prefix and any underscores are optional.

Table : Barcode Types (Symbolologies)

Numeric Value	Name ³	Barcode Name
1	BARCODE_CODE11	Code 11
2*	BARCODE_C25STANDARD	Standard Code 2 of 5
3	BARCODE_C25INTER	Interleaved 2 of 5
4	BARCODE_C25IATA	Code 2 of 5 IATA
6	BARCODE_C25LOGIC	Code 2 of 5 Data Logic
7	BARCODE_C25IND	Code 2 of 5 Industrial
8	BARCODE_CODE39	Code 3 of 9 (Code 39)
9	BARCODE_EXCODE39	Extended Code 3 of 9 (Code 39+)
13	BARCODE_EANX	EAN (EAN-2, EAN-5, EAN-8 and EAN-13)
14	BARCODE_EANX_CHK	EAN + Check Digit
16*	BARCODE_GS1_128	GS1-128 (UCC.EAN-128)
18	BARCODE_CODABAR	Codabar
20	BARCODE_CODE128	Code 128 (automatic Code Set switching)
21	BARCODE_DPLEIT	Deutsche Post Leitcode
22	BARCODE_DPIDENT	Deutsche Post Identcode
23	BARCODE_CODE16K	Code 16K
24	BARCODE_CODE49	Code 49
25	BARCODE_CODE93	Code 93
28	BARCODE_FLAT	Flattermarken
29*	BARCODE_DBAR_OMN	GS1 DataBar Omnidirectional (including GS1 DataBar Truncated)
30*	BARCODE_DBAR_LTD	GS1 DataBar Limited
31*	BARCODE_DBAR_EXP	GS1 DataBar Expanded
32	BARCODE_TELEPEN	Telepen Alpha
34	BARCODE_UPCA	UPC-A
35	BARCODE_UPCA_CHK	UPC-A + Check Digit
37	BARCODE_UPCE	UPC-E
38	BARCODE_UPCE_CHK	UPC-E + Check Digit
40	BARCODE_POSTNET	POSTNET
47	BARCODE_MSI_PLESSEY	MSI Plessey
49	BARCODE_FIM	FIM
50	BARCODE_LOGMARS	LOGMARS
51	BARCODE_PHARMA	Pharmacode One-Track
52	BARCODE_PZN	PZN
53	BARCODE_PHARMA_TWO	Pharmacode Two-Track
54	BARCODE_CEPNET	Brazilian CEPNet
55	BARCODE_PDF417	PDF417
56*	BARCODE_PDF417COMP	Compact PDF417 (Truncated PDF417)
57	BARCODE_MAXICODE	MaxiCode
58	BARCODE_QRCODE	QR Code
60	BARCODE_CODE128AB	Code 128 (Suppress Code Set C)
63	BARCODE_AUSPOST	Australia Post Standard Customer
66	BARCODE_AUSREPLY	Australia Post Reply Paid
67	BARCODE_AUSRROUTE	Australia Post Routing
68	BARCODE_AUSDIRECT	Australia Post Redirection
69	BARCODE_ISBNX	ISBN (EAN-13 with verification stage)
70	BARCODE_RM4SCC	Royal Mail 4-State Customer Code (RM4SCC)
71	BARCODE_DATAMATRIX	Data Matrix (ECC200)
72	BARCODE_EAN14	EAN-14
73	BARCODE_VIN	Vehicle Identification Number
74	BARCODE_CODABLOCKF	Codablock-F

Numeric Value	Name	Barcode Name
75	BARCODE_NVE18	NVE-18 (SSCC-18)
76	BARCODE_JAPANPOST	Japanese Postal Code
77	BARCODE_KOREAPOST	Korea Post
79*	BARCODE_DBAR_STK	GS1 DataBar Stacked
80*	BARCODE_DBAR_OMNSTK	GS1 DataBar Stacked Omnidirectional
81*	BARCODE_DBAR_EXPSTK	GS1 DataBar Expanded Stacked
82	BARCODE_PLANET	PLANET
84	BARCODE_MICROPDF417	MicroPDF417
85*	BARCODE_USPS_IMAIL	USPS Intelligent Mail (OneCode)
86	BARCODE_PLESSEY	UK Plessey
87	BARCODE_TELEPEN_NUM	Telepen Numeric
89	BARCODE_ITF14	ITF-14
90	BARCODE_KIX	Dutch Post KIX Code
92	BARCODE_AZTEC	Aztec Code
93	BARCODE_DAFT	DAFT Code
96	BARCODE_DPD	DPD Code
97	BARCODE_MICROQR	Micro QR Code
98	BARCODE_HIBC_128	HIBC Code 128
99	BARCODE_HIBC_39	HIBC Code 39
102	BARCODE_HIBC_DM	HIBC Data Matrix ECC200
104	BARCODE_HIBC_QR	HIBC QR Code
106	BARCODE_HIBC_PDF	HIBC PDF417
108	BARCODE_HIBC_MICPDF	HIBC MicroPDF417
110	BARCODE_HIBC_BLOCKF	HIBC Codablock-F
112	BARCODE_HIBC_AZTEC	HIBC Aztec Code
115	BARCODE_DOTCODE	DotCode
116	BARCODE_HANXIN	Han Xin (Chinese Sensible) Code
119	BARCODE_MAILMARK_2D	Royal Mail 2D Mailmark (CMDM) (Data Matrix)
121	BARCODE_MAILMARK_4S	Royal Mail 4-State Mailmark
128	BARCODE_AZRUNE	Aztec Runes
129	BARCODE_CODE32	Code 32
130	BARCODE_EANX_CC	GS1 Composite Symbol with EAN linear component
131*	BARCODE_GS1_128_CC	GS1 Composite Symbol with GS1-128 linear component
132*	BARCODE_DBAR_OMN_CC	GS1 Composite Symbol with GS1 DataBar Omnidirectional linear component
133*	BARCODE_DBAR_LTD_CC	GS1 Composite Symbol with GS1 DataBar Limited linear component
134*	BARCODE_DBAR_EXP_CC	GS1 Composite Symbol with GS1 DataBar Expanded linear component
135	BARCODE_UPCA_CC	GS1 Composite Symbol with UPC-A linear component
136	BARCODE_UPCE_CC	GS1 Composite Symbol with UPC-E linear component
137*	BARCODE_DBAR_STK_CC	GS1 Composite Symbol with GS1 DataBar Stacked component
138*	BARCODE_DBAR_OMNSTK_CC	GS1 Composite Symbol with GS1 DataBar Stacked Omnidirectional component
139*	BARCODE_DBAR_EXPSTK_CC	GS1 Composite Symbol with GS1 DataBar Expanded Stacked component
140	BARCODE_CHANNEL	Channel Code
141	BARCODE_CODEONE	Code One
142	BARCODE_GRIDMATRIX	Grid Matrix
143	BARCODE_UPNQR	UPNQR (Univerzalnega Plačilnega Naloga QR)
144	BARCODE_ULTRA	Ultracode
145	BARCODE_RMQR	Rectangular Micro QR Code (rMQR)
146	BARCODE_BC412	IBM BC412 (SEMI T1-95)

³The symbologies marked with an asterisk (*) in Table : **Barcode Types (Symbologies)** above used different names in Zint before version 2.9.0. For example, symbology 29 used the name BARCODE_RSS14. These names are now deprecated but are still recognised by Zint and will continue to be supported in future versions.

4.4 Adjusting Height

The height of a symbol (except those with a fixed width-to-height ratio) can be adjusted using the `--height` switch. For example:

```
zint --height=100 -d "This Text"
```

This specifies a symbol height of 100 times the X-dimension of the symbol.

The default height of most linear barcodes is 50X, but this can be changed for barcodes whose specifications give a standard height by using the switch `--complantheight`. For instance

```
zint -b LOGMARS -d "This Text" --complantheight
```

will produce a barcode of height 45.455X instead of the normal default of 50X. The flag also causes Zint to return a warning if a non-compliant height is given:

```
zint -b LOGMARS -d "This Text" --complantheight --height=6.2
```

Warning 247: Height not compliant with standards

Another switch is `--heightperrow`, which can be useful for symbologies that have a variable number of linear rows, namely Codablock-F, Code 16K, Code 49, GS1 DataBar Expanded Stacked, MicroPDF417 and PDF417, as it changes the treatment of the height value from overall height to per-row height, allowing you to specify a consistent height for each linear row without having to know how many there are. For instance

```
zint -b PDF417 -d "This Text" --height=4 --heightperrow
```



Figure 14: `zint -b PDF417 -d "This Text" --height=4 --heightperrow`

will produce a barcode of height 32X, with each of the 8 rows 4X high.

4.5 Adjusting Whitespace

The amount of horizontal whitespace to the left and right of the generated barcode can be altered using the `-w` or `--whitespace` switch, in integral multiples of the X-dimension. For example:

```
zint -w 10 -d "This Text"
```

This specifies a whitespace width of 10 times the X-dimension of the symbol both to the left and to the right of the barcode.

The amount of vertical whitespace above and below the barcode can be altered using the `--vwhitespace` switch, in integral multiples of the X-dimension. For example for 3 times the X-dimension:

```
zint --vwhitespace=3 -d "This Text"
```

Note that the whitespace at the bottom appears below the text, if any.

Horizontal and vertical whitespace can of course be used together:

```
zint -b DATAMATRIX --whitespace=1 --vwhitespace=1 -d "This Text"
```

A `--quietzones` option is also available which adds quiet zones compliant with the symbology's specification. This is in addition to any whitespace specified with the `--whitespace` or `--vwhitespace` switches.

Note that Codablock-F, Code 16K, Code 49, ITF-14, EAN-2 to EAN-13, ISBN, UPC-A and UPC-E have compliant quiet zones added by default. This can be disabled with the option `--noquietzones`.

4.6 Adding Boundary Bars and Boxes

Zint allows the symbol to be bound with 'boundary bars' (also known as 'bearer bars') using the option `--bind`. These bars help to prevent misreading of the symbol by corrupting a scan if the scanning beam strays off the top or bottom of the symbol. Zint can also put a border right around the symbol and its horizontal whitespace with the `--box` option.

The width of the boundary bars or box borders, in integral multiples of the X-dimension, must be specified using the `--border` switch. For example:

```
zint --box --border=10 -w 10 -d "This Text"
```

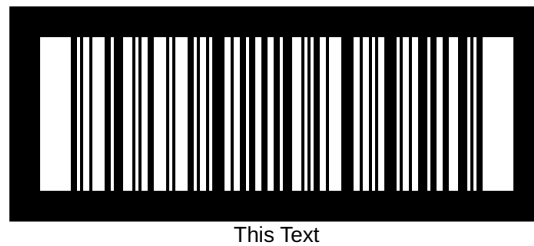


Figure 15: `zint --border=10 --box -d "This Text" -w 10`

gives a box with a width 10 times the X-dimension of the symbol. Note that when specifying a box, horizontal whitespace is usually required in order to create a quiet zone between the barcode and the sides of the box. To add a boundary bar to the top only use `--bindtop`.

For linear symbols, horizontal boundary bars appear tight against the barcode, inside any vertical whitespace (or text). For matrix symbols, however, where they are decorative rather than functional, boundary bars appear outside any whitespace.



Figure 16: `zint -b QRCODE --border=1 --box -d "This Text" --quietzones`

Codablock-F, Code 16K and Code 49 always have boundary bars, and default to particular horizontal whitespace values. Special considerations apply to ITF-14 and DPD - see [6.1.2.6 ITF-14](#) and [6.1.10.7 DPD Code](#) for those symbologies.

4.7 Using Colour

The default colours of a symbol are a black symbol on a white background. Zint allows you to change this. The `-r` or `--reverse` switch allows the default colours to be inverted so that a white symbol is shown on a black background (known as “reflectance reversal” or “reversed reflectance”). For example the command

```
zint -r -d "This Text"
```

gives an inverted Code 128 symbol. This is not practical for most symbologies but white-on-black is allowed by the Aztec Code, Data Matrix, DotCode, Han Xin Code, Grid Matrix and QR Code symbology specifications.

For more specific needs the foreground (ink) and background (paper) colours can be specified using the `--fg` and `--bg` options followed by a number in "RRGGBB" hexadecimal notation (the same system used in HTML) or in "C, M, Y, K" decimal percentages format (the latter normally used with the `--cmyk` option - see below). For example the command

```
zint --fg=00FF00 -d "This Text"
```

alters the symbol to a bright green.



Figure 17: `zint -d "This Text" --fg=00FF00`

Zint also supports RGBA colour information for those output file formats which support alpha channels (currently only GIF, PCX, PNG, SVG and TIF, with GIF supporting either a background or foreground alpha but not both) in a "RRGGBBAA" format. For example:

```
zint --fg=00ff0055 -d "This Text"
```

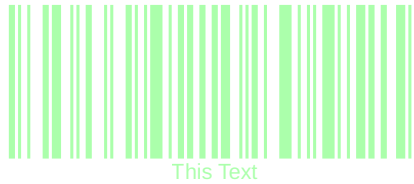


Figure 18: `zint -d "This Text" --fg=00FF0055`

will produce a semi-transparent green foreground with standard (white) background. Note that transparency is treated differently by raster and vector (SVG) output formats, as for vector output the background will “shine through” a transparent foreground. For instance

```
zint --bg=ff0000 --fg=ffffff00 ...
```

will give different results for PNG and SVG. Experimentation is advised!

In addition the `--nobackground` option will remove the background from all output formats except BMP.⁴

The `--cmyk` option is specific to output in Encapsulated PostScript (EPS) and TIF, and selects the CMYK colour space. Custom colours should then usually be given in the comma-separated "C,M,Y,K" format, where C, M, Y and K are expressed as decimal percentage values from 0 to 100. RGB values may still be used, in which case they will be converted formulaically to CMYK approximations.

4.8 Rotating the Symbol

The symbol can be rotated through four orientations using the `--rotate` option followed by the angle of rotation as shown below.

```
--rotate=0 (default)
--rotate=90
--rotate=180
--rotate=270
```



Figure 19: `zint -d "This Text" --rotate=90`

⁴The background is omitted for vector outputs EMF, EPS and SVG when `--nobackground` is given. For raster outputs GIF, PCX, PNG and TIF, the background's alpha channel is set to zero (fully transparent).

4.9 Adjusting Image Size (X-dimension)

The size of the image can be altered using the `--scale` option, which sets the X-dimension. The default scale is 1.

The scale is multiplied by 2 (with the exception of MaxiCode) before being applied to the X-dimension. For MaxiCode, it is multiplied by 10 for raster output, by 40 for EMF vector output, and by 2 otherwise (non-EMF vector output).

For non-MaxiCode raster output, the default scale of 1 results in an X-dimension of 2 pixels. For example for non-MaxiCode PNG images a scale of 5 will increase the X-dimension to 10 pixels. For MaxiCode, see [4.9.3 MaxiCode Raster Scaling](#) below.

Scales for non-MaxiCode raster output should be given in increments of 0.5, i.e. 0.5, 1, 1.5, 2, 2.5, 3, 3.5, etc., to avoid the X-dimension varying across the symbol due to interpolation. 0.5 increments are also faster to render.

The minimum scale for non-MaxiCode raster output in non-dotty mode is 0.5, giving a minimum X-dimension of 1 pixel. For MaxiCode, it is 0.2. The minimum scale for raster output in dotty mode is 1 (see [4.15 Working with Dots](#)). For raster output, text will not be printed for scales less than 1.

The minimum scale for vector output is 0.1, giving a minimum X-dimension of 0.2 (or for MaxiCode EMF output, 4). The maximum scale for both raster and vector is 200.

To summarize the more intricate details:

Table : Scaling Multipliers and Minima

MaxiCode?	Output	Multiplier	Min. Scale (non-dotty)	Min. Scale (dotty)
No	Raster	2	0.5	1
No	Vector	2	0.1	0.1
Yes	Raster	10	0.2	N/A
Yes	Vector (non-EMF)	2	0.1	N/A
Yes	EMF	40	0.1	N/A

4.9.1 Scaling by X-dimension and Resolution

An alternative way to specify the scale, which takes the above details into account, is to specify measurable units using the `--scalexdimp` option, which has the format

```
--scalexdimp=X[, R]
```

where X is the X-dimension (in mm by default) and R is the resolution (in dpmm, dots per mm, by default). R is optional, and defaults to 12 dpmm, and X may be zero, in which case it uses a symbology-specific default. The units may be given in inches for X by appending "in", and in dpi (dots per inch) for R by appending "dpi". For example

```
zint -d "1234" --scalexdimp=0.013in,300dpi
```

Explicit metric units may also be given by appending "mm" and "dpmm" as appropriate, and may be mixed with U.S. units:

```
zint -d "1234" --scalexdimp=0.33mm,300dpi
```

4.9.2 Scaling Example

The GS1 General Specifications Section 5.2.6.6 'Symbol dimensions at nominal size' gives an example of an EAN-13 barcode using the X-dimension of 0.33mm. To print that example as a PNG at 12 dpmm, the approximate equivalent of 300 dpi ($\text{dpi} = \text{dpmm} * 25.4$), specify a scale of 2, since $0.33 * 12 = 3.96$ pixels, or 4 pixels rounding to the nearest pixel:

```
zint -b EANX -d "501234567890" --complantheight --scale=2
```

This will result in output of 37.29mm x 25.56mm (WxH) at 12 dpmm. The same result can be achieved using the `--scalexdimp` option with

```
zint -b EANX -d "501234567890" --complantheight --scalexdimp=0
```

as 0.33mm is the default X-dimension for EAN, and 12 dpmm the default resolution.

4.9.3 MaxiCode Raster Scaling

For MaxiCode symbols, which use hexagons, the scale for raster output is multiplied by 10 before being applied. The 0.5 increment recommended for normal raster output does not apply.

The minimum scale is 0.2, so the minimum X-dimension is 2 pixels. However scales below 0.5 are not recommended and may produce symbols that are not within the following size ranges.

MaxiCode symbols have fixed size ranges of 24.82mm to 27.93mm in width, and 23.71mm to 26.69mm in height, excluding quiet zones. The default X-dimension is 0.88mm. For example, to output at the default X-dimension at 600 dpi specify:

```
zint -b MAXICODE -d "MaxiCode (19 chars)" --scalexdimdp=0,600dpi
```

4.10 Human Readable Text (HRT) Options

For linear barcodes the text present in the output image can be removed by using the `--notext` option. Note also that for raster output text will not be printed for scales less than 1 (see [4.9 Adjusting Image Size \(X-dimension\)](#)).

Text can be set to bold using the `--bold` option, or a smaller font can be substituted using the `--small` option. The `--bold` and `--small` options can be used together if required, but only for vector output.

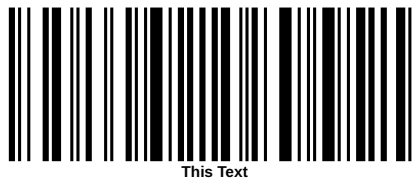


Figure 20: `zint --bold -d "This Text" --small`

The gap between the barcode and the text can be adjusted using the `--textgap` option, where the gap is given in X-dimensions, and may be negative (minimum -5X, maximum 10X). The default gap is 1X. Note that a very small gap may cause accented texts to overlap with the barcode:

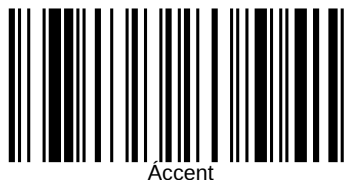


Figure 21: `zint -d "Áccent" --textgap=0.1`

For SVG output, the font preferred by Zint (monospaced “OCR-B” for EAN/UPC, “Arimo” - a proportional sans-serif font metrically compatible with “Arial” - for all others) can be embedded in the file for portability using the `--embedfont` option:



Figure 22: `zint -d "Áccent" --embedfont`

4.11 Input Modes

4.11.1 Unicode, Data, and GS1 Modes

By default all CLI input data is assumed to be encoded in UTF-8 format. Many barcode symbologies encode data using the Latin-1 (ISO/IEC 8859-1 plus ASCII) character set, so input is converted from UTF-8 to Latin-1

before being put in the symbol. In addition QR Code and its variants and Han Xin Code can by default encode Japanese (Kanji) or Chinese (Hanzi) characters which are also converted from UTF-8.

There are two exceptions to the Latin-1 default: Grid Matrix, whose default character set is GB 2312 (Chinese); and UPNQR, whose default character set is Latin-2 (ISO/IEC 8859-2 plus ASCII).

Table : Default Character Sets

Symbology	Default character sets	Alternate if input not Latin-1
Aztec Code	Latin-1	None
Codablock-F	Latin-1	None
Code 128	Latin-1	None
Code 16K	Latin-1	None
Code One	Latin-1	None
Data Matrix	Latin-1	None
DotCode	Latin-1	None
Grid Matrix	GB 2312 (includes ASCII)	N/A
Han Xin	Latin-1	GB 18030 (includes ASCII)
MaxiCode	Latin-1	None
MicroPDF417	Latin-1	None
Micro QR Code	Latin-1	Shift JIS (includes ASCII ⁵)
PDF417	Latin-1	None
QR Code	Latin-1	Shift JIS (see above)
rMQR	Latin-1	Shift JIS (see above)
Ultracode	Latin-1	None
UPNQR	Latin-2	N/A
All others	ASCII	N/A

If Zint encounters characters which can not be encoded using the default character encoding then it will take advantage of the ECI (Extended Channel Interpretations) mechanism to encode the data if the symbology supports it - see [4.11.2 Input Modes and ECI](#) below.

GS1 data can be encoded in a number of symbologies. Application Identifiers (AIs) should be enclosed in [square brackets] followed by the data to be encoded (see [6.1.10.3 GS1-128](#)). To encode GS1 data use the `--gs1` option. GS1 mode is assumed (and doesn't need to be set) for GS1-128, EAN-14, GS1 DataBar and GS1 Composite symbologies but is also available for Aztec Code, Code 16K, Code 49, Code One, Data Matrix, DotCode, QR Code and Ultracode.

Health Industry Barcode (HIBC) data may also be encoded in the symbologies Aztec Code, Codablock-F, Code 128, Code 39, Data Matrix, MicroPDF417, PDF417 and QR Code. Within this mode, the leading '+' and the check character are automatically added by Zint, conforming to HIBC Labeler Identification Code (HIBC LIC). For HIBC Provider Applications Standard (HIBC PAS), preface the data with a slash '/ '.

The `--binary` option encodes the input data as given. Automatic code page translation to an ECI page is disabled, and no validation of the data's encoding takes place. This may be used for raw binary or binary encrypted data. This switch plays together with the built-in ECI logic and examples may be found below.

The `--fullmultibyte` option uses the multibyte modes of QR Code, Micro QR Code, Rectangular Micro QR Code, Han Xin Code and Grid Matrix for non-ASCII data, maximizing density. This is achieved by using compression designed for Kanji/Hanzi characters; however some decoders take blocks which are encoded this way and interpret them as Kanji/Hanzi characters, thus causing data corruption. Symbols encoded with this option should be checked against decoders before they are used. The popular open-source ZXing decoder is known to exhibit this behaviour.

4.11.2 Input Modes and ECI

If your data contains characters that are not in the default character set, you may encode it using an ECI-aware symbology and an ECI value from [Table : ECI Codes](#) below. The ECI information is added to your code symbol as prefix data. The symbologies that support ECI are

⁵Shift JIS (JIS X 0201 Roman) re-maps two ASCII characters: backslash (\) to the yen sign (¥), and tilde (~) to overline (U+203E).

Table : ECI-Aware Symbolologies

Aztec Code	Grid Matrix	PDF417
Code One	Han Xin Code	QR Code
Data Matrix	MaxiCode	rMQR
DotCode	MicroPDF417	Ultracode

Be aware that not all barcode readers support ECI mode, so this can sometimes lead to unreadable barcodes. If you are using characters beyond those supported by the default character set then you should check that the resulting barcode can be understood by your target barcode reader.

The ECI value may be specified with the `--eci` switch, followed by the value in the column "ECI Code" in the table below. The input data should be UTF-8 formatted. Zint automatically translates the data into the target encoding.

Table : ECI Codes

ECI Code	Character Encoding Scheme (ISO/IEC 8859 schemes include ASCII)
3	ISO/IEC 8859-1 - Latin alphabet No. 1
4	ISO/IEC 8859-2 - Latin alphabet No. 2
5	ISO/IEC 8859-3 - Latin alphabet No. 3
6	ISO/IEC 8859-4 - Latin alphabet No. 4
7	ISO/IEC 8859-5 - Latin/Cyrillic alphabet
8	ISO/IEC 8859-6 - Latin/Arabic alphabet
9	ISO/IEC 8859-7 - Latin/Greek alphabet
10	ISO/IEC 8859-8 - Latin/Hebrew alphabet
11	ISO/IEC 8859-9 - Latin alphabet No. 5 (Turkish)
12	ISO/IEC 8859-10 - Latin alphabet No. 6 (Nordic)
13	ISO/IEC 8859-11 - Latin/Thai alphabet
15	ISO/IEC 8859-13 - Latin alphabet No. 7 (Baltic)
16	ISO/IEC 8859-14 - Latin alphabet No. 8 (Celtic)
17	ISO/IEC 8859-15 - Latin alphabet No. 9
18	ISO/IEC 8859-16 - Latin alphabet No. 10
20	Shift JIS (JIS X 0208 and JIS X 0201)
21	Windows 1250 - Latin 2 (Central Europe)
22	Windows 1251 - Cyrillic
23	Windows 1252 - Latin 1
24	Windows 1256 - Arabic
25	UTF-16BE (High order byte first)
26	UTF-8
27	ASCII (ISO/IEC 646 IRV)
28	Big5 (Taiwan) Chinese Character Set
29	GB 2312 (PRC) Chinese Character Set
30	Korean Character Set EUC-KR (KS X 1001:2002)
31	GBK Chinese Character Set
32	GB 18030 Chinese Character Set
33	UTF-16LE (Low order byte first)
34	UTF-32BE (High order bytes first)
35	UTF-32LE (Low order bytes first)
170	ISO/IEC 646 Invariant ⁶
899	8-bit binary data

An ECI value of 0 does not encode any ECI information in the code symbol (unless the data contains non-default character set characters). In this case, the default character set applies (see Table : [Default Character Sets](#) above).

If no ECI is specified or a value of 0 is given, and the data does contain characters other than in the default character set, then Zint will automatically insert the appropriate single-byte ECI if possible (ECIs 3 to 24, excluding

⁶ISO/IEC 646 Invariant is a subset of ASCII with 12 characters undefined: #, \$, @, [, \,], ^, ` , {, |, }, ~.

ECI 20), or failing that ECI 26 (UTF-8). A warning will be generated. This mechanism is not applied if the `--binary` option is given.

Multiple ECIs can be specified using the `--segN` options - see [4.16 Multiple Segments](#).

Note: the `--eci=3` specification should only be used for special purposes. Using this parameter, the ECI information is explicitly added to the symbol. Nevertheless, for ECI Code 3, this is not usually required, as this is the default encoding for most barcodes, which is also active without any ECI information.

4.11.2.1 Input Modes and ECI Example 1

The Euro sign U+20AC can be encoded in ISO/IEC 8859-15. The Euro sign has the ISO/IEC 8859-15 codepoint hex "A4". It is encoded in UTF-8 as the hex sequence: "E2 82 AC". Those 3 bytes are contained in the file "utf8euro.txt". This command will generate the corresponding code:

```
zint -b 71 --scale=10 --eci=17 -i utf8euro.txt
```

This is equivalent to the commands (using the `--esc` switch):

```
zint -b 71 --scale=10 --eci=17 --esc -d "\xE2\x82\xAC"
```

```
zint -b 71 --scale=10 --eci=17 --esc -d "\u20AC"
```

and to the command:

```
zint -b 71 --scale=10 --eci=17 -d "€"
```



Figure 23: `zint -b DATAMATRIX --eci=17 -d "€"`

4.11.2.2 Input Modes and ECI Example 2

The Chinese character with the Unicode codepoint U+5E38 can be encoded in Big5 encoding. The Big5 representation of this character is the two hex bytes: "B1 60" (contained in the file "big5char.txt"). The generation command for Data Matrix is:

```
zint -b 71 --scale=10 --eci=28 --binary -i big5char.txt
```

This is equivalent to the command (using the `--esc` switch):

```
zint -b 71 --scale=10 --eci=28 --binary --esc -d "\xB1\x60"
```

and to the commands (no `--binary` switch so conversion occurs):

```
zint -b 71 --scale=10 --eci=28 --esc -d "\xE5\xB8\xB8"
```

```
zint -b 71 --scale=10 --eci=28 --esc -d "\u5E38"
```

```
zint -b 71 --scale=10 --eci=28 -d "常"
```



Figure 24: `zint -b DATAMATRIX --eci=28 -d "\u5E38" --esc`

4.11.2.3 Input Modes and ECI Example 3

Some decoders (in particular mobile app ones) for QR Code assume UTF-8 encoding by default and do not support ECI. In this case supply UTF-8 data and use the `--binary` switch so that the data will be encoded as UTF-8 without conversion:

```
zint -b 58 --binary -d "UTF-8 data"
```



Figure 25: `zint -b QRCODE --binary -d "\xE2\x82\xAC\xE5\xB8\xB8" --esc`

4.12 Batch Processing

Data can be batch processed by reading from a text file and producing a separate barcode image for each line of text in that file. To do this use the `--batch` switch together with `-i` to select the input file from which to read data. For example

```
zint -b EANX --batch -i ean13nos.txt
```

where "ean13nos.txt" contains a list of EAN-13 numbers (GTINs), each on its own line. Zint will automatically detect the end of a line of text (in either Unix or Windows formatted text files) and produce a symbol each time it finds this.

Input files should end with a line feed character - if this is not present then Zint will not encode the last line of text, and will warn you that there is a problem.

By default Zint will output numbered filenames starting with 00001.png, 00002.png etc. To change this behaviour specify the `-o` option using special characters in the output filename as shown in the table below:

Table : Batch Filename Formatting

Input Character	Interpretation
~	Insert a number or 0
#	Insert a number or space
@	Insert a number or * (or + on Windows)
Any other	Insert literally

For instance

```
zint -b EANX --batch -i ean13nos.txt -o file~~~.svg
```

The following table shows some examples to clarify this method:

Table : Batch Filename Examples

Input	Filenames Generated
-o file~~~.svg	"file001.svg", "file002.svg", "file003.svg"
-o @@@@bar.png	"***1.png", "***2.png", "***3.png" (except Windows)
-o @@@@bar.png	"+++1.png", "+++2.png", "+++3.png" (on Windows)
-o my~~~bar.eps	"my001bar.eps", "my002bar.eps", "my003bar.eps"
-o t#es~t~.png	"t es0t1.png", "t es0t2.png", "t es0t3.png"

The special characters can span directories also, which is useful when creating a large number of barcodes:

Table : Batch Directory Examples

Input	Filenames Generated
-o dir~/file~~~.svg	"dir0/file001.svg", "dir0/file002.svg", ..., "dir0/file999.svg", "dir1/file000.svg", ...

For an alternative method of naming output files see the `--mirror` option in [4.14 Automatic Filenames](#) below.

4.13 Direct Output to stdout

The finished image files can be output directly to stdout for use as part of a pipe by using the `--direct` option. By default `--direct` will output data as a PNG image (or GIF image if `libpng` is not present), but this can be altered by supplementing the `--direct` option with a `--filetype` option followed by the suffix of the file type required. For example:

```
zint -b 84 --direct --filetype=pcx -d "Data to encode"
```

This command will output the symbol as a PCX file to stdout. For the supported output file formats see Table : [Output File Formats](#).

CAUTION: Outputting binary files to the command shell without catching that data in a pipe can have unpredictable results. Use with care!

4.14 Automatic Filenames

The `--mirror` option instructs Zint to use the data to be encoded as an indicator of the filename to be used. This is particularly useful if you are processing batch data. For example the input data "1234567" will result in a file named "1234567.png".

There are restrictions, however, on what characters can be stored in a filename, so the filename may vary from the data if the data includes non-printable characters, for example, and may be shortened if the data input is long.

To set the output file format use the `--filetype` option as detailed above in [4.13 Direct Output to stdout](#). To output to a specific directory use the `-o` option giving the name of the directory (any filename will be ignored, unless `--filetype` is not specified, in which case the filename's extension will be used).

4.15 Working with Dots

Matrix codes can be rendered as a series of dots or circles rather than the normal squares by using the `--dotty` option. This option is only available for matrix symbologies, and is automatically selected for DotCode. The size of the dots can be adjusted using the `--dotsize` option followed by the diameter of the dot, where that diameter is in X-dimensions. The minimum dot size is 0.01, the maximum is 20. The default size is 0.8.

The default and minimum scale for raster output in dotty mode is 1.



Figure 26: `zint -b CODEONE -d "123456789012345678" --dotty --vers=9`

4.16 Multiple Segments

If you need to specify different ECIs for different sections of the input data, the `--seg1` to `--seg9` options can be used. Each option is of the form `--segN=ECI,data` where ECI is the ECI code (see Table : [ECI Codes](#)) and data is the data to which this applies. This is in addition to the ECI and data specified using the `--eci` and `-d` options which must still be present and which in effect constitute segment 0. For instance

```
zint -b AZTEC_CODE --eci=9 -d "Κείμενο" --seg1=7, "Текст" --seg2=20, "文章"
```

specifies 3 segments: segment 0 with ECI 9 (Greek), segment 1 with ECI 7 (Cyrillic), and segment 2 with ECI 20 (Shift JIS). Segments must be consecutive.

Naturally the symbology must be ECI-aware (see Table : [ECI-Aware Symbologies](#)).



Figure 27: `zint -b AZTEC --eci=9 -d "Κείμενο" --seg1=7, "Текст" --seg2=20, " 文章"`

ECIs of zero may be given, in which case Zint will automatically determine an ECI if necessary, as described in section 4.11.2 [Input Modes and ECI](#).

Multiple segments are not currently supported for use with GS1 data.

4.17 Structured Append

Structured Append is a method of splitting data among several symbols so that they form a sequence that can be scanned and re-assembled in the correct order on reading, and is available for Aztec Code, Code One, Data Matrix, DotCode, Grid Matrix, MaxiCode, MicroPDF417, PDF417, QR Code and Ultracode.

The `--structapp` option marks a symbol as part of a Structured Append sequence, and has the format

`--structapp=I,C[,ID]`



Figure 28: `zint -b DATAMATRIX -d "2nd of 3" --structapp="2,3,5006"`

where `I` is the index (position) of the symbol in the Structured Append sequence, `C` is the count or total number of symbols in the sequence, and `ID` is an optional identifier (not available for Code One, DotCode or MaxiCode) that is the same for all symbols belonging to the same sequence. The index is 1-based and goes from 1 to count. Count must be 2 or more. See the individual symbologies for further details.

4.18 Help Options

There are three help options which give information about how to use the command line. The `-h` or `--help` option will display a list of all of the valid options available, and also gives the exact version of the software (the version by itself can be displayed with `-v` or `--version`).

The `-t` or `--types` option gives the table of symbologies along with the symbol ID numbers and names.

The `-e` or `--ecinos` option gives a list of the ECI codes.

4.19 Other Options

Zint can output a representation of the symbol data as a set of hexadecimal values if asked to output to a text file (`*.txt`) or if given the option `--filetype=txt`. This can be used for test and diagnostic purposes.

Additional options are available which are specific to certain symbologies. These may, for example, control the amount of error correction data or the size of the symbol. These options are discussed in section 6. [Types of Symbology](#) of this guide.

5. Using the API

Zint has been written using the C language and has an API for use with C/C++ language programs. A Qt interface (see [Annex B. Qt Backend QZint](#)) is available in the "backend_qt" sub-directory, and a Tcl interface is available in the "backend_tcl" sub-directory (see [Annex C. Tcl Backend Binding](#)).

The libzint API has been designed to be very similar to that used by the GNU Barcode package. This allows easy migration from GNU Barcode to Zint. Zint, however, uses none of the same function names or option names as GNU Barcode. This allows you to use both packages in your application without conflict if you wish.

5.1 Creating and Deleting Symbols

The symbols manipulated by Zint are held in a `zint_symbol` structure defined in "zint.h". These symbol structures are created with the `ZBarcode_Create()` function and deleted using the `ZBarcode_Delete()` function. For example the following code creates and then deletes a symbol:

```
#include <zint.h>
#include <stdio.h>
int main()
{
    struct zint_symbol *my_symbol;
    my_symbol = ZBarcode_Create();
    if (my_symbol != NULL) {
        printf("Symbol successfully created!\n");
        ZBarcode_Delete(my_symbol);
    }
    return 0;
}
```

When compiling this code it will need to be linked with the `libzint` library using the `-lzint` option:

```
gcc -o simple simple.c -lzint
```

5.2 Encoding and Saving to File

To encode data in a barcode use the `ZBarcode_Encode()` function. To write the symbol to a file use the `ZBarcode_Print()` function. For example the following code takes a string from the command line and outputs a Code 128 symbol to a PNG file named "out.png" (or a GIF file "out.gif" if `libpng` is not present) in the current working directory:

```
#include <zint.h>
int main(int argc, char **argv)
{
    struct zint_symbol *my_symbol;
    my_symbol = ZBarcode_Create();
    ZBarcode_Encode(my_symbol, argv[1], 0);
    ZBarcode_Print(my_symbol, 0);
    ZBarcode_Delete(my_symbol);
    return 0;
}
```

This can also be done in one stage using the `ZBarcode_Encode_and_Print()` function as shown in the next example:

```
#include <zint.h>
int main(int argc, char **argv)
{
    struct zint_symbol *my_symbol;
    my_symbol = ZBarcode_Create();
    ZBarcode_Encode_and_Print(my_symbol, argv[1], 0, 0);
    ZBarcode_Delete(my_symbol);
    return 0;
}
```

Note that when using the API, the input data is assumed to be 8-bit binary unless the `input_mode` member of the `zint_symbol` structure is set - see [5.10 Setting the Input Mode](#) for details.

5.3 Encoding and Printing Functions in Depth

The functions for encoding and printing barcodes are defined as:

```
int ZBarcode_Encode(struct zint_symbol *symbol,
                   const unsigned char *source, int length);

int ZBarcode_Encode_File(struct zint_symbol *symbol,
                        const char *filename);

int ZBarcode_Print(struct zint_symbol *symbol, int rotate_angle);

int ZBarcode_Encode_and_Print(struct zint_symbol *symbol,
                             const unsigned char *source, int length, int rotate_angle);

int ZBarcode_Encode_File_and_Print(struct zint_symbol *symbol,
                                  const char *filename, int rotate_angle);
```

In these definitions `length` can be used to set the length of the input string. This allows the encoding of NUL (ASCII 0) characters in those symbologies which allow this. A value of 0 (or less than 0) will disable this usage and Zint will encode data up to the first NUL character in the input string, which must be present.

The `rotate_angle` value can be used to rotate the image when outputting. Valid values are 0, 90, 180 and 270.

The `ZBarcode_Encode_File()` and `ZBarcode_Encode_File_and_Print()` functions can be used to encode data read directly from a text file where the filename is given in the NUL-terminated filename string. The special filename "-" (single hyphen) can be used to read from stdin. Note that on Windows, filenames are assumed to be UTF-8 encoded.

If printing more than one barcode, the `zint_symbol` structure may be re-used by calling the `ZBarcode_Clear()` function after each barcode to free any output buffers allocated. The `zint_symbol` input members must be reset. To fully restore `zint_symbol` to its default state, call `ZBarcode_Reset()` instead.

5.4 Buffering Symbols in Memory (raster)

In addition to saving barcode images to file Zint allows you to access a representation of the resulting bitmap image in memory. The following functions allow you to do this:

```
int ZBarcode_Buffer(struct zint_symbol *symbol, int rotate_angle);

int ZBarcode_Encode_and_Buffer(struct zint_symbol *symbol,
                              const unsigned char *source, int length, int rotate_angle);

int ZBarcode_Encode_File_and_Buffer(struct zint_symbol *symbol,
                                   const char *filename, int rotate_angle);
```

The arguments here are the same as above, and rotation and colour options can be used with the buffer functions in the same way as when saving to a file. The difference is that instead of saving the image to a file it is placed in a byte (`unsigned char`) array pointed to by the `bitmap` member, with `bitmap_width` set to the number of columns and `bitmap_height` set to the number of rows.

The RGB channels are split into 3 consecutive red, green, blue bytes per pixel, and there are `bitmap_width` pixels per row and `bitmap_height` rows, so the total size of the bitmap array is $3 * \text{bitmap_width} * \text{bitmap_height}$.

If the background and/or foreground are RGBA then the byte array `alphamap` will also be set, with a single alpha value for each pixel. Its total size will be $\text{bitmap_width} * \text{bitmap_height}$.

The pixel data can be extracted from the array (or arrays) by the method shown in the example below, where `render_rgb()` and `render_rgba()` are assumed to be functions for drawing an RGB and RGBA pixel on the screen implemented by the client application:

```
int row, col, i = 0, j = 0;
int red, blue, green, alpha;
```

```

for (row = 0; row < my_symbol->bitmap_height; row++) {
    for (col = 0; col < my_symbol->bitmap_width; col++) {
        red = (int) my_symbol->bitmap[i];
        green = (int) my_symbol->bitmap[i + 1];
        blue = (int) my_symbol->bitmap[i + 2];
        if (my_symbol->alphamap) {
            alpha = (int) my_symbol->alphamap[j];
            render_rgba(row, col, red, green, blue, alpha);
            j++;
        } else {
            render_rgb(row, col, red, green, blue);
        }
        i += 3;
    }
}

```

Where speed is important, the buffer can be returned instead in a more compact intermediate form using the output option `OUT_BUFFER_INTERMEDIATE`. Here each byte is an ASCII value: '1' for foreground colour and '0' for background colour, except for Ultracode, which also uses colour codes: 'W' for white, 'C' for cyan, 'B' for blue, 'M' for magenta, 'R' for red, 'Y' for yellow, 'G' for green, and 'K' for black. Alpha values are not reported (alphamap will always be NULL). The loop for accessing the data is then:

```

int row, col, i = 0;

for (row = 0; row < my_symbol->bitmap_height; row++) {
    for (col = 0; col < my_symbol->bitmap_width; col++) {
        render_pixel(row, col, my_symbol->bitmap[i]);
        i++;
    }
}

```

5.5 Buffering Symbols in Memory (vector)

Symbols can also be saved to memory in a vector representation as well as a bitmap one. The following functions, exactly analogous to the ones above, allow you to do this:

```

int ZBarcode_Buffer_Vector(struct zint_symbol *symbol, int rotate_angle);

int ZBarcode_Encode_and_Buffer_Vector(struct zint_symbol *symbol,
    const unsigned char *source, int length, int rotate_angle);

int ZBarcode_Encode_File_and_Buffer_Vector(struct zint_symbol *symbol,
    const char *filename, int rotate_angle);

```

Here the vector member is set to point to a `zint_vector` header structure which contains pointers to lists of structures representing the various elements of the barcode: rectangles, hexagons, strings and circles. To draw the barcode, each of the element types is iterated in turn, and using the information stored is drawn by a rendering system. For instance, to draw a barcode using a rendering system with `prepare_canvas()`, `draw_rect()`, `draw_hexagon()`, `draw_string()`, and `draw_circle()` routines available:

```

struct zint_vector_rect *rect;
struct zint_vector_hexagon *hex;
struct zint_vector_string *string;
struct zint_vector_circle *circle;

prepare_canvas(my_symbol->vector->width, my_symbol->vector->height,
    my_symbol->scale, my_symbol->fgcolour, my_symbol->bgcolour,
    rotate_angle);

for (rect = my_symbol->vector->rectangles; rect; rect = rect->next) {
    draw_rect(rect->x, rect->y, rect->width, rect->height,
        rect->colour);
}

```

```

}
for (hex = my_symbol->vector->hexagons; hex; hex = hex->next) {
    draw_hexagon(hex->x, hex->y, hex->diameter, hex->rotation);
}
for (string = my_symbol->vector->strings; string; string = string->next) {
    draw_string(string->x, string->y, string->fsize,
                string->rotation, string->halign,
                string->text, string->length);
}
for (circle = my_symbol->vector->circles; circle; circle = circle->next) {
    draw_circle(circle->x, circle->y, circle->diameter, circle->width);
}

```

5.6 Setting Options

So far our application is not very useful unless we plan to only make Code 128 symbols and we don't mind that they only save to "out.png". As with the CLI program, of course, these options can be altered. The way this is done is by altering the contents of the `zint_symbol` structure between the creation and encoding stages. The `zint_symbol` structure consists of the following members:

Table : API Structure `zint_symbol`

Member Name	Type	Meaning	Default Value
<code>symbology</code>	integer	Symbol to use - see 5.8 Specifying a Symbology .	<code>BARCODE_CODE128</code>
<code>height</code>	float	Symbol height in X-dimensions, excluding fixed width-to-height symbols. ⁷	Symbol dependent
<code>scale</code>	float	Scale factor for adjusting size of image (sets X-dimension).	1.0
<code>whitespace_width</code>	integer	Horizontal whitespace width in X-dimensions.	0
<code>whitespace_height</code>	integer	Vertical whitespace height in X-dimensions.	0
<code>border_width</code>	integer	Border width in X-dimensions.	0
<code>output_options</code>	integer	Set various output parameters - see 5.9 Adjusting Output Options .	0 (none)
<code>fgcolour</code>	character string	Foreground (ink) colour as RGB/RGBA hexadecimal string or "C, M, Y, K" decimal percentages string, with a terminating NUL.	"000000"
<code>bgcolour</code>	character string	Background (paper) colour as RGB/RGBA hexadecimal string or "C, M, Y, K" decimal percentages string, with a terminating NUL.	"ffffff"
<code>fgcolor</code>	pointer	Points to <code>fgcolour</code> allowing alternate spelling.	
<code>bgcolor</code>	pointer	Points to <code>bgcolour</code> allowing alternate spelling.	
<code>outfile</code>	character string	Contains the name of the file to output a resulting barcode symbol to. Must end in <code>.png</code> , <code>.gif</code> , <code>.bmp</code> , <code>.emf</code> , <code>.eps</code> , <code>.pcx</code> , <code>.svg</code> , <code>.tif</code> or <code>.txt</code> followed by a terminating NUL. ⁸	"out.png"

⁷The height value is ignored for Aztec (including HIBC and Aztec Rune), Code One, Data Matrix (including HIBC), DotCode, Grid Matrix, Han Xin, MaxiCode, QR Code (including HIBC, Micro QR, rMQR and UPNQR), and Ultracode - all of which have a fixed width-to-height ratio (or, in the case of Code One, a fixed height).

⁸For Windows, `outfile` is assumed to be UTF-8 encoded.

Member Name	Type	Meaning	Default Value
primary	character string	Primary message data for more complex symbols, with a terminating NUL.	"" (empty)
option_1	integer	Symbol specific options.	-1
option_2	integer	Symbol specific options.	0
option_3	integer	Symbol specific options.	0
show_hrt	integer	Set to 0 to hide Human Readable Text (HRT).	1
input_mode	integer	Set encoding of input data - see 5.10 Setting the Input Mode .	DATA_MODE
eci	integer	Extended Channel Interpretation code.	0 (none)
dpmm	float	Resolution of output in dots per mm (BMP, EMF, PCX, PNG and TIF only).	0 (none)
dot_size	float	Diameter of dots used in dotty mode (in X-dimensions).	0.8
text_gap	float	Gap between barcode and text (HRT) in X-dimensions.	1.0
guard_descent	float	Height of guard bar descent (EAN/UPC only) in X-dimensions.	5.0
structapp	Structured Append structure	Mark a symbol as part of a sequence of symbols.	count 0 (disabled)
debug	integer	Debugging flags.	0
warn_level	integer	Affects error/warning value returned by Zint API - see 5.7 Handling Errors .	WARN_DEFAULT
text	unsigned character string	Human Readable Text, which usually consists of input data plus one more check digit. Uses UTF-8 formatting, with a terminating NUL.	"" (empty) (output only)
rows	integer	Number of rows used by the symbol.	(output only)
width	integer	Width of the generated symbol.	(output only)
encoded_data	array of unsigned character arrays	Representation of the encoded data.	(output only)
row_height	array of floats	Heights of each row.	(output only)
errtxt	character string	Error message in the event that an error occurred, with a terminating NUL - see 5.7 Handling Errors .	(output only)
bitmap	pointer to unsigned character array	Pointer to stored bitmap image - see 5.4 Buffering Symbols in Memory (raster) .	(output only)
bitmap_width	integer	Width of stored bitmap image (in pixels) - see <code>bitmap</code> member.	(output only)
bitmap_height	integer	Height of stored bitmap image (in pixels) - see <code>bitmap</code> member.	(output only)
alphamap	pointer to unsigned character array	Pointer to array representing alpha channel of stored bitmap image (or NULL if no alpha channel used) - see <code>bitmap</code> member.	(output only)
vector	pointer to vector structure	Pointer to vector header containing pointers to vector elements - see 5.5 Buffering Symbols in Memory (vector) .	(output only)

To alter these values use the syntax shown in the example below. This code has the same result as the previous example except the output is now taller and plotted in green.

```
#include <zint.h>
#include <string.h>
int main(int argc, char **argv)
{
    struct zint_symbol *my_symbol;
    my_symbol = ZBarcode_Create();
    strcpy(my_symbol->fgcolour, "00ff00");
    my_symbol->height = 400.0f;
    ZBarcode_Encode_and_Print(my_symbol, argv[1], 0, 0);
    ZBarcode_Delete(my_symbol);
    return 0;
}
```

Note that background removal for all outputs except BMP can be achieved by setting the background alpha to "00" where the values for R, G and B will be ignored:

```
strcpy(my_symbol->bgcolour, "55555500");
```

This is what the CLI option `--nobackground` does - see [4.7 Using Colour](#).

5.7 Handling Errors

If errors occur during encoding a non-zero integer value is passed back to the calling application. In addition the `errtxt` member is set to a message detailing the nature of the error. The errors generated by Zint are:

Table : API Warning and Error Return Values

Return Value	Meaning
ZINT_WARN_HRT_TRUNCATED	The Human Readable Text returned in text was truncated (maximum 199 bytes).
ZINT_WARN_INVALID_OPTION	One of the values in <code>zint_struct</code> was set incorrectly but Zint has made a guess at what it should have been and generated a barcode accordingly.
ZINT_WARN_USES_ECI	Zint has automatically inserted an ECI character. The symbol may not be readable with some readers.
ZINT_WARN_NONCOMPLIANT	The symbol was created but is not compliant with certain standards set in its specification (e.g. height, GS1 AI data lengths).
ZINT_ERROR	Marks the divide between warnings and errors. For return values greater than or equal to this no symbol (or only an incomplete symbol) is generated.
ZINT_ERROR_TOO_LONG	The input data is too long or too short for the selected symbology. No symbol has been generated.
ZINT_ERROR_INVALID_DATA	The data to be encoded includes characters which are not permitted by the selected symbology (e.g. alphabetic characters in an EAN symbol). No symbol has been generated.
ZINT_ERROR_INVALID_CHECK	Data with an incorrect check digit has been entered. No symbol has been generated.
ZINT_ERROR_INVALID_OPTION	One of the values in <code>zint_struct</code> was set incorrectly and Zint was unable (or unwilling) to guess what it should have been. No symbol has been generated.
ZINT_ERROR_ENCODING_PROBLEM	A problem has occurred during encoding of the data. This should never happen. Please contact the developer if you encounter this error.
ZINT_ERROR_FILE_ACCESS	Zint was unable to open the requested output file. This is usually a file permissions problem.
ZINT_ERROR_MEMORY	Zint ran out of memory. This should only be a problem with legacy systems.

Return Value	Meaning
ZINT_ERROR_FILE_WRITE	Zint failed to write all contents to the requested output file. This should only occur if the output device becomes full.
ZINT_ERROR_USES_ECI	Returned if warn_level set to WARN_FAIL_ALL and ZINT_WARN_USES_ECI occurs.
ZINT_ERROR_NONCOMPLIANT	Returned if warn_level set to WARN_FAIL_ALL and ZINT_WARN_NONCOMPLIANT occurs.
ZINT_ERROR_HRT_TRUNCATED	Returned if warn_level set to WARN_FAIL_ALL and ZINT_WARN_HRT_TRUNCATED occurs.

To catch errors use an integer variable as shown in the code below:

```
#include <zint.h>
#include <stdio.h>
#include <string.h>
int main(int argc, char **argv)
{
    struct zint_symbol *my_symbol;
    int error;
    my_symbol = ZBarcode_Create();
    /* Set invalid foreground colour */
    strcpy(my_symbol->fgcolour, "nonsense");
    error = ZBarcode_Encode_and_Print(my_symbol, argv[1], 0, 0);
    if (error != 0) {
        /* Some warning or error occurred */
        printf("%s\n", my_symbol->errtxt);
        if (error >= ZINT_ERROR) {
            /* Stop now */
            ZBarcode_Delete(my_symbol);
            return 1;
        }
    }
    /* Otherwise carry on with the rest of the application */
    ZBarcode_Delete(my_symbol);
    return 0;
}
```

This code will exit with the appropriate message:

Error 881: Malformed foreground RGB colour 'nonsense' (hexadecimal only)

To treat all warnings as errors, set symbol->warn_level to WARN_FAIL_ALL.

5.8 Specifying a Symbology

Symbologies can be specified by number or by name as shown in the Table: [Barcode Types \(Symbologies\)](#). For example

```
symbol->symbology = BARCODE_LOGMARS;
```

means the same as

```
symbol->symbology = 50;
```

5.9 Adjusting Output Options

The output_options member can be used to adjust various aspects of the output file. To select more than one option from the table below simply OR them together when adjusting this value:

```
my_symbol->output_options |= BARCODE_BIND | READER_INIT;
```


Table : API output_options Values

Value	Effect
0	No options selected.
BARCODE_BIND_TOP	Boundary bar above the symbol only. ⁹
BARCODE_BIND	Boundary bars above and below the symbol and between rows if stacking multiple symbols. ¹⁰
BARCODE_BOX	Add a box surrounding the symbol and whitespace.
BARCODE_STDOUT	Output the file to stdout.
READER_INIT	Create as a Reader Initialisation (Programming) symbol.
SMALL_TEXT	Use a smaller font for the Human Readable Text.
BOLD_TEXT	Embolden the Human Readable Text.
CMYK_COLOUR	Select the CMYK colour space option for Encapsulated PostScript and TIF files.
BARCODE_DOTTY_MODE	Plot a matrix symbol using dots rather than squares.
GS1_GS_SEPARATOR	Use GS (Group Separator) instead of FNC1 as GS1 separator (Data Matrix only).
OUT_BUFFER_INTERMEDIATE	Return the bitmap buffer as ASCII values instead of separate colour channels - see 5.4 Buffering Symbols in Memory (raster) .
BARCODE_QUIET_ZONES	Add compliant quiet zones (additional to any specified whitespace). ¹¹
BARCODE_NO_QUIET_ZONES	Disable quiet zones, notably those with defaults.
COMPLIANT_HEIGHT	Warn if height specified not compliant, or use standard height (if any) as default.
EANUPC_GUARD_WHITESPACE	Add quiet zone indicators (“<” and/or “>”) to HRT whitespace (EAN/UPC).
EMBED_VECTOR_FONT	Embed font in vector output - currently available for SVG output only.

5.10 Setting the Input Mode

The way in which the input data is encoded can be set using the `input_mode` member. Valid values are shown in the table below.

Table : API input_mode Values

Value	Effect
DATA_MODE	Uses full 8-bit range interpreted as binary data.
UNICODE_MODE	Uses UTF-8 input.
GS1_MODE	Encodes GS1 data using FNC1 characters. <i>The above are exclusive, the following optional and OR-ed.</i>
ESCAPE_MODE	Process input data for escape sequences.
GS1PARENS_MODE	Parentheses (round brackets) used in GS1 data instead of square brackets to delimit Application Identifiers (parentheses must not otherwise occur in the data).
GS1NOCHECK_MODE	Do not check GS1 data for validity, i.e. suppress checks for valid AIs and data lengths. Invalid characters (e.g. control characters, extended ASCII characters) are still checked for.
HEIGHTPERROW_MODE	Interpret the <code>height</code> member as per-row rather than as overall height.
FAST_MODE	Use faster if less optimal encodation or other shortcuts if available (affects DATAMATRIX, MICROPDF417, PDF417, QRCODE and UPNQR only).
EXTRA_ESCAPE_MODE	Process special symbology-specific escape sequences (CODE128 only).

The default mode is `DATA_MODE`. (Note that this differs from the default for the CLI and GUI, which is `UNICODE_MODE`.)

⁹The `BARCODE_BIND_TOP` flag is set by default for DPD - see [6.1.10.7 DPD Code](#).

¹⁰The `BARCODE_BIND` flag is always set for Codablock-F, Code 16K and Code 49. Special considerations apply to ITF-14 - see [6.1.2.6 ITF-14](#).

¹¹Codablock-F, Code 16K, Code 49, EAN-2 to EAN-13, ISBN, ITF-14, UPC-A and UPC-E have compliant quiet zones added by default.

DATA_MODE, UNICODE_MODE and GS1_MODE are mutually exclusive, whereas ESCAPE_MODE, GS1PARENS_MODE, GS1NOCHECK_MODE, HEIGHTPERROW_MODE, FAST_MODE and EXTRA_ESCAPE_MODE are optional. So, for example, you can set

```
my_symbol->input_mode = UNICODE_MODE | ESCAPE_MODE;
```

or

```
my_symbol->input_mode = GS1_MODE | GS1PARENS_MODE | GS1NOCHECK_MODE;
```

whereas

```
my_symbol->input_mode = DATA_MODE | GS1_MODE;
```

is not valid.

Permissible escape sequences (ESCAPE_MODE) are listed in Table : [Escape Sequences](#), and the special Code 128-only EXTRA_ESCAPE_MODE escape sequences are given in [6.1.10.1 Standard Code 128 \(ISO 15417\)](#). An example of GS1PARENS_MODE usage is given in section [6.1.10.3 GS1-128](#).

GS1NOCHECK_MODE is for use with legacy systems that have data that does not conform to the current GS1 standard. Printable ASCII input is still checked for, as is the validity of GS1 data specified without AIs (e.g. linear data for GS1 DataBar Omnidirectional/Limited/etc.).

For HEIGHTPERROW_MODE, see --heightperrow in section [4.4 Adjusting Height](#). The height member should be set to the desired per-row value on input (it will be set to the overall height on output).

FAST_MODE causes a less optimal encodation scheme to be used for Data Matrix, MicroPDF417 and PDF417. For QR Code and UPNQR, it affects Zint's automatic mask selection - see [6.6.3 QR Code \(ISO 18004\)](#) for details.

5.11 Multiple Segments

For input data requiring multiple ECIs, the following functions may be used:

```
int ZBarcode_Encode_Segs(struct zint_symbol *symbol,
    const struct zint_seg segs[], const int seg_count);

int ZBarcode_Encode_Segs_and_Print(struct zint_symbol *symbol,
    const struct zint_seg segs[], const int seg_count, int rotate_angle);

int ZBarcode_Encode_Segs_and_Buffer(struct zint_symbol *symbol,
    const struct zint_seg segs[], const int seg_count, int rotate_angle);

int ZBarcode_Encode_Segs_and_Buffer_Vector(struct zint_symbol *symbol,
    const struct zint_seg segs[], const int seg_count, int rotate_angle);
```

These are direct analogues of the previously mentioned ZBarcode_Encode(), ZBarcode_Encode_and_Print(), ZBarcode_Encode_and_Buffer() and ZBarcode_Encode_and_Buffer_Vector() respectively, where instead of a pair consisting of "source, length", a pair consisting of "segs, seg_count" is given, with segs being an array of struct zint_seg segments and seg_count being the number of elements it contains. The zint_seg structure is of the form:

```
struct zint_seg {
    unsigned char *source; /* Data to encode */
    int length;           /* Length of `source`. If 0, `source` must be
                           NUL-terminated */
    int eci;              /* Extended Channel Interpretation */
};
```

The symbology must support ECIs (see Table : [ECI-Aware Symbologies](#)). For example:

```
#include <zint.h>
int main(int argc, char **argv)
{
    struct zint_seg segs[] = {
        { "Κείμενο", 0, 9 },
        { "Текст", 0, 7 },
        { "文章", 0, 20 }
    };
```

```

};
struct zint_symbol *my_symbol;
my_symbol = ZBarcode_Create();
my_symbol->symbology = BARCODE_AZTEC;
my_symbol->input_mode = UNICODE_MODE;
ZBarcode_Encode_Segs(my_symbol, segs, 3);
ZBarcode_Print(my_symbol, 0);
ZBarcode_Delete(my_symbol);
return 0;
}

```

A maximum of 256 segments may be specified. Use of multiple segments with GS1 data is not currently supported.

5.12 Scaling Helpers

To help with scaling the output, the following three function are available:

```

float ZBarcode_Default_Xdim(int symbol_id);

float ZBarcode_Scale_From_XdimDp(int symbol_id, float x_dim_mm, float dpmm,
    const char *filetype) {

float ZBarcode_XdimDP_From_Scale(int symbol_id, float scale,
    float x_dim_mm_or_dpmm, const char *filetype);

```

The first `ZBarcode_Default_Xdim()` returns the default X-dimension suggested by Zint for symbology `symbol_id`.

The second `ZBarcode_Scale_From_XdimDp()` returns the scale to use to output to a file of type `filetype` with X-dimension `x_dim_mm` at `dpmm` dots per mm. The given X-dimension must be non-zero and less than or equal to 10mm, however `dpmm` may be zero and defaults to 12 dpmm, and `filetype` may be NULL or empty in which case a GIF filetype is assumed. For raster output (BMP/GIF/PCX/PNG/TIF) the scale is rounded to half-integer increments.

For example:

```

/* Royal Mail 4-State Customer Code */
my_symbol->symbology = BARCODE_RM4SCC;
my_symbol->dpmm = 600.0f / 25.4f; /* 600 dpi */
my_symbol->scale = ZBarcode_Scale_From_XdimDp(
    my_symbol->symbology,
    ZBarcode_Default_Xdim(my_symbol->symbology),
    my_symbol->dpmm, "PNG"); /* Returns 7.5 */

```

The third function `ZBarcode_XdimDP_From_Scale()` is the “reverse” of `ZBarcode_Scale_From_XdimDp()`, returning the X-dimension (in mm) or the dot density (in dpmm) given a scale `scale`. Both `scale` and `x_dim_mm_or_dpmm` must be non-zero. The returned value is bound to the maximum value of dpmm (1000), so must be further bound to 10 on return if the X-dimension is sought.

Note that the X-dimension to use is application dependent, and varies not only due to the symbology, resolution and filetype but also due to the type of scanner used, the intended scanning distance, and what media (“substrates”) the barcode appears on.

5.13 Verifying Symbology Availability

An additional function available in the API is:

```

int ZBarcode_ValidID(int symbol_id);

```

which allows you to check whether a given symbology is available, returning a non-zero value if so. For example:

```

if (ZBarcode_ValidID(BARCODE_PDF417) != 0) {
    printf("PDF417 available\n");
} else {

```

```
    printf("PDF417 not available\n");
}
```

Another function that may be useful is:

```
int ZBarcode_BarcodeName(int symbol_id, char name[32]);
```

which copies the name of a symbology into the supplied name buffer, which should be 32 characters in length. The name is NUL-terminated, and zero is returned on success. For instance:

```
char name[32];
if (ZBarcode_BarcodeName(BARCODE_PDF417, name) == 0) {
    printf("%s\n", name);
}
```

will print BARCODE_PDF417.

5.14 Checking Symbology Capabilities

It can be useful for frontend programs to know the capabilities of a symbology. This can be determined using another additional function:

```
unsigned int ZBarcode_Cap(int symbol_id, unsigned int cap_flag);
```

by OR-ing the flags below in the cap_flag argument and checking the return to see which are set.

Table : API Capability Flags

Value	Meaning
ZINT_CAP_HRT	Can the symbology print Human Readable Text?
ZINT_CAP_STACKABLE	Is the symbology stackable?
ZINT_CAP_EANUPC ¹²	Is the symbology EAN/UPC?
ZINT_CAP_COMPOSITE	Does the symbology support composite data? (see 6.3 GS1 Composite Symbols (ISO 24723) below)
ZINT_CAP_ECI	Does the symbology support Extended Channel Interpretations?
ZINT_CAP_GS1	Does the symbology support GS1 data?
ZINT_CAP_DOTTY	Can the symbology be outputted as dots?
ZINT_CAP_QUIET_ZONES	Does the symbology have default quiet zones?
ZINT_CAP_FIXED_RATIO	Does the symbology have a fixed width-to-height (aspect) ratio?
ZINT_CAP_READER_INIT	Does the symbology support Reader Initialisation?
ZINT_CAP_FULL_MULTIBYTE	Is the ZINT_FULL_MULTIBYTE option applicable?
ZINT_CAP_MASK	Is mask selection applicable?
ZINT_CAP_STRUCTAPP	Does the symbology support Structured Append?
ZINT_CAP_COMPLIANT_HEIGHT	Does the symbology have a compliant height defined?

For example:

```
unsigned int cap;
cap = ZBarcode_Cap(BARCODE_PDF417, ZINT_CAP_HRT | ZINT_CAP_ECI);
if (cap & ZINT_CAP_HRT) {
    printf("PDF417 supports HRT\n");
} else {
    printf("PDF417 does not support HRT\n");
}
if (cap & ZINT_CAP_ECI) {
    printf("PDF417 supports ECI\n");
} else {
    printf("PDF417 does not support ECI\n");
}
```

¹²ZINT_CAP_EANUPC was previously named ZINT_CAP_EXTENDABLE, which is still recognised.

5.15 Zint Version

Whether the Zint library linked to was built with PNG support may be determined with:

```
int ZBarcode_NoPng();
```

which returns 1 if no PNG support is available, else zero.

Lastly, the version of the Zint library linked to is returned by:

```
int ZBarcode_Version();
```

The version parts are separated by hundreds. For instance, version "2.9.1" is returned as "20901".

6. Types of Symbology

6.1 One-Dimensional Symbols

One-dimensional or linear symbols are what most people associate with the term barcode. They consist of a number of bars and a number of spaces of differing widths.

6.1.1 Code 11



Figure 29: `zint -b CODE11 -d "9212320967"`

Developed by Intermec in 1977, Code 11 is similar to Code 2 of 5 Matrix and is primarily used in telecommunications. The symbol can encode data consisting of the digits 0-9 and the dash character (-) up to a maximum of 140 characters. Two modulo-11 check digits are added by default. To add just one check digit, set `--vers=1` (API `option_2 = 1`). To add no check digits, set `--vers=2` (API `option_2 = 2`).

6.1.2 Code 2 of 5

Code 2 of 5 is a family of one-dimensional symbols, 8 of which are supported by Zint. Note that the names given to these standards alters from one source to another so you should take care to ensure that you have the right barcode type before using these standards.

6.1.2.1 Standard Code 2 of 5



Figure 30: `zint -b C25STANDARD -d "9212320967"`

Also known as Code 2 of 5 Matrix, this is a self-checking code used in industrial applications and photo development. Standard Code 2 of 5 will encode numeric input (digits 0-9) up to a maximum of 112 digits. No check digit is added by default. To add a check digit, set `--vers=1` (API `option_2 = 1`). To add a check digit but not show it in the Human Readable Text, set `--vers=2` (API `option_2 = 2`).

6.1.2.2 IATA Code 2 of 5



Figure 31: `zint -b C25IATA -d "9212320967"`

Used for baggage handling in the air-transport industry by the International Air Transport Agency, this self-checking code will encode numeric input (digits 0-9) up to a maximum of 80 digits. No check digit is added by default, but can be set the same as for [6.1.2.1 Standard Code 2 of 5](#).

6.1.2.3 Industrial Code 2 of 5

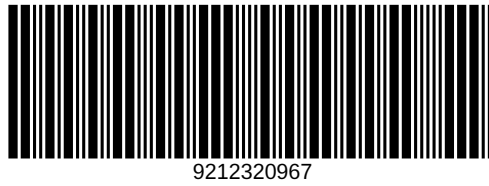


Figure 32: `zint -b C25IND -d "9212320967"`

Industrial Code 2 of 5 can encode numeric input (digits 0-9) up to a maximum of 79 digits. No check digit is added by default, but can be set the same as for [6.1.2.1 Standard Code 2 of 5](#).

6.1.2.4 Interleaved Code 2 of 5 (ISO 16390)



Figure 33: `zint -b C25INTER --compliantheight -d "9212320967"`

This self-checking symbology encodes pairs of numbers, and so can only encode an even number of digits (0-9). If an odd number of digits is entered a leading zero is added by Zint. A maximum of 62 pairs (124 digits) can be encoded. No check digit is added by default, but can be set the same as for [6.1.2.1 Standard Code 2 of 5](#).

6.1.2.5 Code 2 of 5 Data Logic



Figure 34: `zint -b C25LOGIC -d "9212320967"`

Data Logic does not include a check digit by default and can encode numeric input (digits 0-9) up to a maximum of 113 digits. Check digit options are the same as for [6.1.2.1 Standard Code 2 of 5](#).

6.1.2.6 ITF-14

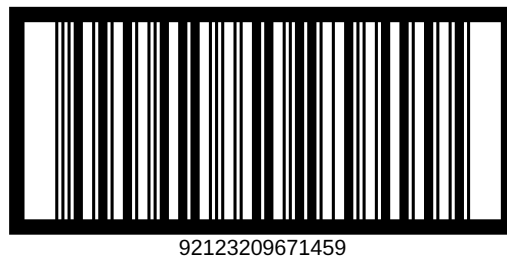


Figure 35: `zint -b ITF14 --compliantheight -d "92123209671459"`

ITF-14, also known as UPC Shipping Container Symbol or Case Code, is based on Interleaved Code 2 of 5 and requires a 13-digit numeric input (digits 0-9). One modulo-10 check digit is added by Zint.

If no border option is specified Zint defaults to adding a bounding box with a border width of 5. This behaviour can be overridden by using the `--bind` option (API `output_options |= BARCODE_BIND`). Similarly the border width can be overridden using `--border` (API `border_width`). If a symbol with no border is required this can be achieved by explicitly setting the border type to `box` (or `bind` or `bindtop`) and leaving the border width 0.



Figure 36: `zint -b ITF14 --box --compliantheight -d "9212320967145"`

6.1.2.7 Deutsche Post Leitcode



Figure 37: `zint -b DPLEIT -d "9212320967145"`

Leitcode is based on Interleaved Code 2 of 5 and is used by Deutsche Post for routing purposes. Leitcode requires a 13-digit numerical input to which Zint adds a check digit.

6.1.2.8 Deutsche Post Identcode



Figure 38: `zint -b DPIDENT -d "91232096712"`

Identcode is based on Interleaved Code 2 of 5 and is used by Deutsche Post for identification purposes. Identcode requires an 11-digit numerical input to which Zint adds a check digit.

6.1.3 UPC (Universal Product Code) (ISO 15420)

6.1.3.1 UPC Version A



Figure 39: `zint -b UPCA --complantheight -d "72527270270"`

UPC-A is used in the United States for retail applications. The symbol requires an 11-digit article number. The check digit is calculated by Zint. In addition EAN-2 and EAN-5 add-on symbols can be added using the + character. For example, to draw a UPC-A symbol with the data 72527270270 with an EAN-5 add-on showing the data 12345 use the command:

```
zint -b UPCA -d "72527270270+12345"
```

or using the API encode a data string with the + character included:

```
my_symbol->symbology = BARCODE_UPCA;  
error = ZBarcode_Encode_and_Print(my_symbol, "72527270270+12345", 0, 0);
```



Figure 40: `zint -b UPCA --complantheight -d "72527270270+12345"`

If your input data already includes the check digit symbology `BARCODE_UPCA_CHK` (35) can be used which takes a 12-digit input and validates the check digit before encoding.

A quiet zone indicator can be added to the HRT by setting `--guardwhitespace` (API `output_options |= EANUPC_GUARD_WHITESPACE`). For UPC, this is only relevant when there is add-on:

```
zint -b UPCA -d "72527270270+12345" --guardwhitespace
```

or using the API:

```
my_symbol->symbology = BARCODE_UPCA;  
my_symbol->output_options |= EANUPC_GUARD_WHITESPACE;  
error = ZBarcode_Encode_and_Print(my_symbol, "72527270270+12345", 0, 0);
```



Figure 41: `zint -b UPCA --complantheight -d "72527270270+12345" --guardwhitespace`

You can adjust the gap between the main symbol and an add-on in integral multiples of the X-dimension by setting `--addongap` (API `option_2`) to a value between 9 (default) and 12. The height in X-dimensions that the guard bars descend below the main bars can be adjusted by setting `--guarddescent` (API `guard_descent`) to a value between 0 and 20 (default 5).

6.1.3.2 UPC Version E



Figure 42: `zint -b UPCE --compliantheight -d "1123456"`

UPC-E is a zero-compressed version of UPC-A developed for smaller packages. The code requires a 6-digit article number (digits 0-9). The check digit is calculated by Zint. EAN-2 and EAN-5 add-on symbols can be added using the + character as with UPC-A. In addition Zint also supports Number System 1 encoding by entering a 7-digit article number starting with the digit 1. For example:

```
zint -b UPCE -d "1123456"
```

or

```
my_symbol->symbology = BARCODE_UPCE;  
error = ZBarcode_Encode_and_Print(my_symbol, "1123456", 0, 0);
```

If your input data already includes the check digit symbology `BARCODE_UPCE_CHK` (38) can be used which takes a 7 or 8-digit input and validates the check digit before encoding.

As with UPC-A, a quiet zone indicator can be added when there is an add-on by setting `--guardwhitespace` (API output_options |= `EANUPC_GUARD_WHITESPACE`):

```
zint -b UPCE -d "1123456+12" --guardwhitespace
```



Figure 43: `zint -b UPCE --compliantheight -d "1123456+12" --guardwhitespace`

You can adjust the gap between the main symbol and an add-on in integral multiples of the X-dimension by setting `--addongap` (API option_2) to a value between 7 (default) and 12. The height in X-dimensions that the guard bars descend below the main bars can be adjusted by setting `--guarddescent` (API guard_descent) to a value between 0 and 20 (default 5).

6.1.4 EAN (European Article Number) (ISO 15420)

6.1.4.1 EAN-2, EAN-5, EAN-8 and EAN-13



Figure 44: `zint -b EANX --compliantheight -d "4512345678906"`

The EAN system is used in retail across Europe and includes standards for EAN-2, EAN-5, EAN-8 and EAN-13 which encode 2, 5, 7 or 12-digit numbers respectively. Zint will decide which symbology to use depending on the length of the input data. In addition EAN-2 and EAN-5 add-on symbols can be added to EAN-8 and EAN-13 symbols using the + character as with UPC symbols. For example:

```
zint -b EANX -d "54321"
```

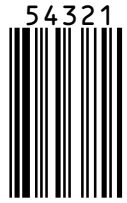


Figure 45: `zint -b EANX --complantheight -d "54321"`

will encode a stand-alone EAN-5, whereas

```
zint -b EANX -d "7432365+54321"
```

will encode an EAN-8 symbol with an EAN-5 add-on. As before these results can be achieved using the API:

```
my_symbol->symbology = BARCODE_EANX;
```

```
error = ZBarcode_Encode_and_Print(my_symbol, "54321", 0, 0);
```

```
error = ZBarcode_Encode_and_Print(my_symbol, "7432365+54321", 0, 0);
```



Figure 46: `zint -b EANX --complantheight -d "7432365+54321"`

All of the EAN symbols include check digits which are added by Zint.

If you are encoding an EAN-8 or EAN-13 symbol and your data already includes the check digit then you can use symbology `BARCODE_EANX_CHK` (14) which takes an 8 or 13-digit input and validates the check digit before encoding.

Options to add quiet zone indicators and to adjust the add-on gap and the guard bar descent height are the same as for [6.1.3.2 UPC Version E](#). For instance:

```
zint -b EANX_CHK -d "74323654" --guardwhitespace
```



Figure 47: `zint -b EANX_CHK --complantheight -d "74323654" --guardwhitespace`

6.1.4.2 SBN, ISBN and ISBN-13



Figure 48: `zint -b ISBNX --complantheight -d "9789295055124"`

EAN-13 symbols (also known as Bookland EAN-13) can also be produced from 9-digit SBN, 10-digit ISBN or 13-digit ISBN-13 data. The relevant check digit needs to be present in the input data and will be verified before the symbol is generated.

As with EAN-13, a quiet zone indicator can be added using `--guardwhitespace`:



Figure 49: `zint -b ISBNX --compliantheight -d "9789295055124" --guardwhitespace`

EAN-2 and EAN-5 add-on symbols can be added using the `+` character, and there are options to adjust the add-on gap and the guard bar descent height - see [6.1.3.2 UPC Version E](#).

6.1.5 Plessey
6.1.5.1 UK Plessey



Figure 50: `zint -b PLESSEY -d "C64"`

Also known as Plessey Code, this symbology was developed by the Plessey Company Ltd. in the UK. The symbol can encode data consisting of digits (0-9) or letters A-F up to a maximum of 67 characters and includes a hidden CRC check digit.

6.1.5.2 MSI Plessey



Figure 51: `zint -b MSI_PLESSEY -d "6502" --vers=2`

Based on Plessey and developed by MSI Data Corporation, MSI Plessey can encode numeric (digits 0-9) input of up to 92 digits. It has a range of check digit options that are selectable by setting `--vers` (API `option_2`), shown in the table below:

Table : MSI Plessey Check Digit Options

Value	Check Digits
0	None
1	Modulo-10 (Luhn)
2	Modulo-10 & Modulo-10
3	Modulo-11 (IBM)
4	Modulo-11 (IBM) & Modulo-10
5	Modulo-11 (NCR)

Value	Check Digits
6	Modulo-11 (NCR) & Modulo-10

To not show the check digit or digits in the Human Readable Text, add 10 to the `--vers` value. For example `--vers=12` (API `option_2 = 12`) will add two hidden modulo-10 check digits.

6.1.6 Telepen

6.1.6.1 Telepen Alpha



Figure 52: `zint -b TELEPEN --compliantheight -d "Z80"`

Telepen Alpha was developed by SB Electronic Systems Limited and can encode ASCII text input, up to a maximum of 69 characters. Telepen includes a hidden modulo-127 check digit, added by Zint.

6.1.6.2 Telepen Numeric



Figure 53: `zint -b TELEPEN_NUM --compliantheight -d "466X33"`

Telepen Numeric allows compression of numeric data into a Telepen symbol. Data can consist of pairs of numbers or pairs consisting of a numerical digit followed an X character. For example: 466333 and 466X33 are valid codes whereas 46X333 is not (the digit pair "X3" is not valid). Up to 136 digits can be encoded. Telepen Numeric includes a hidden modulo-127 check digit which is added by Zint.

6.1.7 Code 39

6.1.7.1 Standard Code 39 (ISO 16388)

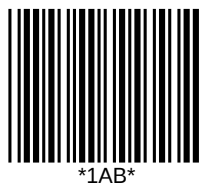


Figure 54: `zint -b CODE39 --compliantheight -d "1A" --vers=1`

Standard Code 39 was developed in 1974 by Intermec. Input data can be up to 86 characters in length and can include the characters 0-9, A-Z, dash (-), full stop (.), space, asterisk (*), dollar (\$), slash (/), plus (+) and percent (%). The standard does not require a check digit but a modulo-43 check digit can be added if desired by setting `--vers=1` (API `option_2 = 1`). To add a check digit but not show it in the Human Readable Text, set `--vers=2` (API `option_2 = 2`).

6.1.7.2 Extended Code 39



Figure 55: `zint -b EXCODE39 --compliantheight -d "123.45$@fd"`

Also known as Code 39e and Code39+, this symbology expands on Standard Code 39 to provide support for the full 7-bit ASCII character set. The check digit options are the same as for [6.1.7.1 Standard Code 39 \(ISO 16388\)](#).

6.1.7.3 Code 93

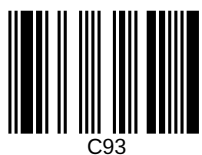


Figure 56: `zint -b CODE93 --compliantheight -d "C93"`

A variation of Extended Code 39, Code 93 also supports full ASCII text, accepting up to 123 characters. Two check characters are added by Zint. By default these check characters are not shown in the Human Readable Text, but may be shown by setting `--vers=1` (API option_2 = 1).

6.1.7.4 PZN (Pharmazentralnummer)



Figure 57: `zint -b PZN --compliantheight -d "27580899"`

PZN is a Code 39 based symbology used by the pharmaceutical industry in Germany. PZN encodes a 7-digit number to which Zint will add a modulo-11 check digit (PZN8). Input less than 7 digits will be zero-filled. An 8-digit input can be supplied in which case Zint will validate the check digit.

To encode a PZN7 (obsolete since 2013) instead set `--vers=1` (API option_2 = 1) and supply up to 7 digits. As with PZN8, a modulo-11 check digit will be added or if 7 digits supplied the check digit validated.

6.1.7.5 LOGMARS



Figure 58: `zint -b LOGMARS --compliantheight -d "12345/ABCDE" --vers=1`

LOGMARS (Logistics Applications of Automated Marking and Reading Symbols) is a variation of the Code 39 symbology used by the U.S. Department of Defense. LOGMARS encodes the same character set as [6.1.7.1 Standard Code 39 \(ISO 16388\)](#), and the check digit options are also the same. Input is restricted to a maximum of 30 characters.

6.1.7.6 Code 32



Figure 59: `zint -b CODE32 --compliantheight -d "14352312"`

A variation of Code 39 used by the Italian Ministry of Health (“Ministero della Sanità”) for encoding identifiers on pharmaceutical products. This symbology requires a numeric input up to 8 digits in length. A check digit is added by Zint.

6.1.7.7 HIBC Code 39



Figure 60: `zint -b HIBC_39 --compliantheight -d "14352312"`

This variant adds a leading '+' character and a trailing modulo-49 check digit to a standard Code 39 symbol as required by the Health Industry Barcode standards.

6.1.7.8 Vehicle Identification Number (VIN)



Figure 61: `zint -b VIN -d "2FTPX28L0XCA15511" --vers=1`

A variation of Code 39 that for vehicle identification numbers used in North America (first character '1' to '5') has a check character verification stage. A 17 character input (0-9, and A-Z excluding 'I', 'O' and 'Q') is required. An invisible Import character prefix 'I' can be added by setting `--vers=1` (API option_2 = 1).

6.1.8 Codabar (EN 798)



Figure 62: `zint -b CODABAR --compliantheight -d "A37859B"`

Also known as NW-7, Monarch, ABC Codabar, USD-4, Ames Code and Code 27, this symbology was developed in 1972 by Monarch Marketing Systems for retail purposes. The American Blood Commission adopted Codabar in 1977 as the standard symbology for blood identification. Codabar can encode up to 103 characters starting and ending with the letters A-D and containing between these letters the numbers 0-9, dash (-), dollar (\$), colon (:), slash (/), full stop (.) or plus (+). No check character is generated by default, but a modulo-16 one can be added by setting `--vers=1` (API option_2 = 1). To have the check character appear in the Human Readable Text, set `--vers=2` (API option_2 = 2).

6.1.9 Pharmacode



Figure 63: `zint -b PHARMA --complianceheight -d "130170"`

Developed by Laetus, Pharmacode is used for the identification of pharmaceuticals. The symbology is able to encode whole numbers between 3 and 131070.

6.1.10 Code 128

6.1.10.1 Standard Code 128 (ISO 15417)



Figure 64: `zint -b CODE128 --bind -d "130170X178"`

One of the most ubiquitous one-dimensional barcode symbologies, Code 128 was developed in 1981 by Computer Identics. This symbology supports full ASCII text and uses a three-Code Set system to compress the data into a smaller symbol. Zint automatically switches between Code Sets A, B and C (but see following) and adds a hidden modulo-103 check digit.

Manual switching of Code Sets is possible using the `--extraesc` option (`API input_mode |= EXTRA_ESCAPE_MODE`) and the Code 128-specific escapes `\^A`, `\^B`, `\^C`. For instance the following will force switching to Code Set B for the data "5678" (normally Code Set C would be used throughout):

```
zint -b CODE128 -d "1234\^B5678" --extraesc
```

The manually selected Code Set will apply until the next Code Set escape sequence, with the exception that data that cannot be represented in that Code Set will be switched as appropriate. If the data contains a special code sequence, it can be escaped by doubling the caret (^). For instance

```
zint -b CODE128 -d "\^AABC\^BDEF" --extraesc
```

will encode the data "ABC\^BDEF" in Code Set A.

Code 128 is the default barcode symbology used by Zint. In addition Zint supports the encoding of ISO/IEC 8859-1 (non-English) characters in Code 128 symbols. The ISO/IEC 8859-1 character set is shown in Annex [A.2 Latin Alphabet No. 1 \(ISO/IEC 8859-1\)](#).

Zint can encode a maximum of 99 symbol characters, which allows for e.g. 198 all-numeric characters.

6.1.10.2 Code 128 Suppress Code Set C (Code Sets A and B only)



Figure 65: `zint -b CODE128AB -d "130170X178"`

It is sometimes advantageous to stop Code 128 from using Code Set C which compresses numerical data. The `BARCODE_CODE128AB`¹³ variant (symbology 60) suppresses Code Set C in favour of Code Sets A and B.

Note that the special escapes to manually switch Code Sets mentioned above are not available for this variant (nor for any other).

¹³`BARCODE_CODE128AB` previously used the name `BARCODE_CODE128B`, which is still recognised.

6.1.10.3 GS1-128

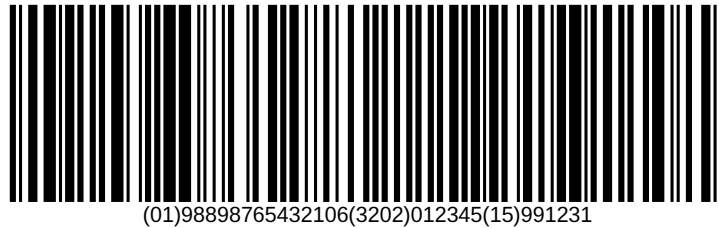


Figure 66: `zint -b GS1_128 --compliantheight -d "[01]98898765432106[3202]012345[15]991231"`

A variation of Code 128 previously known as UCC/EAN-128, this symbology is defined by the GS1 General Specifications. Application Identifiers (AIs) should be entered using [square bracket] notation. These will be converted to parentheses (round brackets) for the Human Readable Text. This will allow round brackets to be used in the data strings to be encoded.

For compatibility with data entry in other systems, if the data does not include round brackets, the option `--gs1parens` (API `input_mode |= GS1PARENS_MODE`) may be used to signal that AIs are encased in round brackets instead of square ones.

Fixed length data should be entered at the appropriate length for correct encoding. GS1-128 does not support extended ASCII (ISO/IEC 8859-1) characters. Check digits for GTIN data AI (01) are not generated and need to be included in the input data. The following is an example of a valid GS1-128 input:

```
zint -b 16 -d "[01]98898765432106[3202]012345[15]991231"
```

or using the `--gs1parens` option:

```
zint -b 16 --gs1parens -d "(01)98898765432106(3202)012345(15)991231"
```

6.1.10.4 EAN-14

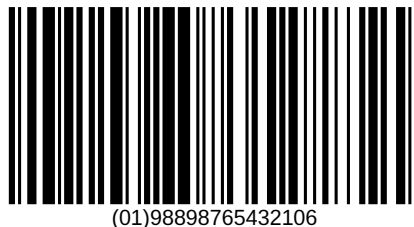


Figure 67: `zint -b EAN14 --compliantheight -d "98898765432106"`

A shorter version of GS1-128 which encodes GTIN data only. A 13-digit number is required. The GTIN check digit and AI (01) are added by Zint.

6.1.10.5 NVE-18 (SSCC-18)

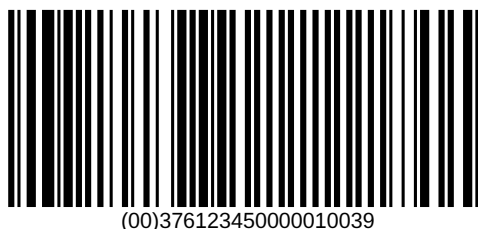


Figure 68: `zint -b NVE18 --compliantheight -d "37612345000001003"`

A variation of Code 128 the 'Nummer der Versandeinheit' standard, also known as SSCC-18 (Serial Shipping Container Code), includes both a visible modulo-10 and a hidden modulo-103 check digit. NVE-18 requires a 17-digit numerical input. Check digits and AI (00) are added by Zint.

6.1.10.6 HIBC Code 128



Figure 69: `zint -b HIBC_128 -d "A123BJC5D6E71"`

This option adds a leading '+' character and a trailing modulo-49 check digit to a standard Code 128 symbol as required by the Health Industry Barcode standards.

6.1.10.7 DPD Code



Figure 70: `zint -b DPD --compliantheight -d "000393206219912345678101040"`

Another variation of Code 128 as used by DPD (Deutscher Paketdienst). Requires a 27 or 28 character input. For 28 character input, the first character is an identification tag (Barcode ID), which should usually be "%" (ASCII 37). If 27 characters are supplied, "%" will be prefixed by Zint (except if marked as a "relabel", see below). The rest of the 27-character input must be alphanumeric, and is of the form:

Table : DPD Input Fields

Destination Post Code	Tracking Number	Service Code	Destination Country Code
PPPPPPP (7 alphanumerics)	TTTTTTTTTTTTTTT (14 alphanumerics)	SSS (3 digits)	CCC (3-digit ISO 3166-1)

A warning will be generated if the Service Code, the Destination Country Code, or the last 10 characters of the Tracking Number are non-numeric.

Zint formats the Human Readable Text as specified by DPD, leaving out the identification tag, and adds a modulo-36 check character to the text (not to the barcode itself), thus:

PPPP PPP TTTT TTTT TTTT TT SSS CCC D

By default a top boundary bar is added, with default width 3X. The width can be overridden using `--border` (API `border_width`). For a symbol with no top boundary bar, explicitly set the border type to `bindtop` (or `bind` or `box`) and leave the border width 0.

A DPD Code can be marked as a "relabel" by specifying `--vers=1` (API `option_2 = 1`), which omits the identification tag and prints the barcode at half height. In this case, an input of 27 alphanumeric characters is required.

6.1.10.8 UPU S10



Figure 71: `zint -b UPU_S10 --complantheight -d "EE876543216CA"`

The Universal Postal Union S10 variant of Code 128 encodes 13 characters in the format "SSNNNNNNNNXCC", where "SS" is a two-character alphabetic service indicator, "NNNNNNNN" is an 8-digit serial number, "X" is a modulo-11 check digit, and "CC" is a two-character ISO 3166-1 country code.

The check digit may be omitted in which case Zint will add it. Warnings will be generated if the service indicator is non-standard or the country code is not ISO 3361-1.

6.1.11 GS1 DataBar (ISO 24724)

Previously known as RSS (Reduced Spaced Symbology), these symbols are due to replace GS1-128 symbols in accordance with the GS1 General Specifications. If a GS1 DataBar symbol is to be printed with a 2D component as specified in ISO/IEC 24723 set `--mode=2` (API option_1 = 2). See [6.3 GS1 Composite Symbols \(ISO 24723\)](#) to find out how to generate DataBar symbols with 2D components.

6.1.11.1 GS1 DataBar Omnidirectional and GS1 DataBar Truncated



Figure 72: `zint -b DBAR_OMN --complantheight -d "0950110153001"`

Previously known as RSS-14 this standard encodes a 13-digit item code. A check digit and Application Identifier of (01) are added by Zint. (A 14-digit code that appends the check digit may be given, in which case the check digit will be verified.)

GS1 DataBar Omnidirectional symbols should have a height of 33 or greater. To produce a GS1 DataBar Truncated symbol set the symbol height to a value between 13 and 32. Truncated symbols may not be scannable by omnidirectional scanners.



Figure 73: `zint -b DBAR_OMN -d "0950110153001" --height=13`

6.1.11.2 GS1 DataBar Limited



Figure 74: `zint -b DBAR_LTD --complantheight -d "0950110153001"`

Previously known as RSS Limited this standard encodes a 13-digit item code and can be used in the same way as GS1 DataBar Omnidirectional above. GS1 DataBar Limited, however, is limited to data starting with digits 0 and 1 (i.e. numbers in the range 0 to 1999999999999). As with GS1 DataBar Omnidirectional a check digit and Application Identifier of (01) are added by Zint, and a 14-digit code may be given in which case the check digit will be verified.

6.1.11.3 GS1 DataBar Expanded



Figure 75: `zint -b DBAR_EXP --compliantheight -d "[01]98898765432106[3202]012345[15]991231"`

Previously known as RSS Expanded this is a variable length symbology capable of encoding data from a number of AIs in a single symbol. AIs should be encased in [square brackets] in the input data, which will be converted to parentheses (round brackets) before being included in the Human Readable Text attached to the symbol. This method allows the inclusion of parentheses in the data to be encoded. If the data does not include parentheses, the AIs may alternatively be encased in parentheses using the `--gs1parens` switch. See [6.1.10.3 GS1-128](#).

GTIN data AI (01) should also include the check digit data as this is not calculated by Zint when this symbology is encoded. Fixed length data should be entered at the appropriate length for correct encoding. The following is an example of a valid GS1 DataBar Expanded input:

```
zint -b 31 -d "[01]98898765432106[3202]012345[15]991231"
```

6.1.12 Korea Post Barcode



Figure 76: `zint -b KOREAPOST -d "923457"`

The Korean Postal Barcode is used to encode a 6-digit number and includes one check digit.

6.1.13 Channel Code



Figure 77: `zint -b CHANNEL -d "453678" --compliantheight`

A highly compressed symbol for numeric data. The number of channels in the symbol can be between 3 and 8 and this can be specified by setting the value of the `--vers` option (API `option_2`). It can also be determined by the length of the input data: e.g. a three character input string generates a 4 channel code by default.

The maximum values permitted depend on the number of channels used as shown in the table below:

Table : Channel Value Ranges

Channels	Minimum Value	Maximum Value
3	00	26
4	000	292
5	0000	3493
6	00000	44072
7	000000	576688
8	0000000	7742862

6.1.14 BC412 (SEMI T1-95)



Figure 78: `zint -b BC412 -d "AQQ45670" --compliantheight`

Designed by IBM for marking silicon wafers, each BC412 character is represented by 4 bars of a single size, interleaved with 4 spaces of varying sizes that total 8 (hence 4 bars in 12). Zint implements the SEMI T1-95 standard, where input must be alphanumeric, excluding the letter 0, and must be from 7 to 18 characters in length. A single check character is added by Zint, appearing in the 2nd character position. Lowercase input is automatically made uppercase.

6.2 Stacked Symbolologies

6.2.1 Basic Symbol Stacking

An early innovation to get more information into a symbol, used primarily in the vehicle industry, is to simply stack one-dimensional codes on top of each other. This can be achieved at the command prompt by giving more than one set of input data. For example

```
zint -d "This" -d "That"
```

will draw two Code 128 symbols, one on top of the other. The same result can be achieved using the API by executing the `ZBarcode_Encode()` function more than once on a symbol. For example:

```
my_symbol->symbology = BARCODE_CODE128;  
  
error = ZBarcode_Encode(my_symbol, "This", 0);  
  
error = ZBarcode_Encode(my_symbol, "That", 0);  
  
error = ZBarcode_Print(my_symbol);
```

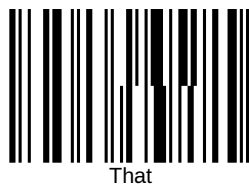


Figure 79: `zint -d "This" -d "That"`

Note that the Human Readable Text will be that of the last data, so it's best to use the option `--notext` (API `show_hrt = 0`).

The stacked barcode rows can be separated by row separator bars by specifying `--bind` (API `output_options |= BARCODE_BIND`). The height of the row separator bars in integral multiples of the X-dimension (minimum and default 1, maximum 4) can be set by `--separator` (API `option_3`):

```
zint --bind --notext --separator=2 -d "This" -d "That"
```



Figure 80: `zint --notext --bind --separator=2 -d "This" -d "That"`

A more sophisticated method is to use some type of line indexing which indicates to the barcode reader which order the stacked symbols should be read in. This is demonstrated by the symbologies below.

6.2.2 Codablock-F



Figure 81: `zint -b CODABLOCKF -d "CODABLOCK F Symbology" --rows=3`

This is a stacked symbology based on Code 128 which can encode Latin-1 data up to a maximum length of 2725 characters. The width of the Codablock-F symbol can be set using the `--cols` option (API `option_2`), to a value between 9 and 67. The height (number of rows) can be set using the `--rows` option (API `option_1`), with a maximum of 44. Zint does not currently support encoding of GS1 data in Codablock-F symbols.

A separate symbology ID (BARCODE_HIBC_BLOCKF) can be used to encode Health Industry Barcode (HIBC) data which adds a leading '+' character and a modulo-49 check digit to the encoded data.

6.2.3 Code 16K (EN 12323)



Figure 82: `zint -b CODE16K --complianceheight -d "ab0123456789"`

Code 16K uses a Code 128 based system which can stack up to 16 rows in a block. This gives a maximum data capacity of 77 characters or 154 numerical digits and includes two modulo-107 check digits. Code 16K also supports ISO/IEC 8859-1 character encoding in the same manner as Code 128. GS1 data encoding is also supported. The minimum number of rows to use can be set using the `--rows` option (API `option_1`), with values from 2 to 16.

6.2.4 PDF417 (ISO 15438)



Figure 83: `zint -b PDF417 -d "PDF417"`

Heavily used in the parcel industry, the PDF417 symbology can encode a vast amount of data into a small space. Zint supports encoding up to the ISO standard maximum symbol size of 925 codewords which (at error correction level 0) allows a maximum data size of 1850 text characters, or 2710 digits.

The width of the generated PDF417 symbol can be specified at the command line using the `--cols` switch (API `option_2`) followed by a number between 1 and 30, the number of rows using the `--rows` switch (API `option_3`) followed by a number between 3 and 90, and the amount of error correction information can be specified by using the `--secure` switch (API `option_1`) followed by a number between 0 and 8 where the number of codewords used for error correction is determined by $2^{(\text{value} + 1)}$. The default level of error correction is determined by the amount of data being encoded.

This symbology uses Latin-1 character encoding by default but also supports the ECI encoding mechanism. A separate symbology ID (BARCODE_HIBC_PDF) can be used to encode Health Industry Barcode (HIBC) data.

For a faster but less optimal encoding, the `--fast` option (API `input_mode` |= `FAST_MODE`) may be used.

PDF417 supports Structured Append of up to 99,999 symbols and an optional numeric ID of up to 30 digits, which can be set by using the `--structapp` option (see [4.17 Structured Append](#)) (API `structapp`). The ID consists of up to 10 triplets, each ranging from "000" to "899". For instance "123456789" would be a valid ID of 3 triplets. However "123456900" would not, as the last triplet "900" exceeds "899". The triplets are 0-filled, for instance "1234" becomes "123004". If an ID is not given, no ID is encoded.

6.2.5 Compact PDF417 (ISO 15438)



Figure 84: `zint -b PDF417COMP -d "PDF417"`

Previously known as Truncated PDF417, Compact PDF417 omits some per-row overhead to produce a narrower but less robust symbol. Options are the same as for PDF417 above.

6.2.6 MicroPDF417 (ISO 24728)



Figure 85: `zint -b MICROPDF417 -d "12345678"`

A variation of the PDF417 standard, MicroPDF417 is intended for applications where symbol size needs to be kept to a minimum. 34 predefined symbol sizes are available with 1 - 4 columns and 4 - 44 rows. The maximum amount a MicroPDF417 symbol can hold is 250 alphanumeric characters or 366 digits. The amount of error correction used is dependent on symbol size. The number of columns used can be determined using the `--cols` switch (API `option_2`) as with PDF417.

This symbology uses Latin-1 character encoding by default but also supports the ECI encoding mechanism. A separate symbology ID (`BARCODE_HIBC_MICPDF`) can be used to encode Health Industry Barcode (HIBC) data. MicroPDF417 supports `FAST_MODE` and `Structured Append` the same as PDF417, for which see details.

6.2.7 GS1 DataBar Stacked (ISO 24724)

6.2.7.1 GS1 DataBar Stacked



Figure 86: `zint -b DBAR_STK --complantheight -d "9889876543210"`

A stacked variation of the GS1 DataBar Truncated symbol requiring the same input (see [6.1.11.1 GS1 DataBar Omnidirectional and GS1 DataBar Truncated](#)), this symbol is the same as the following GS1 DataBar Stacked Omnidirectional symbol except that its height is reduced and its central separator is a single row, making it suitable for small items when omnidirectional scanning is not required. It can be generated with a two-dimensional component to make a composite symbol.

6.2.7.2 GS1 DataBar Stacked Omnidirectional



Figure 87: `zint -b DBAR_OMNSTK --complantheight -d "9889876543210"`

A stacked variation of the GS1 DataBar Omnidirectional symbol requiring the same input (see [6.1.11.1 GS1 DataBar Omnidirectional and GS1 DataBar Truncated](#)). The data is encoded in two rows of bars with a central 3-row separator. This symbol can be generated with a two-dimensional component to make a composite symbol.

6.2.7.3 GS1 DataBar Expanded Stacked



Figure 88: `zint -b DBAR_EXPSTK --complantheight -d "[01]98898765432106[3202]012345[15]991231"`

A stacked variation of the GS1 DataBar Expanded symbol for smaller packages. Input is the same as for GS1 DataBar Expanded (see [6.1.11.3 GS1 DataBar Expanded](#)). In addition the width of the symbol can be altered using the `--cols` switch (API `option_2`). In this case the number of columns (values 1 to 11) relates to the number of character pairs on each row of the symbol. Alternatively the `--rows` switch (API `option_3`) can be used to specify the maximum number of rows (values 2 to 11), and the number of columns will be adjusted accordingly. This symbol can be generated with a two-dimensional component to make a composite symbol. For symbols with a 2D component the number of columns must be at least 2.

6.2.8 Code 49

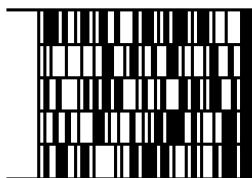


Figure 89: `zint -b CODE49 --complantheight -d "MULTIPLE ROWS IN CODE 49"`

Developed in 1987 at Intermec, Code 49 is a cross between UPC and Code 39. It is one of the earliest stacked symbologies and influenced the design of Code 16K a few years later. It supports full 7-bit ASCII input up to a maximum of 49 characters or 81 numeric digits. GS1 data encoding is also supported. The minimum number of rows to use can be set using the `--rows` option (API `option_1`), with values from 2 to 8.

6.3 GS1 Composite Symbols (ISO 24723)

GS1 Composite symbols employ a mixture of components to give more comprehensive information about a product. The permissible contents of a composite symbol is determined by the terms of the GS1 General Specifications. Composite symbols consist of a linear component which can be an EAN, UPC, GS1-128 or GS1 DataBar symbol, a two-dimensional (2D) component which is based on PDF417 or MicroPDF417, and a separator pattern. The type of linear component to be used is determined using the `-b` or `--barcode` switch (API symbology) as with other encoding methods. Valid values are shown below.

Table : GS1 Composite Symbology Values

Numeric Value	Name	Barcode Name
130	BARCODE_EANX_CC	GS1 Composite Symbol with EAN linear component
131	BARCODE_GS1_128_CC	GS1 Composite Symbol with GS1-128 linear component
132	BARCODE_DBAR_OMN_CC	GS1 Composite Symbol with GS1 DataBar Omnidirectional linear component
133	BARCODE_DBAR_LTD_CC	GS1 Composite Symbol with GS1 DataBar Limited linear component
134	BARCODE_DBAR_EXP_CC	GS1 Composite Symbol with GS1 DataBar Expanded linear component
135	BARCODE_UPCA_CC	GS1 Composite Symbol with UPC-A linear component
136	BARCODE_UPCE_CC	GS1 Composite Symbol with UPC-E linear component
137	BARCODE_DBAR_STK_CC	GS1 Composite Symbol with GS1 DataBar Stacked component
138	BARCODE_DBAR_OMNSTK_CC	GS1 Composite Symbol with GS1 DataBar Stacked Omnidirectional component
139	BARCODE_DBAR_EXPSTK_CC	GS1 Composite Symbol with GS1 DataBar Expanded Stacked component

The data to be encoded in the linear component of a composite symbol should be entered into a primary string with the data for the 2D component being entered in the normal way. To do this at the command prompt use the `--primary` switch (API `primary`). For example:

```
zint -b EANX_CC --mode=1 --primary=331234567890 -d "[99]1234-abcd"
```

This creates an EAN-13 linear component with the data "331234567890" and a 2D CC-A (see [below](#)) component with the data "(99)1234-abcd". The same results can be achieved using the API as shown below:

```
my_symbol->symbology = BARCODE_EANX_CC;
```

```
my_symbol->option_1 = 1;
```

```
strcpy(my_symbol->primary, "331234567890");
```

```
ZBarcode_Encode_and_Print(my_symbol, "[99]1234-abcd", 0, 0);
```

EAN-2 and EAN-5 add-on data can be used with EAN and UPC symbols using the `+` symbol as described in sections [6.1.3 UPC \(Universal Product Code\) \(ISO 15420\)](#) and [6.1.4 EAN \(European Article Number\) \(ISO 15420\)](#).

The 2D component of a composite symbol can use one of three systems: CC-A, CC-B and CC-C, as described below. The 2D component type can be selected automatically by Zint dependent on the length of the input string. Alternatively the three methods can be accessed using the `--mode` prompt (API `option_1`) followed by 1, 2 or 3 for CC-A, CC-B or CC-C respectively.

6.3.1 CC-A



Figure 90: `zint -b EANX_CC --compliantheight -d "[99]1234-abcd" --mode=1 --primary=331234567890`

This system uses a variation of MicroPDF417 which is optimised to fit into a small space. The size of the 2D component and the amount of error correction is determined by the amount of data to be encoded and the type of linear component which is being used. CC-A can encode up to 56 numeric digits or an alphanumeric string of shorter length. To select CC-A use `--mode=1` (API `option_1 = 1`).

6.3.2 CC-B



Figure 91: `zint -b EANX_CC --compliantheight -d "[99]1234-abcd" --mode=2 --primary=331234567890`

This system uses MicroPDF417 to encode the 2D component. The size of the 2D component and the amount of error correction is determined by the amount of data to be encoded and the type of linear component which is being used. CC-B can encode up to 338 numeric digits or an alphanumeric string of shorter length. To select CC-B use `--mode=2` (API `option_1 = 2`).

6.3.3 CC-C



Figure 92: `zint -b GS1_128_CC --compliantheight -d "[99]1234-abcd" --mode=3 --primary="[01]03312345678903"`

This system uses PDF417 and can only be used in conjunction with a GS1-128 linear component. CC-C can encode up to 2361 numeric digits or an alphanumeric string of shorter length. To select CC-C use `--mode=3` (API `option_1 = 3`).

6.4 Two-Track Symbols

6.4.1 Two-Track Pharmacode



Figure 93: `zint -b PHARMA_TWO --compliantheight -d "29876543"`

Developed by Laetus, Pharmacode Two-Track is an alternative system to Pharmacode One-Track (see 6.1.9 Pharmacode) used for the identification of pharmaceuticals. The symbology is able to encode whole numbers between 4 and 64570080.

6.4.2 POSTNET



Figure 94: `zint -b POSTNET --complianceheight -d "12345678901"`

Used by the United States Postal Service until 2009, the POSTNET barcode was used for encoding zip-codes on mail items. POSTNET uses numerical input data and includes a modulo-10 check digit. While Zint will encode POSTNET symbols of up to 38 digits in length, standard lengths as used by USPS were `PostNet6` (5-digit ZIP input), `PostNet10` (5-digit ZIP + 4-digit user data) and `PostNet12` (5-digit ZIP + 6-digit user data), and a warning will be issued if the input length is not one of these.

6.4.3 PLANET



Figure 95: `zint -b PLANET --compliantheight -d "4012345235636"`

Used by the United States Postal Service until 2009, the PLANET (Postal Alpha Numeric Encoding Technique) barcode was used for encoding routing data on mail items. PLANET uses numerical input data and includes a modulo-10 check digit. While Zint will encode PLANET symbols of up to 38 digits in length, standard lengths used by USPS were Planet12 (11-digit input) and Planet14 (13-digit input), and as with POSTNET a warning will be issued if the length is not one of these.

6.4.4 Brazilian CEPNet



Figure 96: `zint -b CEPNET --compliantheight -d "12345678"`

Based on POSTNET, the CEPNet symbol is used by Correios, the Brazilian postal service, to encode CEP (Código de Endereçamento Postal) numbers on mail items. Input should consist of eight digits with the check digit being automatically added by Zint.

6.5 4-State Postal Codes

6.5.1 Australia Post 4-State Symbols

6.5.1.1 Customer Barcodes



Figure 97: `zint -b AUSPOST --compliantheight -d "96184209"`

Australia Post Standard Customer Barcode, Customer Barcode 2 and Customer Barcode 3 are 37-bar, 52-bar and 67-bar specifications respectively, developed by Australia Post for printing Delivery Point ID (DPID) and customer information on mail items. Valid data characters are 0-9, A-Z, a-z, space and hash (#). A Format Control Code (FCC) is added by Zint and should not be included in the input data. Reed-Solomon error correction data is generated by Zint. Encoding behaviour is determined by the length of the input data according to the formula shown in the following table.

Table : Australia Post Input Formats

Input Length	Required Input Format	Symbol Length	FCC	Encoding Table
8	99999999	37-bar	11	None
13	99999999AAAAA	52-bar	59	C
16	9999999999999999	52-bar	59	N
18	999999999AAAAA	67-bar	62	C
23	9999999999999999999999	67-bar	62	N

6.5.1.2 Reply Paid Barcode



Figure 98: `zint -b AUSREPLY --compliantheight -d "12345678"`

A Reply Paid version of the Australia Post 4-State Barcode (FCC 45) which requires an 8-digit DPID input.

6.5.1.3 Routing Barcode



Figure 99: `zint -b AUSROUTE --compliantheight -d "34567890"`

A Routing version of the Australia Post 4-State Barcode (FCC 87) which requires an 8-digit DPID input.

6.5.1.4 Redirect Barcode



Figure 100: `zint -b AUSREDIRECT --compliantheight -d "98765432"`

A Redirection version of the Australia Post 4-State Barcode (FCC 92) which requires an 8-digit DPID input.

6.5.2 Dutch Post KIX Code



Figure 101: `zint -b KIX --complantheight -d "2500GG30250"`

This symbology is used by Royal Dutch TPG Post (Netherlands) for Postal code and automatic mail sorting. Data input can consist of numbers 0-9 and letters A-Z and needs to be 11 characters in length. No check digit is included.

6.5.3 Royal Mail 4-State Customer Code (RM4SCC)



Figure 102: `zint -b RM4SCC --complantheight -d "W1J0TR01"`

The RM4SCC standard is used by the Royal Mail in the UK to encode postcode and customer data on mail items. Data input can consist of numbers 0-9 and letters A-Z and usually includes delivery postcode followed by house number. For example "W1J0TR01" for 1 Piccadilly Circus in London. Check digit data is generated by Zint.

6.5.4 Royal Mail 4-State Mailmark



Figure 103: `zint -b MAILMARK_4S --complantheight -d "11000000000000XY11"`

Developed in 2014 as a replacement for RM4SCC this 4-state symbol includes Reed- Solomon error correction. Input is a pre-formatted alphanumeric string of 22 (for Barcode C) or 26 (for Barcode L) characters, producing a symbol with 66 or 78 bars respectively. The rules for the input data are complex, as summarized in the following table.

Table : Royal Mail 4-State Mailmark Input Fields

Format	Version ID	Class	Supply Chain ID	Item ID	Destination+DPS
1 digit (0-4)	1 digit (0-3)	1 alphanum. (0-9A-E)	2 digits (C) or 6 digits (L)	8 digits	9 alphanumerics (1 of 6 patterns)

The 6 Destination+DPS (Destination Post Code plus Delivery Point Suffix) patterns are:

Table : Royal Mail Mailmark Destination+DPS Patterns

FFNFNLLNLS	FFNNLLNLS	FFNNNLLNL
FFNFNLLNL	FNNLLNLSS	FNNNLLNLS

where 'F' stands for full alphabetic (A-Z), 'L' for limited alphabetic (A-Z less 'CIKMOV'), 'N' for numeric (0-9), and 'S' for space.

Four of the permitted patterns include a number of trailing space characters - these will be appended by Zint if not included in the input data.

For the two-dimensional Data Matrix-based version, see [6.6.2 Royal Mail 2D Mailmark \(CMDM\) \(Data Matrix\)](#).

6.5.5 USPS Intelligent Mail



Figure 104: `zint -b USPS_IMAIL --compliantheight -d "01234567094987654321-01234"`

Also known as the OneCode barcode and used in the U.S. by the United States Postal Service (USPS), the Intelligent Mail system replaced the POSTNET and PLANET symbologies in 2009. Intelligent Mail is a fixed length (65-bar) symbol which combines routing and customer information in a single symbol. Input data consists of a 20-digit tracking code, followed by a dash (-), followed by a delivery point zip-code which can be 0, 5, 9 or 11 digits in length. For example all of the following inputs are valid data entries:

- `"01234567094987654321"`
- `"01234567094987654321-01234"`
- `"01234567094987654321-012345678"`
- `"01234567094987654321-01234567891"`

6.5.6 Japanese Postal Code



Figure 105: `zint -b JAPANPOST --compliantheight -d "15400233-16-4-205"`

Used for address data on mail items for Japan Post. Accepted values are 0-9, A-Z and dash (-). A modulo 19 check digit is added by Zint.

6.5.7 DAFT Code



Figure 106: `zint -b DAFT -d "AAFDTTDAFADFTFTFFFDATFTADTTFFTDFAFDTF" --height=8.494 --vers=256`

This is a method for creating 4-state codes where the data encoding is provided by an external program. Input data should consist of the letters 'D', 'A', 'F' and 'T' where these refer to descender, ascender, full (ascender and descender) and tracker (neither ascender nor descender) respectively. All other characters are invalid. The ratio of the tracker size to full height can be given in thousandths (permille) using the `--vers` option (API option_2). The default value is 250 (25%).

For example the following

```
zint -b DAFT -d AAFDTTDAFADFTFTFFFDATFTADTTFFTDFAFDTF --height=8.494 --vers=256
```

produces the same barcode (see [6.5.3 Royal Mail 4-State Customer Code \(RM4SCC\)](#)) as

```
zint -b RM4SCC --compliantheight -d "W1J0TR01"
```

6.6 Matrix Symbols

6.6.1 Data Matrix (ISO 16022)



Figure 107: `zint -b HIBC_DM -d "/ACMRN123456/V200912190833" --fast --square`

Also known as Semacode this symbology was developed in 1989 by Acuity CiMatrix in partnership with the U.S. DoD and NASA. The symbol can encode a large amount of data in a small area. Data Matrix encodes characters in the Latin-1 set by default but also supports encoding in other character sets using the ECI mechanism. It can also encode GS1 data. The size of the generated symbol can be adjusted using the `--vers` option (API `option_2`) as shown in the table below. A separate symbology ID (`BARCODE_HIBC_DM`) can be used to encode Health Industry Barcode (HIBC) data. Note that only ECC200 encoding is supported, the older standards have now been removed from Zint.

Table : Data Matrix Sizes

Input	Symbol Size	Input	Symbol Size	Input	Symbol Size
1	10 x 10	11	36 x 36	21	104 x 104
2	12 x 12	12	40 x 40	22	120 x 120
3	14 x 14	13	44 x 44	23	132 x 132
4	16 x 16	14	48 x 48	24	144 x 144
5	18 x 18	15	52 x 52	25	8 x 18
6	20 x 20	16	64 x 64	26	8 x 32
7	22 x 22	17	72 x 72	28	12 x 26
8	24 x 24	18	80 x 80	28	12 x 36
9	26 x 26	19	88 x 88	29	16 x 36
10	32 x 32	20	96 x 96	30	16 x 48

The largest version 24 (144 x 144) can encode 3116 digits, around 2335 alphanumeric characters, or 1555 bytes of data.

When using automatic symbol sizes you can force Zint to use square symbols (versions 1-24) at the command line by using the option `--square` (API `option_3 = DM_SQUARE`).

Data Matrix Rectangular Extension (ISO/IEC 21471) codes may be generated with the following values as before:

Table : DMRE Sizes

Input	Symbol Size	Input	Symbol Size
31	8 x 48	40	20 x 36
32	8 x 64	41	20 x 44
33	8 x 80	42	20 x 64
34	8 x 96	43	22 x 48
35	8 x 120	44	24 x 48
36	8 x 144	45	24 x 64
37	12 x 64	46	26 x 40
38	12 x 88	47	26 x 48
39	16 x 64	48	26 x 64

DMRE symbol sizes may be activated in automatic size mode using the option `--dmre` (API `option_3 = DM_DMRE`).

GS1 data may be encoded using FNC1 (default) or GS (Group Separator, ASCII 29) as separator. Use the option `--gssep` to change to GS (API `output_options |= GS1_GS_SEPARATOR`).

By default Zint uses a “de facto” codeword placement for symbols of size 144 x 144 (version 24). To override this and use the now clarified ISO/IEC standard placement, use option `--dmiso144` (API `option_3 |= DM_ISO_144`).

For a faster but less optimal encoding, the `--fast` option (API `input_mode |= FAST_MODE`) may be used.

Data Matrix supports Structured Append of up to 16 symbols and a numeric ID (file identifications), which can be set by using the `--structapp` option (see [4.17 Structured Append](#)) (API `structapp`). The ID consists of 2 numbers ID1 and ID2, each of which can range from 1 to 254, and is specified as the single number $ID1 * 1000 + ID2$, so for instance ID1 "123" and ID2 "234" would be given as "123234". Note that both ID1 and ID2 must be non-zero, so e.g. "123000" or "000123" would be invalid IDs. If an ID is not given it defaults to "001001".

6.6.2 Royal Mail 2D Mailmark (CMDM) (Data Matrix)



Figure 108: `zint -b MAILMARK_2D -d "JGB 01Z99999990000001EC1A1AA1A0SN35TQ" --vers=30`

This variant of Data Matrix, also known as “Complex Mail Data Mark” (CMDM), was introduced by Royal Mail along with [6.5.4 Royal Mail 4-State Mailmark](#), and offers space for customer data following an initial pre-formatted 45 character section, as summarized below.

Table : Royal Mail 2D Mailmark Input Fields

Field Name	Length	Values
UPU Country ID	4	"JGB "
Information Type	1	Alphanumeric
Version ID	1	"1"
Class	1	Alphanumeric
Supply Chain ID	7	Numeric
Item ID	8	Numeric
Destination+DPS	9	Alphanumeric (1 of 6 patterns)
Service Type	1	Numeric
RTS Post Code	7	Alphanumeric (1 of 6 patterns)
Reserved	6	Spaces
Customer Data	6, 45 or 29	Anything (Latin-1)

The 6 Destination+DPS (Destination Post Code plus Delivery Point Suffix) patterns are the same as for the 4-state - see Table : [Royal Mail Mailmark Destination+DPS Patterns](#). The 6 RTS (Return to Sender) Post Code patterns are the same also except without the additional DPS 'NL', i.e.

Table : Royal Mail 2D Mailmark RTS Patterns

FNFNLLS	FFNNLLS	FFNNLL
FFFNLL	FNNLLS	FNNLLS

where 'F' is full alphabetic (A-Z), 'L' limited alphabetic (A-Z less 'CIKM0V'), 'N' numeric (0-9), and 'S' space.

Three sizes are defined, one rectangular, with varying maximum amounts of optional customer data:

Table : Royal Mail 2D Mailmark Sizes

Name	Size	Customer Data	Zint Version
Type 7	24 x 24	6 characters	8

Name	Size	Customer Data	Zint Version
Type 9	32 x 32	45 characters	10
Type 29	16 x 48	29 characters	30

Zint will automatically select a size based on the amount of customer data, or it can be specified using the `--vers` option (API option_2), which takes the Zint version number (one more than the Royal Mail Type number). Zint will prefix the input data with "JGB " if it's missing, and also space-pad the input if the customer data is absent or falls short. As with Data Matrix, the rectangular symbol Type 29 can be excluded from automatic size selection by using the option `--square` (API option_3 = DM_SQUARE).

GS1 data, the ECI mechanism, and Structured Append are not supported.

6.6.3 QR Code (ISO 18004)



Figure 109: `zint -b QRCODE -d "QR Code Symbol" --mask=5`

Also known as Quick Response Code this symbology was developed by Denso. Four levels of error correction are available using the `--secure` option (API option_1) as shown in the following table.

Table : QR Code ECC Levels

Input	ECC Level	Error Correction Capacity	Recovery Capacity
1	L	Approx 20% of symbol	Approx 7%
2	M	Approx 37% of symbol	Approx 15%
3	Q	Approx 55% of symbol	Approx 25%
4	H	Approx 65% of symbol	Approx 30%

The size of the symbol can be specified by setting the `--vers` option (API option_2) to the QR Code version required (1-40). The size of symbol generated is shown in the table below.

Table : QR Code Sizes

Input	Symbol Size	Input	Symbol Size	Input	Symbol Size
1	21 x 21	15	77 x 77	29	133 x 133
2	25 x 25	16	81 x 81	30	137 x 137
3	29 x 29	17	85 x 85	31	141 x 141
4	33 x 33	18	89 x 89	32	145 x 145
5	37 x 37	19	93 x 93	33	149 x 149
6	41 x 41	20	97 x 97	34	153 x 153
7	45 x 45	21	101 x 101	35	157 x 157
8	49 x 49	22	105 x 105	36	161 x 161
9	53 x 53	23	109 x 109	37	165 x 165
10	57 x 57	24	113 x 113	38	169 x 169
11	61 x 61	25	117 x 117	39	173 x 173
12	65 x 65	26	121 x 121	40	177 x 177
13	69 x 69	27	125 x 125		
14	73 x 73	28	129 x 129		

The maximum capacity of a QR Code symbol (version 40) is 7089 numeric digits, 4296 alphanumeric characters or 2953 bytes of data. QR Code symbols can also be used to encode GS1 data. QR Code symbols can by default encode either characters in the Latin-1 set or Kanji, Katakana and ASCII characters which are members of the

Shift JIS encoding scheme. In addition QR Code supports other character sets using the ECI mechanism. Input should usually be entered as UTF-8 with conversion to Latin-1 or Shift JIS being carried out by Zint. A separate symbology ID (BARCODE_HIBC_QR) can be used to encode Health Industry Barcode (HIBC) data.

Non-ASCII data density may be maximized by using the `--fullmultibyte` switch (API `option_3 = ZINT_FULL_MULTIBYTE`), but check that your barcode reader supports this before using.

QR Code has eight different masks designed to minimize unwanted patterns. The best mask to use is selected automatically by Zint but may be manually specified by using the `--mask` switch with values 0-7, or in the API by setting `option_3 = (N + 1) << 8` where N is 0-7. To use with `ZINT_FULL_MULTIBYTE` set

`option_3 = ZINT_FULL_MULTIBYTE | (N + 1) << 8`

The `--fast` option (API `input_mode |= FAST_MODE`) may be used when leaving Zint to automatically select a mask to reduce the number of masks to try to four (0, 2, 4, 7).

QR Code supports Structured Append of up to 16 symbols and a numeric ID (parity), which can be set by using the `--structapp` option (see [4.17 Structured Append](#)) (API `structapp`). The parity ID ranges from 0 (default) to 255, and for full compliance should be set to the value obtained by XOR-ing together each byte of the complete data forming the sequence. Currently this calculation must be done outside of Zint.

6.6.4 Micro QR Code (ISO 18004)



Figure 110: `zint -b MICROQR -d "01234567"`

A miniature version of the QR Code symbol for short messages, Micro QR Code symbols can encode either Latin-1 characters or Shift JIS characters. Input should be entered as a UTF-8 stream with conversion to Latin-1 or Shift JIS being carried out automatically by Zint. A preferred symbol size can be selected by using the `--vers` option (API `option_2`), as shown in the table below. Note that versions M1 and M2 have restrictions on what characters can be encoded.

Table : Micro QR Code Sizes

Input	Version	Symbol Size	Allowed Characters
1	M1	11 x 11	Numeric only
2	M2	13 x 13	Numeric, uppercase letters, space, and the characters "\$%*+ - . / : "
3	M3	15 x 15	Latin-1 and Shift JIS
4	M4	17 x 17	Latin-1 and Shift JIS

Version M4 can encode up to 35 digits, 21 alphanumerics, 15 bytes or 9 Kanji characters.

Except for version M1, which is always ECC level L, the amount of ECC codewords can be adjusted using the `--secure` option (API `option_1`); however ECC level H is not available for any version, and ECC level Q is only available for version M4:

Table : Micro QR ECC Levels

Input	ECC Level	Error Correction Capacity	Recovery Capacity	Available for Versions
1	L	Approx 20% of symbol	Approx 7%	M1, M2, M3, M4
2	M	Approx 37% of symbol	Approx 15%	M2, M3, M4
3	Q	Approx 55% of symbol	Approx 25%	M4

The defaults for symbol size and ECC level depend on the input and whether either of them is specified.

For barcode readers that support it, non-ASCII data density may be maximized by using the `--fullmultibyte` switch (API `option_3 = ZINT_FULL_MULTIBYTE`).

Micro QR Code has four different masks designed to minimize unwanted patterns. The best mask to use is selected automatically by Zint but may be manually specified by using the `--mask` switch with values 0-3, or in the API by setting `option_3 = (N + 1) << 8` where N is 0-3. To use with `ZINT_FULL_MULTIBYTE` set

`option_3 = ZINT_FULL_MULTIBYTE | (N + 1) << 8`

6.6.5 Rectangular Micro QR Code (rMQR) (ISO 23941)



Figure 111: `zint -b RMQR -d "0123456"`

A rectangular version of QR Code, rMQR supports encoding of GS1 data, and either Latin-1 characters or Shift JIS characters, and other encodings using the ECI mechanism. As with other symbologies data should be entered as UTF-8 with conversion being handled by Zint. The amount of ECC codewords can be adjusted using the `--secure` option (API `option_1`), however only ECC levels M and H are valid for this type of symbol.

Table : rMQR ECC Levels

Input	ECC Level	Error Correction Capacity	Recovery Capacity
2	M	Approx 37% of symbol	Approx 15%
4	H	Approx 65% of symbol	Approx 30%

The preferred symbol sizes can be selected using the `--vers` option (API `option_2`) as shown in the table below. Input values between 33 and 38 fix the height of the symbol while allowing Zint to determine the minimum symbol width.

Table : rMQR Sizes

Input	Version	Symbol Size (HxW)	Input	Version	Symbol Size (HxW)
1	R7x43	7 x 43	20	R13x77	13 x 77
2	R7x59	7 x 59	21	R13x99	13 x 99
3	R7x77	7 x 77	22	R13x139	13 x 139
4	R7x99	7 x 99	23	R15x43	15 x 43
5	R7x139	7 x 139	24	R15x59	15 x 59
6	R9x43	9 x 43	25	R15x77	15 x 77
7	R9x59	9 x 59	26	R15x99	15 x 99
8	R9x77	9 x 77	27	R15x139	15 x 139
9	R9x99	9 x 99	28	R17x43	17 x 43
10	R9x139	9 x 139	29	R17x59	17 x 59
11	R11x27	11 x 27	30	R17x77	17 x 77
12	R11x43	11 x 43	31	R17x99	17 x 99
13	R11x59	11 x 59	32	R17x139	17 x 139
14	R11x77	11 x 77	33	R7xW	7 x automatic width
15	R11x99	11 x 99	34	R9xW	9 x automatic width
16	R11x139	11 x 139	35	R11xW	11 x automatic width
17	R13x27	13 x 27	36	R13xW	13 x automatic width
18	R13x43	13 x 43	37	R15xW	15 x automatic width
19	R13x59	13 x 59	38	R17xW	17 x automatic width

The largest version R17x139 (32) can encode up to 361 digits, 219 alphanumerics, 150 bytes, or 92 Kanji characters.

For barcode readers that support it, non-ASCII data density may be maximized by using the `--fullmultibyte` switch or in the API by setting `option_3 = ZINT_FULL_MULTIBYTE`.

6.6.6 UPNQR (Univerzalnega Plačilnega Naloga QR)



Figure 112: `zint -b UPNQR -i upn_utf8.txt --quietzones`

A variation of QR Code used by Združenje Bank Slovenije (Bank Association of Slovenia). The size, error correction level and ECI are set by Zint and do not need to be specified. UPNQR is unusual in that it uses Latin-2 (ISO/IEC 8859-2 plus ASCII) formatted data. Zint will accept UTF-8 data and convert it to Latin-2, or if your data is already Latin-2 formatted use the `--binary` switch (API `input_mode = DATA MODE`).

The following example creates a symbol from data saved as a Latin-2 file:

```
zint -o upnqr.png -b 143 --scale=3 --binary -i upn.txt
```

A mask may be manually specified or the `--fast` option used as with `QRCODE`.

6.6.7 MaxiCode (ISO 16023)

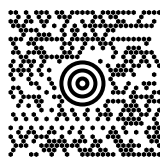


Figure 113: `zint -b MAXICODE -d "1Z00004951\GUPSN\G06X610\G159\G1234567\G1/1\G\GY\G1 MAIN ST\GNY\GNY\R\E" --esc --primary="152382802000000" --scmvv=96`

Developed by UPS the MaxiCode symbology employs a grid of hexagons surrounding a bullseye finder pattern. This symbology is designed for the identification of parcels. MaxiCode symbols can be encoded in one of five modes. In modes 2 and 3 MaxiCode symbols are composed of two parts named the primary and secondary messages. The primary message consists of a Structured Carrier Message which includes various data about the package being sent and the secondary message usually consists of address data in a data structure. The format of the primary message required by Zint is given in the following table.

Table : MaxiCode Structured Carrier Message Format

Characters	Meaning
1 - 9	Postcode data which can consist of up to 9 digits (for mode 2) or up to 6 alphanumeric characters (for mode 3). Remaining unused characters for mode 3 can be filled with the SPACE character (ASCII 32) or omitted. (adjust the following character positions according to postcode length)
10 - 12	Three-digit country code according to ISO 3166-1.
13 - 15	Three-digit service code. This depends on your parcel courier.

The primary message can be set at the command prompt using the `--primary` switch (API `primary`). The secondary message uses the normal data entry method. For example:

```
zint -o test.eps -b 57 --primary="999999999840012" \
-d "Secondary Message Here"
```

When using the API the primary message must be placed in the primary string. The secondary is entered in the same way as described in [5.2 Encoding and Saving to File](#). When either of these modes is selected Zint will analyse the primary message and select either mode 2 or mode 3 as appropriate.

As a convenience the secondary message for modes 2 and 3 can be set to be prefixed by the ISO/IEC 15434 Format "01" (transportation) sequence "[>\R01\Gvv", where vv is a 2-digit version, by using the --scmvv switch (API option_2 = vv + 1). For example to use the common version "96" (ASC MH10/SC 8):

```
zint -b 57 --primary="152382802840001" --scmvv=96 --esc -d \
"1Z00004951\GUPSN\G06X610\G159\G1234567\G1/1\G\GY\G1 MAIN ST\GNY\GNY\R\E"
```

will prefix "[>\R01\G96" to the secondary message. (\R, \G and \E are the escape sequences for Record Separator, Group Separator and End of Transmission respectively - see [Table : Escape Sequences](#).)

Modes 4 to 6 can be accessed using the --mode switch (API option_1). Modes 4 to 6 do not have a primary message. For example:

```
zint -o test.eps -b 57 --mode=4 -d "A MaxiCode Message in Mode 4"
```

Mode 6 is reserved for the maintenance of scanner hardware and should not be used to encode user data.

This symbology uses Latin-1 character encoding by default but also supports the ECI encoding mechanism. The maximum length of text which can be placed in a MaxiCode symbol depends on the type of characters used in the text.

Example maximum data lengths are given in the table below:

Table : MaxiCode Data Length Maxima

Mode	Maximum Data Length for Capital Letters	Maximum Data Length for Numeric Digits	Number of Error Correction Codewords
2*	84	126	50
3*	84	126	50
4	93	138	50
5	77	113	66
6	93	138	50

* - secondary only

MaxiCode supports Structured Append of up to 8 symbols, which can be set by using the --structapp option (see [4.17 Structured Append](#)) (API structapp). It does not support specifying an ID.

MaxiCode uses a different scaling than other symbols for raster output, see [4.9.3 MaxiCode Raster Scaling](#), and also for EMF vector output, when the scale is multiplied by 20 instead of 2.

6.6.8 Aztec Code (ISO 24778)



Figure 114: zint -b AZTEC -d "123456789012"

Invented by Andrew Longacre at Welch Allyn Inc in 1995 the Aztec Code symbol is a matrix symbol with a distinctive bullseye finder pattern. Zint can generate Compact Aztec Code (sometimes called Small Aztec Code) as well as 'full-range' Aztec Code symbols and by default will automatically select symbol type and size dependent on the length of the data to be encoded. Error correction codewords will normally be generated to fill at least 23% of the symbol. Two options are available to change this behaviour:

The size of the symbol can be specified using the --vers option (API option_2) to a value between 1 and 36 according to the following table. The symbols marked with an asterisk (*) in the table below are 'compact' symbols, meaning they have a smaller bullseye pattern at the centre of the symbol.

Table : Aztec Code Sizes

Input	Symbol Size	Input	Symbol Size	Input	Symbol Size
1	15 x 15*	13	53 x 53	25	105 x 105
2	19 x 19*	14	57 x 57	26	109 x 109
3	23 x 23*	15	61 x 61	27	113 x 113
4	27 x 27*	16	67 x 67	28	117 x 117
5	19 x 19	17	71 x 71	29	121 x 121
6	23 x 23	18	75 x 75	30	125 x 125
7	27 x 27	19	79 x 79	31	131 x 131
8	31 x 31	20	83 x 83	32	135 x 135
9	37 x 37	21	87 x 87	33	139 x 139
10	41 x 41	22	91 x 91	34	143 x 143
11	45 x 45	23	95 x 95	35	147 x 147
12	49 x 49	24	101 x 101	36	151 x 151

Note that in symbols which have a specified size the amount of error correction is dependent on the length of the data input and Zint will allow error correction capacities as low as 3 codewords.

Alternatively the amount of error correction data can be specified by setting the `--secure` option (API `option_1`) to a value from the following table.

Table : Aztec Code Error Correction Modes

Mode	Error Correction Capacity
1	>10% + 3 codewords
2	>23% + 3 codewords
3	>36% + 3 codewords
4	>50% + 3 codewords

It is not possible to select both symbol size and error correction capacity for the same symbol. If both options are selected then the error correction capacity selection will be ignored.

Aztec Code supports ECI encoding and can encode up to a maximum length of approximately 3823 numeric or 3067 alphabetic characters or 1914 bytes of data. A separate symbology ID (`BARCODE_HIBC_AZTEC`) can be used to encode Health Industry Barcode (HIBC) data.

Aztec Code supports Structured Append of up to 26 symbols and an optional alphanumeric ID of up to 32 characters, which can be set by using the `--structapp` option (see [4.17 Structured Append](#)) (API `structapp`). The ID cannot contain spaces. If an ID is not given, no ID is encoded.

6.6.9 Aztec Runes (ISO 24778)

Figure 115: `zint -b AZRUNE -d "125"`

A truncated version of compact Aztec Code for encoding whole integers between 0 and 255, as defined in ISO/IEC 24778 Annex A. Includes Reed-Solomon error correction. It does not support Structured Append.

6.6.10 Code One

Figure 116: `zint -b CODEONE -d "1234567890123456789012"`

A matrix symbology developed by Ted Williams in 1992 which encodes data in a way similar to Data Matrix, Code One is able to encode the Latin-1 character set or GS1 data, and also supports the ECI mechanism. There are two types of Code One symbol - fixed-ratio symbols which are roughly square (versions A through to H) and variable-width versions (versions S and T). These can be selected by using `--vers` (API `option_2`) as shown in the table below:

Table : Code One Sizes

Input	Version	Size (W x H)	Numeric Data Capacity	Alphanumeric Data Capacity
1	A	16 x 18	22	13
2	B	22 x 22	44	27
3	C	28 x 28	104	64
4	D	40 x 42	217	135
5	E	52 x 54	435	271
6	F	70 x 76	886	553
7	G	104 x 98	1755	1096
8	H	148 x 134	3550	2218
9	S	width x 8	18	N/A
10	T	width x 16	90	55

Version S symbols can only encode numeric data. The width of version S and version T symbols is determined by the length of the input data.

Code One supports Structured Append of up to 128 symbols, which can be set by using the `--structapp` option (see [4.17 Structured Append](#)) (API `structapp`). It does not support specifying an ID. Structured Append is not supported with GS1 data nor for Version S symbols.

6.6.11 Grid Matrix

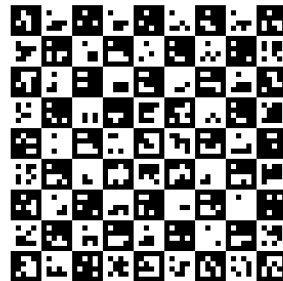


Figure 117: `zint -b GRIDMATRIX --eci=29 -d "AAT2556 电池充电器 + 降压转换器 200mA 至 2A tel:86 019 82512738"`

Grid Matrix groups modules in a chequerboard pattern, and by default supports the GB 2312 standard set, which includes Hanzi, ASCII and a small number of ISO/IEC 8859-1 characters. Input should be entered as UTF-8 with conversion to GB 2312 being carried out automatically by Zint. Up to around 1529 alphanumeric characters or 2751 digits may be encoded. The symbology also supports the ECI mechanism. Support for GS1 data has not yet been implemented.

The size of the symbol and the error correction capacity can be specified. If you specify both of these values then Zint will make a 'best-fit' attempt to satisfy both conditions. The symbol size can be specified using the `--vers` option (API `option_2`), and the error correction capacity can be specified by using the `--secure` option (API `option_1`), according to the following tables.

Table : Grid Matrix Sizes

Input	Symbol Size	Input	Symbol Size
1	18 x 18	8	102 x 102
2	30 x 30	9	114 x 114

Input	Symbol Size	Input	Symbol Size
3	42 x 42	10	126 x 126
4	54 x 54	11	138 x 138
5	66 x 66	12	150 x 150
6	78 x 78	13	162 x 162
7	90 x 90		

Table : Grid Matrix Error Correction Modes

Mode	Error Correction Capacity
1	Approximately 10%
2	Approximately 20%
3	Approximately 30%
4	Approximately 40%
5	Approximately 50%

Non-ASCII data density may be maximized by using the `--fullmultibyte` switch (API `option_3 = ZINT_FULL_MULTIBYTE`), but check that your barcode reader supports this before using.

Grid Matrix supports Structured Append of up to 16 symbols and a numeric ID (file signature), which can be set by using the `--structapp` option (see [4.17 Structured Append](#)) (API `structapp`). The ID ranges from 0 (default) to 255.

6.6.12 DotCode

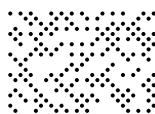


Figure 118: `zint -b DOTCODE -d "[01]00012345678905[17]201231[10]ABC123456" --gs1`

DotCode uses a grid of dots in a rectangular formation to encode characters up to a maximum of approximately 450 characters (or 900 numeric digits). The symbology supports ECI encoding and GS1 data encoding. By default Zint will produce a symbol which is approximately square, however the width of the symbol can be adjusted by using the `--cols` option (API `option_2`) (maximum 200). Outputting DotCode to raster images (BMP, GIF, PCX, PNG, TIF) will require setting the scale of the image to a larger value than the default (e.g. approximately 10) for the dots to be plotted correctly. Approximately 33% of the resulting symbol is comprised of error correction codewords.

DotCode has two sets of 4 masks, designated 0-3 and 0'-3', the second "prime" set being the same as the first with corners lit. The best mask to use is selected automatically by Zint but may be manually specified by using the `--mask` switch with values 0-7, where 4-7 denote 0'-3', or in the API by setting `option_3 = (N + 1) << 8` where N is 0-7.

DotCode supports Structured Append of up to 35 symbols, which can be set by using the `--structapp` option (see [4.17 Structured Append](#)) (API `structapp`). It does not support specifying an ID.

6.6.13 Han Xin Code (ISO 20830)



Figure 119: `zint -b HANXIN -d "Hanxin Code symbol"`

Also known as Chinese Sensible Code, Han Xin is capable of encoding characters in either the Latin-1 character set or the GB 18030 character set (which is a UTF, i.e. includes all Unicode characters, optimized for Chinese

characters) and is also able to support the ECI mechanism. Support for the encoding of GS1 data has not yet been implemented.

The size of the symbol can be specified using the `--vers` option (API `option_2`) to a value between 1 and 84 according to the following table.

Table : Han Xin Sizes

Input	Symbol Size	Input	Symbol Size	Input	Symbol Size
1	23 x 23	29	79 x 79	57	135 x 135
2	25 x 25	30	81 x 81	58	137 x 137
3	27 x 27	31	83 x 83	59	139 x 139
4	29 x 29	32	85 x 85	60	141 x 141
5	31 x 31	33	87 x 87	61	143 x 143
6	33 x 33	34	89 x 89	62	145 x 145
7	35 x 35	35	91 x 91	63	147 x 147
8	37 x 37	36	93 x 93	64	149 x 149
9	39 x 39	37	95 x 95	65	151 x 151
10	41 x 41	38	97 x 97	66	153 x 153
11	43 x 43	39	99 x 99	67	155 x 155
12	45 x 45	40	101 x 101	68	157 x 157
13	47 x 47	41	103 x 103	69	159 x 159
14	49 x 49	42	105 x 105	70	161 x 161
15	51 x 51	43	107 x 107	71	163 x 163
16	53 x 53	44	109 x 109	72	165 x 165
17	55 x 55	45	111 x 111	73	167 x 167
18	57 x 57	46	113 x 113	74	169 x 169
19	59 x 59	47	115 x 115	75	171 x 171
20	61 x 61	48	117 x 117	76	173 x 173
21	63 x 63	49	119 x 119	77	175 x 175
22	65 x 65	50	121 x 121	78	177 x 177
23	67 x 67	51	123 x 123	79	179 x 179
24	69 x 69	52	125 x 125	80	181 x 181
25	71 x 71	53	127 x 127	81	183 x 183
26	73 x 73	54	129 x 129	82	185 x 185
27	75 x 75	55	131 x 131	83	187 x 187
28	77 x 77	56	133 x 133	84	189 x 189

The largest version (84) can encode 7827 digits, 4350 ASCII characters, up to 2175 Chinese characters, or 3261 bytes, making it the most capacious of all the barcodes supported by Zint.

There are four levels of error correction capacity available for Han Xin Code which can be set by using the `--secure` option (API `option_1`) to a value from the following table.

Table : Han Xin Error Correction Modes

Mode	Recovery Capacity
1	Approx 8%
2	Approx 15%
3	Approx 23%
4	Approx 30%

Non-ASCII data density may be maximized by using the `--fullmultibyte` switch (API `option_3 = ZINT_FULL_MULTIBYTE`), but check that your barcode reader supports this before using.

Han Xin has four different masks designed to minimize unwanted patterns. The best mask to use is selected automatically by Zint but may be manually specified by using the `--mask` switch with values 0-3, or in the API by setting `option_3 = (N + 1) << 8` where N is 0-3. To use with `ZINT_FULL_MULTIBYTE` set

`option_3 = ZINT_FULL_MULTIBYTE | (N + 1) << 8`

6.6.14 Ultracode

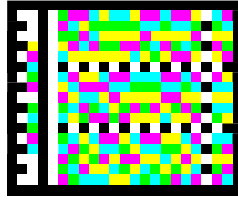


Figure 120: `zint -b ULTRA -d "HEIMASÍÐA KENNARAHÁSKÓLA ÍSLANDS"`

This symbology uses a grid of coloured elements to encode data. ECI and GS1 modes are supported. The amount of error correction can be set using the `--secure` option (API `option_1`) to a value as shown in the following table.

Table : Ultracode Error Correction Values

Value	EC Level	Amount of symbol holding error correction data
1	EC0	0% - Error detection only
2	EC1	Approx 5%
3	EC2	Approx 9% - Default value
4	EC3	Approx 17%
5	EC4	Approx 25%
6	EC5	Approx 33%

Zint does not currently implement data compression by default, but this can be initiated through the API by setting

```
symbol->option_3 = ULTRA_COMPRESSION;
```

With compression, up to 504 digits, 375 alphanumerics or 252 bytes can be encoded.

Revision 2 of Ultracode (2023) may be specified using `--vers=2` (API `option_2 = 2`).

WARNING: Revision 2 of Ultracode was only finalized December 2023 and Zint has not yet been updated to support it. Do not use.

Ultracode supports Structured Append of up to 8 symbols and an optional numeric ID (File Number), which can be set by using the `--structapp` option (see [4.17 Structured Append](#)) (API `structapp`). The ID ranges from 1 to 80088. If an ID is not given, no ID is encoded.

6.7 Other Barcode-Like Markings

6.7.1 Facing Identification Mark (FIM)

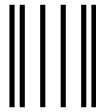


Figure 121: `zint -b FIM --compliantheight -d "C"`

Used by the United States Postal Service (USPS), the FIM symbology is used to assist automated mail processing. There are only 5 valid symbols which can be generated using the characters A-E as shown in the table below.

Table : Valid FIM Characters

Code Letter	Usage
A	Used for courtesy reply mail and metered reply mail with a pre-printed POSTNET symbol.
B	Used for business reply mail without a pre-printed zip code.
C	Used for business reply mail with a pre-printed zip code.
D	Used for Information Based Indicia (IBI) postage.
E	Used for customized mail with a USPS Intelligent Mail barcode.

6.7.2 Flattermarken

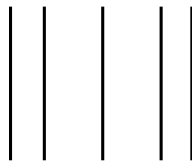


Figure 122: `zint -b FLAT -d "1304056"`

Used for the recognition of page sequences in print-shops, the Flattermarken is not a true barcode symbol and requires precise knowledge of the position of the mark on the page. The Flattermarken system can encode numeric data up to a maximum of 128 digits and does not include a check digit.

7. Legal and Version Information

7.1 License

Zint, libzint and Zint Barcode Studio are Copyright © 2023 Robin Stuart. All historical versions are distributed under the GNU General Public License version 3 or later. Versions 2.5 and later are released under a dual license: the encoding library is released under the BSD (3 clause) license whereas the GUI, Zint Barcode Studio, and the CLI are released under the GNU General Public License version 3 or later.

Telepen is a trademark of SB Electronic Systems Ltd.

QR Code is a registered trademark of Denso Wave Incorporated.

Mailmark is a registered trademark of Royal Mail Group Ltd.

Microsoft, Windows and the Windows logo are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

Linux is the registered trademark of Linus Torvalds in the U.S. and other countries.

Mac and macOS are trademarks of Apple Inc., registered in the U.S. and other countries.

The Zint logo is derived from "SF Planetary Orbiter" font by ShyFoundary.

Zint.org.uk website design and hosting provided by Robert Elliott.

7.2 Patent Issues

All of the code in Zint is developed using information in the public domain, usually freely available on the Internet. Some of the techniques used may be subject to patents and other intellectual property legislation. It is my belief that any patents involved in the technology underlying symbologies utilised by Zint are 'unadopted', that is the holder does not object to their methods being used.

Any methods patented or owned by third parties or trademarks or registered trademarks used within Zint or in this document are and remain the property of their respective owners and do not indicate endorsement or affiliation with those owners, companies or organisations.

7.3 Version Information

The current stable version of Zint is 2.13.0, released on 18th December 2023.

See "ChangeLog" in the project root directory for information on all releases.

7.4 Sources of Information

Below is a list of some of the sources used in rough chronological order:

- Nick Johnson's Barcode Specifications
- Bar Code 1 Specification Source Page
- SB Electronic Systems Telepen website
- Pharmacode specifications from Laetus
- Morovia RM4SCC specification
- Australia Post's 'A Guide to Printing the 4-State Barcode' and bcsample source code
- Plessey algorithm from GNU-Barcode v0.98 by Leonid A. Broukhis
- GS1 General Specifications v 8.0 Issue 2
- PNG: The Definitive Guide and wpng source code by Greg Reolofs
- PDF417 specification and pdf417 source code by Grand Zebu
- Barcode Reference, TBarCode/X User Documentation and TBarCode/X demonstration program from Tec-It
- IEC16022 source code by Stefan Schmidt et al
- United States Postal Service Specification USPS-B-3200
- Adobe Systems Incorporated Encapsulated PostScript File Format Specification
- BSI Online Library
- Libdmtx Data Matrix ECC200 decoding library

7.5 Standards Compliance

Zint was developed to provide compliance with the following British and international standards:

7.5.1 Symbology Standards

- ISO/IEC 24778:2008 Information technology - Automatic identification and data capture techniques - Aztec Code bar code symbology specification
- SEMI T1-95 Specification for Back Surface Bar Code Marking of Silicon Wafers (BC412) (1996)
- ANSI/AIM BC12-1998 - Uniform Symbology Specification Channel Code
- BS EN 798:1996 Bar coding - Symbology specifications - 'Codabar'
- AIM Europe ISS-X-24 - Uniform Symbology Specification Codablock-F (1995)
- ISO/IEC 15417:2007 Information technology - Automatic identification and data capture techniques - Code 128 bar code symbology specification
- BS EN 12323:2005 AIDC technologies - Symbology specifications - Code 16K
- ISO/IEC 16388:2007 Information technology - Automatic identification and data capture techniques - Code 39 bar code symbology specification
- ANSI/AIM BC6-2000 - Uniform Symbology Specification Code 49
- ANSI/AIM BC5-1995 - Uniform Symbology Specification Code 93
- AIM Uniform Symbology Specification Code One (1994)
- ISO/IEC 16022:2006 Information technology - Automatic identification and data capture techniques - Data Matrix ECC200 bar code symbology specification
- ISO/IEC 21471:2020 Information technology - Automatic identification and data capture techniques - Extended rectangular data matrix (DMRE) bar code symbology specification
- AIM TSC1705001 (v 4.0 Draft 0.15) - Information technology - Automatic identification and data capture techniques - Bar code symbology specification - DotCode (Revised 28th May 2019)
- ISO/IEC 15420:2009 Information technology - Automatic identification and data capture techniques - EAN/UPC bar code symbology specification
- AIMD014 (v 1.63) - Information technology, Automatic identification and data capture techniques - Bar code symbology specification - Grid Matrix (Released 9th Dec 2008)
- ISO/IEC 24723:2010 Information technology - Automatic identification and data capture techniques - GS1 Composite bar code symbology specification
- ISO/IEC 24724:2011 Information technology - Automatic identification and data capture techniques - GS1 DataBar bar code symbology specification
- ISO/IEC 20830:2021 Information technology - Automatic identification and data capture techniques - Han Xin Code bar code symbology specification
- ISO/IEC 16390:2007 Information technology - Automatic identification and data capture techniques - Interleaved 2 of 5 bar code symbology specification
- ISO/IEC 16023:2000 Information technology - International symbology specification - MaxiCode
- ISO/IEC 24728:2006 Information technology - Automatic identification and data capture techniques - MicroPDF417 bar code symbology specification
- ISO/IEC 15438:2015 Information technology - Automatic identification and data capture techniques - PDF417 bar code symbology specification
- ISO/IEC 18004:2015 Information technology - Automatic identification and data capture techniques - QR Code bar code symbology specification
- ISO/IEC 23941:2022 Information technology - Automatic identification and data capture techniques - Rectangular Micro QR Code (rMQR) bar code symbology specification
- AIMD/TSC15032-43 (v 0.99c) - International Technical Specification - Ultracode Symbology (Draft) (Released 4th Nov 2015)

A number of other specification documents have also been referenced, such as MIL-STD-1189 Rev. B (1989) (LOGMARS), USPS DMM 300 2006 (2011) (POSTNET, PLANET, FIM) and USPS-B-3200 (2015) (IMAIL). Those not named include postal and delivery company references in particular.

7.5.2 General Standards

- AIM ITS/04-001 International Technical Standard - Extended Channel Interpretations Part 1: Identification Schemes and Protocol (Released 24th May 2004)
- AIM ITS/04-023 International Technical Standard - Extended Channel Interpretations Part 3: Register (Version 2, February 2022)
- GS1 General Specifications Release 23.0 (Jan 2023)
- ANSI/HIBC 2.6-2016 - The Health Industry Bar Code (HIBC) Supplier Labeling Standard

Annex A. Character Encoding

This section is intended as a quick reference to the character sets used by Zint. All symbologies use standard ASCII input as shown in section A.1, but some support extended characters as shown in the subsequent section [A.2 Latin Alphabet No. 1 \(ISO/IEC 8859-1\)](#).

A.1 ASCII Standard

The ubiquitous ASCII standard is well known to most computer users. It's reproduced here for reference.

Table : ASCII

Hex	0	1	2	3	4	5	6	7
0	NUL	DLE	SPACE	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	\$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	TAB	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

A.2 Latin Alphabet No. 1 (ISO/IEC 8859-1)

ISO/IEC 8859-1 defines additional characters common in western European languages like French, German, Italian and Spanish. This extension is the default encoding of many barcodes (see [Table : Default Character Sets](#)) when a codepoint above hex 9F is encoded. Note that codepoints hex 80 to 9F are not defined.

Table : ISO/IEC 8859-1

Hex	8	9	A	B	C	D	E	F
0			NBSP	°	À	Ð	à	ð
1			í	±	Á	Ñ	á	ñ
2			¢	²	Â	Ò	â	ò
3			£	³	Ã	Ó	ã	ó
4			¤	´	Ä	Ô	ä	ô
5			¥	µ	Å	Ö	å	ö
6			¦	¶	Æ	Ø	æ	ø
7			§	·	Ç	×	ç	÷
8			¨	¸	È	Ø	è	ø
9			©	¹	É	Ù	é	ù
A			ª	º	Ê	Ú	ê	ú
B			«	»	Ë	Û	ë	û
C			¬	¼	Ì	Ü	ì	ü
D			SHY	½	Í	Ý	í	ý
E			®	¾	Î	Þ	î	þ
F			—	¿	Ï	ß	ï	ÿ

Annex B. Qt Backend QZint

Used internally by Zint Barcode Studio to display the preview, the Qt Backend QZint renders a barcode by drawing the vector representation (see [5.5 Buffering Symbols in Memory \(vector\)](#)) provided by the Zint library libzint.

The main class is `Zint::QZint`, which has getter/setter properties that correspond to the `zint_symbol` structure (see [5.6 Setting Options](#)), and a main method `render()` which takes a Qt `QPainter` to paint with, and a `QRectF` rectangular area specifying where to paint into:

```
/* Encode and display barcode in `paintRect` using `painter`.
   Note: legacy argument `mode` is not used */
void render(QPainter& painter, const QRectF& paintRect,
            AspectRatioMode mode = IgnoreAspectRatio);
```

`render()` will emit one of two Qt signals - encoded on successful encoding and drawing, or errored on failure. The client can connect and act appropriately, for instance:

```
connect(qzint, SIGNAL(encoded()), SLOT(on_encoded()));
connect(qzint, SIGNAL(errored()), SLOT(on_errored()));
```

where `qzint` is an instance of `Zint::QZint` and `on_encoded()` and `on_error()` are Qt slot methods provided by the caller. On error, the error value and message can be retrieved by the methods `getError()` and `lastError()` respectively.

The other main method is `save_to_file()`:

```
/* Encode and print barcode to file `filename`.
   Only sets `getError()` on error, not on warning */
bool save_to_file(const QString& filename); // `ZBarcode_Print()`
```

which takes a `filename` to output to. It too will emit an errored signal on failure, returning `false` (but nothing on success, which just returns `true`). Note that rotation is achieved through the setter method `setRotateAngleValue()` (as opposed to the `rotate_angle` argument used by `ZBarcode_Print()`).

Various other methods are available, for instance methods for testing symbology capabilities, and utility methods such as `defaultXdim()` and `getASCL()`.

For full details, see "backend_qt/qzint.h".

Annex C. Tcl Backend Binding

A Tcl binding is available in the "backend_tcl" sub-directory. To make on Unix:

```
cd backend_tcl
autoconf
./configure
make
sudo make install
```

For Windows, a Visual Studio 6.0 project file is available at "backend_tcl\zint_tcl.dsp". This can also be opened (and converted) by more modern Visual Studio versions, though some fixing up of the project configuration will likely be required.

Once built and installed, invoke the Tcl/Tk CLI "wish":

```
wish
```

and ignoring the Tk window click back to the command prompt "%" and type:

```
require package zint
zint help
```

which will show the usage message, with options very similar to the Zint CLI. (One notable difference is that boolean options such as -bold take a 1 or 0 as an argument.)

A demonstration Tcl/Tk program which is also useful in itself is available at "backend_tcl/demo/demo.tcl". To run type:

```
wish demo/demo.tcl
```

which will display the following window.

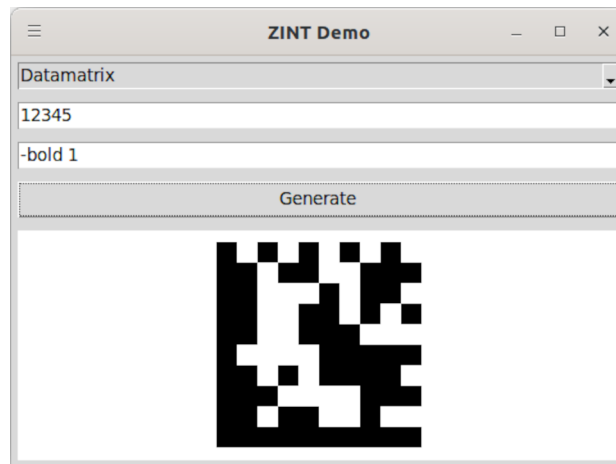


Figure 123: Tcl/Tk demonstration program window

You can select the symbology, enter the data to encode, and set options (which are the same as those given in the usage message). A raster preview of the configured barcode is displayed once the "Generate" button is pressed.

Annex D. Man Page ZINT(1)

NAME

`zint` - encode data as a barcode image

SYNOPSIS

```
zint [-h | --help]  
zint [options]
```

DESCRIPTION

`zint` takes input data from the command line or a file to encode in a barcode which is then output to an image file.

Input data is UTF-8, unless `--binary` is specified.

Human Readable Text (HRT) is displayed by default for those barcodes that support HRT, unless `--notext` is specified.

The output image file (specified with `-o | --output`) may be in one of these formats: Windows Bitmap (BMP), Enhanced Metafile Format (EMF), Encapsulated PostScript (EPS), Graphics Interchange Format (GIF), ZSoft Paintbrush (PCX), Portable Network Format (PNG), Scalable Vector Graphic (SVG), or Tagged Image File Format (TIF).

OPTIONS

-h, --help

Print usage information summarizing command line options.

-b TYPE, --barcode=TYPE

Set the barcode symbology that will be used to encode the data. *TYPE* is the number or name of the barcode symbology. If not given, the symbology defaults to 20 (Code 128). To see what types are available, use the `-t | --types` option. Type names are case-insensitive, and non-alphanumerics are ignored.

--addongap=INTEGER

For EAN/UPC symbologies, set the gap between the main data and the add-on. *INTEGER* is in integral multiples of the X-dimension. The maximum gap that can be set is 12. The minimum is 7, except for UPC-A, when the minimum is 9.

--batch

Treat each line of an input file specified with `-i | --input` as a separate data set and produce a barcode image for each one. The barcode images are outputted by default to numbered filenames starting with "00001.png", "00002.png" etc., which can be changed by using the `-o | --output` option.

--bg=COLOUR

Specify a background (paper) colour where *COLOUR* is in hexadecimal RRGGBB or RRGGBBAA format or in decimal C, M, Y, K percentages format.

--binary

Treat input data as raw 8-bit binary data instead of the default UTF-8. Automatic code page translation to an ECI page is disabled, and no validation of the data's character encoding takes place.

--bind

Add horizontal boundary bars (also known as bearer bars) to the symbol. The width of the boundary bars is specified by the `--border` option. `--bind` can also be used to add row separator bars to symbols stacked with multiple `-d | --data` inputs, in which case the width of the separator bars is specified with the `--separator` option.

--bindtop

Add a horizontal boundary bar to the top of the symbol. The width of the boundary bar is specified by the `--border` option.

--bold

Use bold text for the Human Readable Text (HRT).

--border=INTEGER

Set the width of boundary bars (`--bind` or `--bindtop`) or box borders (`--box`), where *INTEGER* is in integral multiples of the X-dimension. The default is zero.

--box

Add a box around the symbol. The width of the borders is specified by the `--border` option.

--cmyk

Use the CMYK colour space when outputting to Encapsulated PostScript (EPS) or TIF files.

--cols=INTEGER

Set the number of data columns in the symbol to *INTEGER*. Affects Codablock-F, DotCode, GS1 DataBar Expanded Stacked (DBAR_EXPSTK), MicroPDF417 and PDF417 symbols.

--compliantheight

Warn if the height specified by the `--height` option is not compliant with the barcode's specification, or if `--height` is not given, default to the height specified by the specification (if any).

-d, --data=DATA

Specify the input *DATA* to encode. The `--esc` option may be used to enter non-printing characters using escape sequences. The *DATA* should be UTF-8, unless the `--binary` option is given, in which case it can be anything.

--direct

Send output to stdout, which in most cases should be re-directed to a pipe or a file. Use `--filetype` to specify output format.

--dmiso144

For Data Matrix symbols, use the standard ISO/IEC codeword placement for 144 x 144 (`--vers=24`) sized symbols, instead of the default "de facto" placement (which rotates the placement of ECC codewords).

--dmre

For Data Matrix symbols, allow Data Matrix Rectangular Extended (DMRE) sizes when considering automatic sizes. See also `--square`.

--dotsize=NUMBER

Set the radius of the dots in dotty mode (`--dotty`). *NUMBER* is in X-dimensions, and may be floating-point. The default is 0.8.

--dotty

Use dots instead of squares for matrix symbols. DotCode is always in dotty mode.

--dump

Dump a hexadecimal representation of the symbol's encodation to stdout. The same representation may be outputted to a file by using a `.txt` extension with `-o | --output` or by specifying `--filetype=txt`.

-e, --ecinos

Display the table of ECIs (Extended Channel Interpretations).

--eci=INTEGER

Set the ECI code for the input data to *INTEGER*. See `-e | --ecinos` for a list of the ECIs available. ECIs are supported by Aztec Code, Code One, Data Matrix, DotCode, Grid Matrix, Han Xin Code, MaxiCode, MicroPDF417, PDF417, QR Code, rMQR and Ultracode.

--embedfont

For vector output, embed the font in the file for portability. Currently only available for SVG output.

--esc

Process escape characters in the input data. The escape sequences are:

\0	(0x00)	NUL	Null character
\E	(0x04)	EOT	End of Transmission
\a	(0x07)	BEL	Bell
\b	(0x08)	BS	Backspace
\t	(0x09)	HT	Horizontal Tab
\n	(0x0A)	LF	Line Feed
\v	(0x0B)	VT	Vertical Tab
\f	(0x0C)	FF	Form Feed
\r	(0x0D)	CR	Carriage Return
\e	(0x1B)	ESC	Escape
\G	(0x1D)	GS	Group Separator
\R	(0x1E)	RS	Record Separator
\\	(0x5C)	\	Backslash
\dNNN	(NNN)		Any 8-bit character where NNN is decimal (000-255)
\oNNN	(0oNNN)		Any 8-bit character where NNN is octal (000-377)
\xNN	(0xNN)		Any 8-bit character where NN is hexadecimal (00-FF)
\uNNNN	(U+NNNN)		Any 16-bit Unicode BMP character where NNNN is hexadecimal
\UNNNNNN	(U+NNNNNN)		Any 21-bit Unicode character where NNNNNN is hexadecimal

--extraesc

Process the special escape sequences \^A, \^B and \^C that allow manual switching of Code Sets (Code 128 only). The sequence \^^ can be used to encode data that contains special escape sequences.

--fast

Use faster if less optimal encodation or other shortcuts (affects Data Matrix, MicroPDF417, PDF417, QR-CODE & UPNQR only).

--fg=COLOUR

Specify a foreground (ink) colour where *COLOUR* is in hexadecimal RRGGBB or RRGGBBAA format or in decimal C, M, Y, K percentages format.

--filetype=TYPE

Set the output file type to *TYPE*, which is one of BMP, EMF, EPS, GIF, PCX, PNG, SVG, TIF, TXT.

--fullmultibyte

Use the multibyte modes of Grid Matrix, Han Xin and QR Code for non-ASCII data.

--gs1

Treat input as GS1 compatible data. Application Identifiers (AIs) should be placed in square brackets "[" "]" (but see --gs1parens).

--gs1nocheck

Do not check the validity of GS1 data.

--gs1parens

Process parentheses "(" ")" as GS1 AI delimiters, rather than square brackets "[" "]". The input data must not otherwise contain parentheses.

--gssep

For Data Matrix in GS1 mode, use GS (0x1D) as the GS1 data separator instead of FNC1.

--guarddescent=NUMBER

For EAN/UPC symbols, set the height the guard bars descend below the main bars, where *NUMBER* is in X-dimensions. *NUMBER* may be floating-point.

--guardwhitespace

For EAN/UPC symbols, add quiet zone indicators "<" and/or ">" to HRT where applicable.

--height=NUMBER

Set the height of the symbol in X-dimensions. *NUMBER* may be floating-point.

--heightperrow

Treat height as per-row. Affects Codablock-F, Code 16K, Code 49, GS1 DataBar Expanded Stacked (DBAR_EXPSTK), MicroPDF417 and PDF417.

-i, --input=FILE

Read the input data from *FILE*. Specify a single hyphen (-) for *FILE* to read from stdin.

--init

Create a Reader Initialisation (Programming) symbol.

--mask=INTEGER

Set the masking pattern to use for DotCode, Han Xin or QR Code to *INTEGER*, overriding the automatic selection.

--mirror

Use the batch data to determine the filename in batch mode (--batch). The -o | --output option can be used to specify an output directory (any filename will be ignored).

--mode=INTEGER

For MaxiCode and GS1 Composite symbols, set the encoding mode to *INTEGER*.

For MaxiCode (SCM is Structured Carrier Message, with 3 fields: postcode, 3-digit ISO 3166-1 country code, 3-digit service code):

- 2 SCM with 9-digit numeric postcode
- 3 SCM with 6-character alphanumeric postcode
- 4 Enhanced ECC for the primary part of the message
- 5 Enhanced ECC for all of the message
- 6 Reader Initialisation (Programming)

For GS1 Composite symbols (names end in *_CC*, i.e. EANX_CC, GS1_128_CC, DBAR_OMN_CC etc.):

- 1 CC-A
- 2 CC-B
- 3 CC-C (GS1_128_CC only)

--nobackground

Remove the background colour (EMF, EPS, GIF, PNG, SVG and TIF only).

--noquietzones

Disable any quiet zones for symbols that define them by default.

--notext

Remove the Human Readable Text (HRT).

-o, --output=FILE

Send the output to *FILE*. When not in batch mode, the default is "out.png" (or "out.gif" if zint built without PNG support). When in batch mode (--batch), special characters can be used to format the output filenames:

~	Insert a number or 0
#	Insert a number or space
@	Insert a number or * (+ on Windows)
Any other	Insert literally

--primary=STRING

For MaxiCode, set the content of the primary message. For GS1 Composite symbols, set the content of the linear symbol.

--quietzones

Add compliant quiet zones for symbols that specify them. This is in addition to any whitespace specified by `-w|--whitesp` or `--vwhitesp`.

-r, --reverse

Reverse the foreground and background colours (white on black). Known as “reflectance reversal” or “reversed reflectance”.

--rotate=INTEGER

Rotate the symbol by *INTEGER* degrees, where *INTEGER* can be 0, 90, 270 or 360.

--rows=INTEGER

Set the number of rows for Codablock-F or PDF417 to *INTEGER*. It will also set the minimum number of rows for Code 16K or Code 49, and the maximum number of rows for GS1 DataBar Expanded Stacked (DBAR_EXPSTK).

--scale=NUMBER

Adjust the size of the X-dimension. *NUMBER* may be floating-point, and is multiplied by 2 (except for MaxiCode) before being applied. The default scale is 1.

For MaxiCode, the scale is multiplied by 10 for raster output, by 40 for EMF output, and by 2 otherwise.

Increments of 0.5 (half-integers) are recommended for non-MaxiCode raster output (BMP, GIF, PCX, PNG and TIF).

See also `--scalexdimdp` below.

--scalexdimdp=X[,R]

Scale the image according to X-dimension *X* and resolution *R*, where *X* is in mm and *R* is in dpmm (dots per mm). *X* and *R* may be floating-point. *R* is optional and defaults to 12 dpmm (approximately 300 dpi). *X* may be zero in which case a symbology-specific default is used.

The scaling takes into account the output filetype, and deals with all the details mentioned above. Units may be specified for *X* by appending “in” (inch) or “mm”, and for *R* by appending “dpi” (dots per inch) or “dpmm” - e.g. `--scalexdimdp=0.013in,300dpi`.

--scmvv=INTEGER

For MaxiCode, prefix the Structured Carrier Message (SCM) with “[]>\R01\Gvv”, where *vv* is a 2-digit *INTEGER*.

--secure=INTEGER

Set the error correction level (ECC) to *INTEGER*. The meaning is specific to the following matrix symbols (all except PDF417 are approximate):

Aztec Code	1 to 4 (10%, 23%, 36%, 50%)
Grid Matrix	1 to 5 (10% to 50%)
Han Xin	1 to 4 (8%, 15%, 23%, 30%)
Micro QR	1 to 3 (7%, 15%, 25%) (L, M, Q)
PDF417	0 to 8 ($2^{(INTEGER + 1)}$ codewords)
QR Code	1 to 4 (7%, 15%, 25%, 30%) (L, M, Q, H)
rMQR	2 or 4 (15% or 30%) (M or H)
Ultracode	1 to 6 (0%, 5%, 9%, 17%, 25%, 33%)

--segN=ECI, DATA

Set the *ECI* & *DATA* content for segment N, where N is 1 to 9. -d | --data must still be given, and counts as segment 0, its ECI given by --eci. Segments must be consecutive.

--separator=INTEGER

Set the height of row separator bars for stacked symbologies, where *INTEGER* is in integral multiples of the X-dimension. The default is zero.

--small

Use small text for Human Readable Text (HRT).

--square

For Data Matrix symbols, exclude rectangular sizes when considering automatic sizes. See also --dmre.

--structapp=I, C[, ID]

Set Structured Append info, where *I* is the 1-based index, *C* is the total number of symbols in the sequence, and *ID*, which is optional, is the identifier that all symbols in the sequence share. Structured Append is supported by Aztec Code, Code One, Data Matrix, DotCode, Grid Matrix, MaxiCode, MicroPDF417, PDF417, QR Code and Ultracode.

-t, --types

Display the table of barcode types (symbologies). The numbers or names can be used with -b | --barcode.

--textgap=NUMBER

Adjust the gap between the barcode and the Human Readable Text (HRT). *NUMBER* is in X-dimensions, and may be floating-point. Maximum is 10 and minimum is -5. The default is 1.

--vers=INTEGER

Set the symbol version (size, check digits, other options) to *INTEGER*. The meaning is symbol-specific.

For most matrix symbols, it specifies size:

Aztec Code 1 to 36 (1 to 4 compact)

1	15x15	13	53x53	25	105x105
2	19x19	14	57x57	26	109x109
3	23x23	15	61x61	27	113x113
4	27x27	16	67x67	28	117x117
5	19x19	17	71x71	29	121x121
6	23x23	18	75x75	30	125x125
7	27x27	19	79x79	31	131x131
8	31x31	20	83x83	32	135x135
9	37x37	21	87x87	33	139x139
10	41x41	22	91x91	34	143x143
11	45x45	23	95x95	35	147x147
12	49x49	24	101x101	36	151x151

Code One 1 to 10 (9 and 10 variable width) (WxH)

1	16x18	6	70x76
2	22x22	7	104x98
3	28x28	8	148x134
4	40x42	9	Wx8
5	52x54	10	Wx16

Data Matrix 1 to 48 (31 to 48 DMRE) (HxW)

1	10x10	17	72x72	33	8x80
2	12x12	18	80x80	34	8x96
3	14x14	19	88x88	35	8x120
4	16x16	20	96x96	36	8x144
5	18x18	21	104x104	37	12x64
6	20x20	22	120x120	38	12x88
7	22x22	23	132x132	39	16x64

8	24x24	24	144x144	40	20x36
9	26x26	25	8x18	41	20x44
10	32x32	26	8x32	42	20x64
11	36x36	28	12x26	43	22x48
12	40x40	28	12x36	44	24x48
13	44x44	29	16x36	45	24x64
14	48x48	30	16x48	46	26x40
15	52x52	31	8x48	47	26x48
16	64x64	32	8x64	48	26x64

Grid Matrix 1 to 13

1	18x18	6	78x78	11	138x138
2	30x30	7	90x90	12	150x150
3	42x42	8	102x102	13	162x162
4	54x54	9	114x114		
5	66x66	10	126x126		

Han Xin 1 to 84

1	23x23	29	79x79	57	135x135
2	25x25	30	81x81	58	137x137
3	27x27	31	83x83	59	139x139
4	29x29	32	85x85	60	141x141
5	31x31	33	87x87	61	143x143
6	33x33	34	89x89	62	145x145
7	35x35	35	91x91	63	147x147
8	37x37	36	93x93	64	149x149
9	39x39	37	95x95	65	151x151
10	41x41	38	97x97	66	153x153
11	43x43	39	99x99	67	155x155
12	45x45	40	101x101	68	157x157
13	47x47	41	103x103	69	159x159
14	49x49	42	105x105	70	161x161
15	51x51	43	107x107	71	163x163
16	53x53	44	109x109	72	165x165
17	55x55	45	111x111	73	167x167
18	57x57	46	113x113	74	169x169
19	59x59	47	115x115	75	171x171
20	61x61	48	117x117	76	173x173
21	63x63	49	119x119	77	175x175
22	65x65	50	121x121	78	177x177
23	67x67	51	123x123	79	179x179
24	69x69	52	125x125	80	181x181
25	71x71	53	127x127	81	183x183
26	73x73	54	129x129	82	185x185
27	75x75	55	131x131	83	187x187
28	77x77	56	133x133	84	189x189

Micro QR 1 to 4 (M1, M2, M3, M4)

1	11x11	3	15x15
2	13x13	4	17x17

QR Code 1 to 40

1	21x21	15	77x77	29	133x133
2	25x25	16	81x81	30	137x137
3	29x29	17	85x85	31	141x141
4	33x33	18	89x89	32	145x145
5	37x37	19	93x93	33	149x149
6	41x41	20	97x97	34	153x153
7	45x45	21	101x101	35	157x157
8	49x49	22	105x105	36	161x161
9	53x53	23	109x109	37	165x165

10	57x57	24	113x113	38	169x169
11	61x61	25	117x117	39	173x173
12	65x65	26	121x121	40	177x177
13	69x69	27	125x125		
14	73x73	28	129x129		

rMQR 1 to 38 (33 to 38 automatic width) (HxW)

1	7x43	14	11x77	27	15x139
2	7x59	15	11x99	28	17x43
3	7x77	16	11x139	29	17x59
4	7x99	17	13x27	30	17x77
5	7x139	18	13x43	31	17x99
6	9x43	19	13x59	32	17x139
7	9x59	20	13x77	33	7xW
8	9x77	21	13x99	34	9xW
9	9x99	22	13x139	35	11xW
10	9x139	23	15x43	36	13xW
11	11x27	24	15x59	37	15xW
12	11x43	25	15x77	38	17xW
13	11x59	26	15x99		

For a number of linear symbols, it specifies check character options (“hide” or “hidden” means don’t show in HRT, “visible” means do display in HRT):

C25IATA	1 or 2 (add visible or hidden check digit)
C25IND	ditto
C25INTER	ditto
C25LOGIC	ditto
C25STANDARD	ditto
Codabar	1 or 2 (add hidden or visible check digit)
Code 11	0 to 2 (2 visible check digits to none)
	0 (default 2 visible check digits)
	1 (1 visible check digit)
	2 (no check digits)
Code 39	1 or 2 (add visible or hidden check digit)
Code 93	1 (hide the default check characters)
EXCODE39	1 or 2 (add visible or hidden check digit)
LOGMARS	1 or 2 (add visible or hidden check digit)
MSI Plessey	0 to 6 (none to various visible options)
	1, 2 (mod-10, mod-10 + mod-10)
	3, 4 (mod-11 IBM, mod-11 IBM + mod-10)
	5, 6 (mod-11 NCR, mod-11 NCR + mod-10)
	+10 (hide)

For a few other symbologies, it specifies other characteristics:

Channel Code	3 to 8 (no. of channels)
DAFT	50 to 900 (permille tracker ratio)
DPD	1 (relabel)
PZN	1 (PZN7 instead of default PZN8)
Ultracode	2 (revision 2)
VIN	1 (add international prefix)

-v, --version

Display zint version.

--whitespace=INTEGER

Set the height of vertical whitespace above and below the barcode, where *INTEGER* is in integral multiples of the X-dimension.

-w, --whitespace=INTEGER

Set the width of horizontal whitespace either side of the barcode, where *INTEGER* is in integral multiples of the X-dimension.

--werror

Convert all warnings into errors.

EXIT STATUS

0	Success (including when given informational options <code>-h</code> | <code>--help</code> , <code>-e</code> | <code>--ecinos</code> , <code>-t</code> | <code>--types</code> , <code>-v</code> | <code>--version</code>).
1	Human Readable Text was truncated (maximum 199 bytes) (<code>ZINT_WARN_HRT_TRUNCATED</code>)
2	Invalid option given but overridden by Zint (<code>ZINT_WARN_INVALID_OPTION</code>)
3	Automatic ECI inserted by Zint (<code>ZINT_WARN_USES_ECI</code>)
4	Symbol created not compliant with standards (<code>ZINT_WARN_NONCOMPLIANT</code>)
5	Input data wrong length (<code>ZINT_ERROR_TOO_LONG</code>)
6	Input data incorrect (<code>ZINT_ERROR_INVALID_DATA</code>)
7	Input check digit incorrect (<code>ZINT_ERROR_INVALID_CHECK</code>)
8	Incorrect option given (<code>ZINT_ERROR_INVALID_OPTION</code>)
9	Internal error (should not happen) (<code>ZINT_ERROR_ENCODING_PROBLEM</code>)
10	Error opening output file (<code>ZINT_ERROR_FILE_ACCESS</code>)
11	Memory allocation (malloc) failure (<code>ZINT_ERROR_MEMORY</code>)
12	Error writing to output file (<code>ZINT_ERROR_FILE_WRITE</code>)
13	Error counterpart of warning if <code>--werror</code> given (<code>ZINT_ERROR_USES_ECI</code>)
14	Error counterpart of warning if <code>--werror</code> given (<code>ZINT_ERROR_NONCOMPLIANT</code>)
15	Error counterpart of warning if <code>--werror</code> given (<code>ZINT_ERROR_HRT_TRUNCATED</code>)

EXAMPLES

Create “out.png” (or “out.gif” if zint built without PNG support) in the current directory, as a Code 128 symbol.

```
zint -d 'This Text'
```

Create “qr.svg” in the current directory, as a QR Code symbol.

```
zint -b QRCode -d 'This Text' -o 'qr.svg'
```

Use batch mode to read from an input file “ean13nos.txt” containing 13-digit GTINs, to create a series of EAN-13 barcodes, formatting the output filenames to “ean001.gif”, “ean002.gif” etc. using the special character “~”.

```
zint -b EANX --batch -i 'ean13nos.txt' -o 'ean~~~.gif'
```

BUGS

Please send bug reports to <https://sourceforge.net/p/zint/tickets/>.

SEE ALSO

Full documentation for zint (and the API libzint and the GUI zint-qt) is available from

<https://zint.org.uk/manual/>

and at

<https://sourceforge.net/p/zint/docs/manual.txt>

CONFORMING TO

Zint is designed to be compliant with a number of international standards, including:

ISO/IEC 24778:2008, ANSI/AIM BC12-1998, EN 798:1996, AIM ISS-X-24 (1995), ISO/IEC 15417:2007, EN 12323:2005, ISO/IEC 16388:2007, ANSI/AIM BC6-2000, ANSI/AIM BC5-1995, AIM USS Code One (1994), ISO/IEC 16022:2006, ISO/IEC 21471:2019, ISO/IEC 15420:2009, AIMD014 (v 1.63) (2008), ISO/IEC 24723:2010, ISO/IEC 24724:2011, ISO/IEC 20830:2021, ISO/IEC 16390:2007, ISO/IEC 16023:2000, ISO/IEC 24728:2006, ISO/IEC 15438:2015, ISO/IEC 18004:2015, ISO/IEC 23941:2022, AIM ITS/04-023 (2022)

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