

Citizen Systems Europe

**Label & Barcode Printer
Programming & Control
Training Course**

Outline of course

- ◆ **General principles of label printer control**
- ◆ **How to send commands to a printer**
- ◆ **Print Format commands**
- ◆ **Understanding a “Hex Dump”**

General principles of control

◆ Label, Barcode & Laser

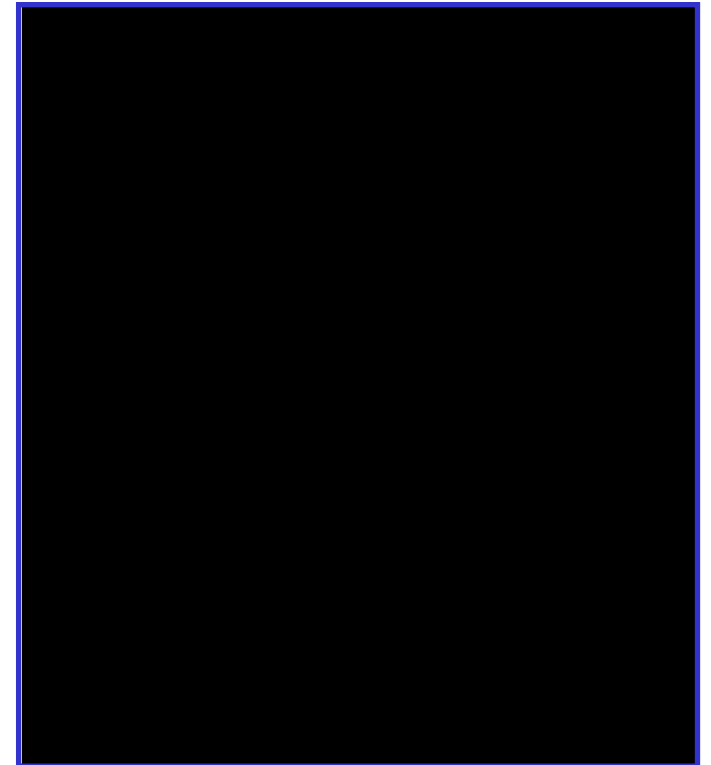
- Page Printers
- Process commands and draws them in the image memory
- Smaller *input* buffer
- Large *image* buffer
- Page design & immediate modes
- Copies generated by printer

◆ Dot Matrix & Inkjet

- Line-by-line printing
- Processes and then prints commands as they are received
- Larger *input* buffer
- Small *image* buffer
- Always in immediate mode
- Copies generated by computer

Sending data to the printer

- ◆ **Datamax emulation uses ASCII 01 (SOH) and 02 (STX) as “command” codes.**
- ◆ **Other data sent as “human-readable” format**
- ◆ **Numbers sent as “500” or “0500” rather than 01_H F4_H**
- ◆ **Upper and lower case are treated differently**



System & label format commands

◆ Commands split in to two types

System level commands

- Immediate execution
- Commands start with SOH or STX
- Control general operation of the printer

Label format commands

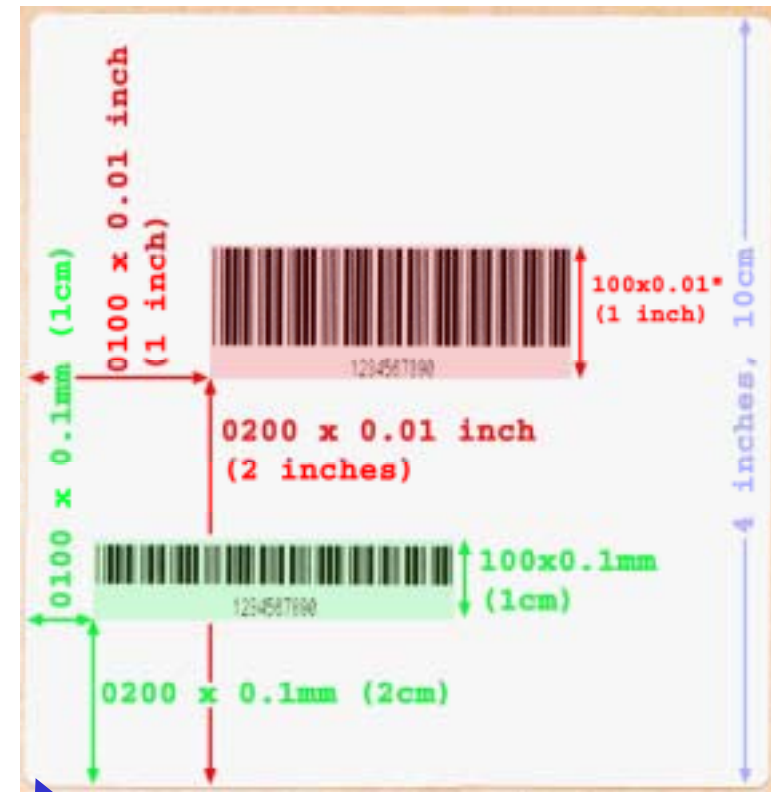
- Only valid after an STX “L” command received putting printer in to label design mode
- Most commands not prefixed with any “special” characters

Measurements

- ◆ **STX m**
 - Metric system
 - Measurements in 0.1mm
- ◆ **STX n**
 - Imperial system
 - Measurements in 0.01 inches

Command sent was

1A31 **100** **0200** **0100** 1234567890



The “m” and “n” commands are also available in label design mode without the STX prefix

System: Label Length

- ◆ **STX M *nnnn* Set maximum label length**
 - Used to allow printer to detect labels running out
 - Generally set to *about* 2.5 times the actual length of the label used
 - Not used to define page length. This is decided by the paper sensors
 - Incorrect value may give an “M-CMND” error on the LCD panel when printing or feeding media
 - Default value of 20 inches
 - Command is not needed if 20 inches is acceptable
 - e.g. STX M 0950 will cause printer to stop if no label “break” is found within 9.5 inches of printing

System: Continuous paper

◆ **STX c *nnnn* Set continuous paper length**

- Set length of form when using continuous paper
- Disables / ignores light sensors in printer
- Not needed for label* paper or
- Sending STX c 0000 will force the printer in to label* mode
- e.g. STX c 0400 will set the printer to 4 inch paper length.

* Label mode is any operation where the light sensors within the printer is used to detect the label length.
This can be for either label media, black registration mark or punched tags

System: Enter label format mode

◆ **STX L Enter label format mode**

- After receiving the STX L command, the printer enters the label format mode
- Commands following STX L are used to design the contents of the label. Commands are processed in the order they are received
- Label format commands are NOT preceded by an STX code
- This mode is exited by sending the command “E” which causes the label designed to be printed. The printer then returns to System Mode

◆ **E Exit label format mode**

- Not preceded by an STX code. Just “E” on a separate line

Label: Print speed

- ◆ ***Pa*** **Set print speed**
 - Sets print speed in inches per second
 - “a” should be between 1 and 8
 - Letters from C, D, E to O are also valid, e.g. PH sets 4 inches/second
 - Setting a speed higher than the maximum print speed for the printer will be ignored.
 - This command doesn’t need to be used. Maximum print speed will be used otherwise if no command is issued.

- ◆ ***Sa*** **Set feed speed (non-printable area)**
 - Sets speed for areas of labels where no image is required.

Label: Dot size and quantity of labels

- ◆ ***Dhv* Set dot size**
 - Specifies the dot formation used when printing
 - Usually *h* and *v* are set to “1” each, e.g. D11
 - Setting D13 will make the image three times larger vertically

- ◆ ***Qnnnn* Set number of pages to be printed**
 - For example Q0010 will cause 10 labels to be printed
 - The printer will only print the quantity of labels when the “E” command is received
 - Default value is Q0001. This command doesn’t need to be used

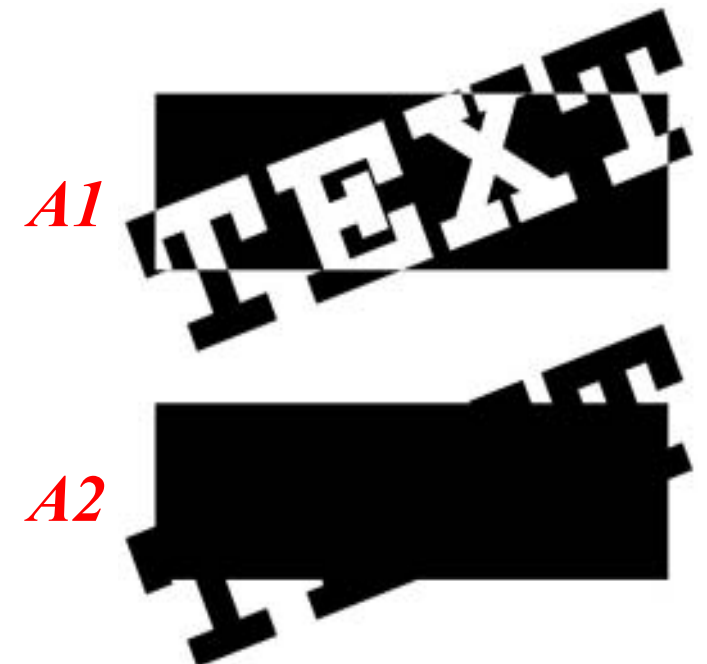
Label: Head temperature & overlays

◆ *Hnn* **Set print head temperature**

- Value between 00 (coolest) and 30 (hottest)
- Standard value is 10
- Higher values will slow the print speed down

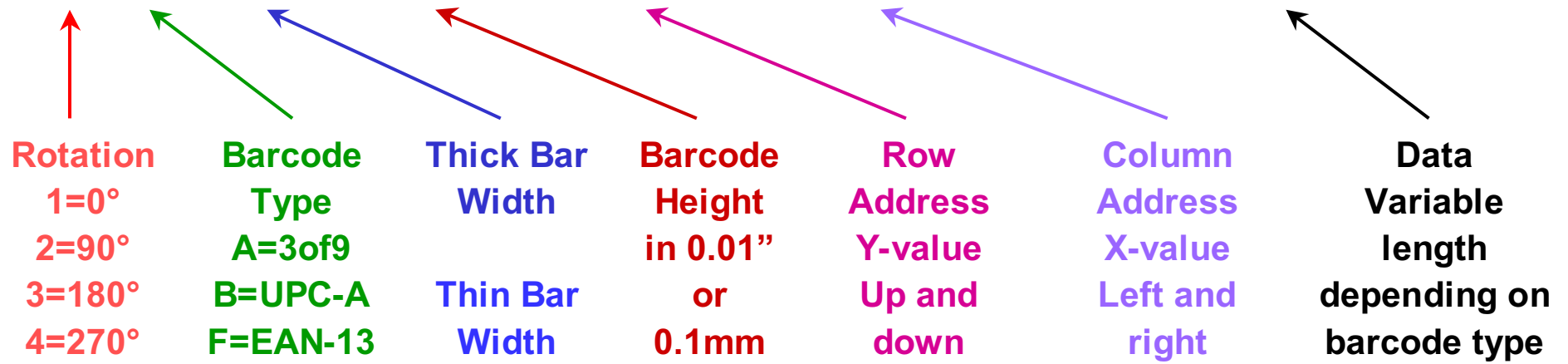
◆ *An* **Set how overlaid images are printed**

- A1 causes images to be inverted (XOR) when overlaid
- A2 causes images to be printed normally when overlaid

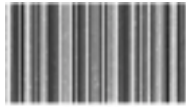


Label: Barcode sample

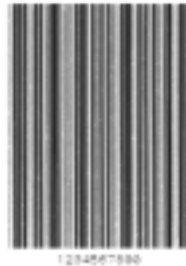
1 A 3 1 1 2 5 0 1 6 5 0 1 9 5 1 2 3 4 5 6 7 8 9 0



Label: Barcode examples



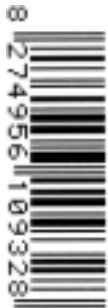
◆ **1A31050010001001234567890**



◆ **1A31125016501951234567890**



◆ **1F3304001000100827495610932**



◆ **2F3304001000100827495610932**

Label: Text printing

1 9 1 1 A 3 0 0 0 5 0 0 1 0 0 Citizen

Rotation	Font Number	Horizontal Expansion	Font Size	Row Address	Column Address	Data Variable length
1=0°	0 to 8 Bitmap	Vertical Expansion	A06 to A48 is 6 to 48pt	Y-value	X-value	depending on barcode type
2=90°	9 Scalable			Up and down	Left and right	
3=180°						
4=270°						

With scalable fonts, you must specify a point size that is supported. Other point sizes will not print. 6, 8, 10, 12, 14, 18, 24, 30, 36 and 48 pt are available on standard models

Label: Text examples

Citizen **161100000500050**Citizen

Citizen **1911A3000500050**Citizen

Citizen **1911A0600500050**Citizen

0123456789 **161100000500050**0123456789

0123456789 **171100000500050**0123456789

Label: Ruled lines and solid boxes

1X1100000500100L010250

1X11000 is fixed
for lines

Row
Address
Y-value
Up and
down

Column
Address
X-value
Left and
right

Upper case "L"
3 digits per size
Lower case "L"
for 4-digit sizes

Horizontal
size of
line or
box

Vertical
size of line
or box

1X11 000 0050 0100 L 010 250 - thin vertical line

1X11 000 0050 0100 L 250 010 - thin horizontal line

1X11 000 0050 0100 L 250 250 - solid black box

Label: Sequential numbers

- ◆ The CLP range can produce labels with automatically increasing or decreasing numbers

STX L

Q0004

1911A3000500100**1000**

-010

1911A2601500100**0800**

+030

E

Enter label mode

Quantity of four labels

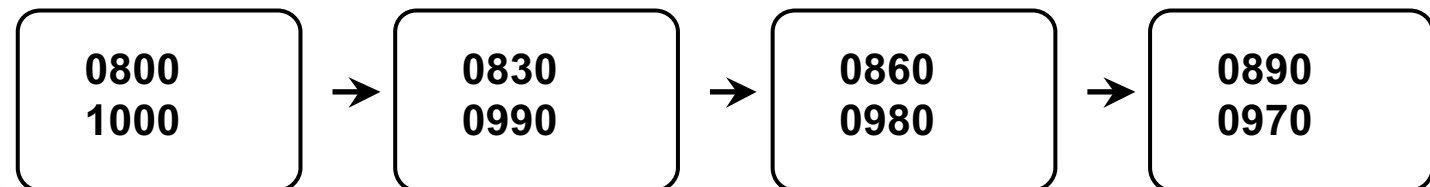
30pt text item "**1000**"

Decrease this number by 10 each label

26pt text item "**0800**"

Increase this number by 30 each label

End label definition and print labels



How to use a hex dump

- Switch on the printer whilst holding down the FEED key. A test will print; then the printer is in “Hex Dump Mode”

DUMP LIST

```

02 4C 0D 0A 44 31 31 0D 0A 51 30 30 30 33 0D 0A
31 39 31 31 41 33 30 30 30 35 30 30 31 30 30 31
30 30 30 0D 0A 2D 30 31 30 0D 0A 31 39 31 31 41
33 30 30 31 35 30 30 31 30 30 31 30 30 30 0D 0A
2B 30 33 30 0D 0A 50 34 0D 0A 53 34 0D 0A 48 31
30 0D 0A 45 0D 0A
  
```

Hexadecimal Data

```

.L.D11.Q0003..
1911A30005001001
000..-010..1911A
30015001001000..
+030..P4..S4..H1
0..E..
  
```

ASCII Data

Printing graphics and logos

- ◆ **Two parts to printing graphics**
 - Define graphic file in “system” mode
 - Print graphic in “label” mode
- ◆ **Use a BMP or PCX graphic**
 - Recommend using a Windows BMP file saved in *1bpp* mode
 - Created in “Paint” software
 - Colours *may* need to be inverted (white on black)
- ◆ **Images are stored in the printer’s memory as separate files and recalled by a “filename”**

System: Defining graphic files

◆ **STX I *mem fmt filename data***

- *mem* is the memory “module” where the data is saved (1 character)
 - A=Internal On-board
 - B=Flash Memory
 - C=Current, default module (set with STX X)
- *fmt* is the type of file used. Recommend “B” for Windows BMP file
- *filename* is the image name used, 16 characters, ending with <CR>
- *data* is the BMP file sent unedited.

Re-sending (re-defining) this graphic by using an existing filename does not delete the previous image. The latest image will be used by the storage space is not reclaimed. Refer to STX q, STX x and STX z for memory clearance and “re-packing”.

Label: Printing graphic files

1Y1100000500100 filename

1Y
(fixed)

Horizontal
Expansion

Vertical
Expansion

000
(fixed)

Row
Address
Y-value
Up and
down

Column
Address
X-value
Left and
right

Image
name of
previously
stored
graphic

Test: create this label !



Uses:

- 5 boxes
- 1 graphic
- 2 barcodes
- 3 text items

but there are other solutions!

Test: One possible solution



```

STX qA
STX IABLOGOX
<send BMP file>
STX L
n
D11
Q0001
H08
1X1100000000010L380380
A1
1X1100000100020L360360
A2
1X1100001000010L380010
1X1100000000100L010380
1Y1100000200020LOGOX
1F3306000200160891827364546
4A93050012500901234567
1911A3602800150CITIZEN
1911A1802100135CLP Label Printers
A1
1X1100001500150L180030
1711000015501700123456789
E

```

Clear onboard memory module
 Define a logo called "LOGOX"
 Send the BMP file to the printer
 Start label design mode
 Use imperial (inch) measurements
 1 x 1 dots
 Quantity of 1 label
 Heat setting 8
 Box (full size of label)
 Invert overprinted items
 Box (white box, full size)
 Don't invert overprinted
 Horizontal line
 Vertical line
 Print the logo
 Print lower barcode
 Print side rotated barcode
 Print CITIZEN text
 Print CLP text
 Invert overprinted
 Print central black line
 Print OCR number
 Exit and physically print label