

Epson ColorWorks Series Technical Training

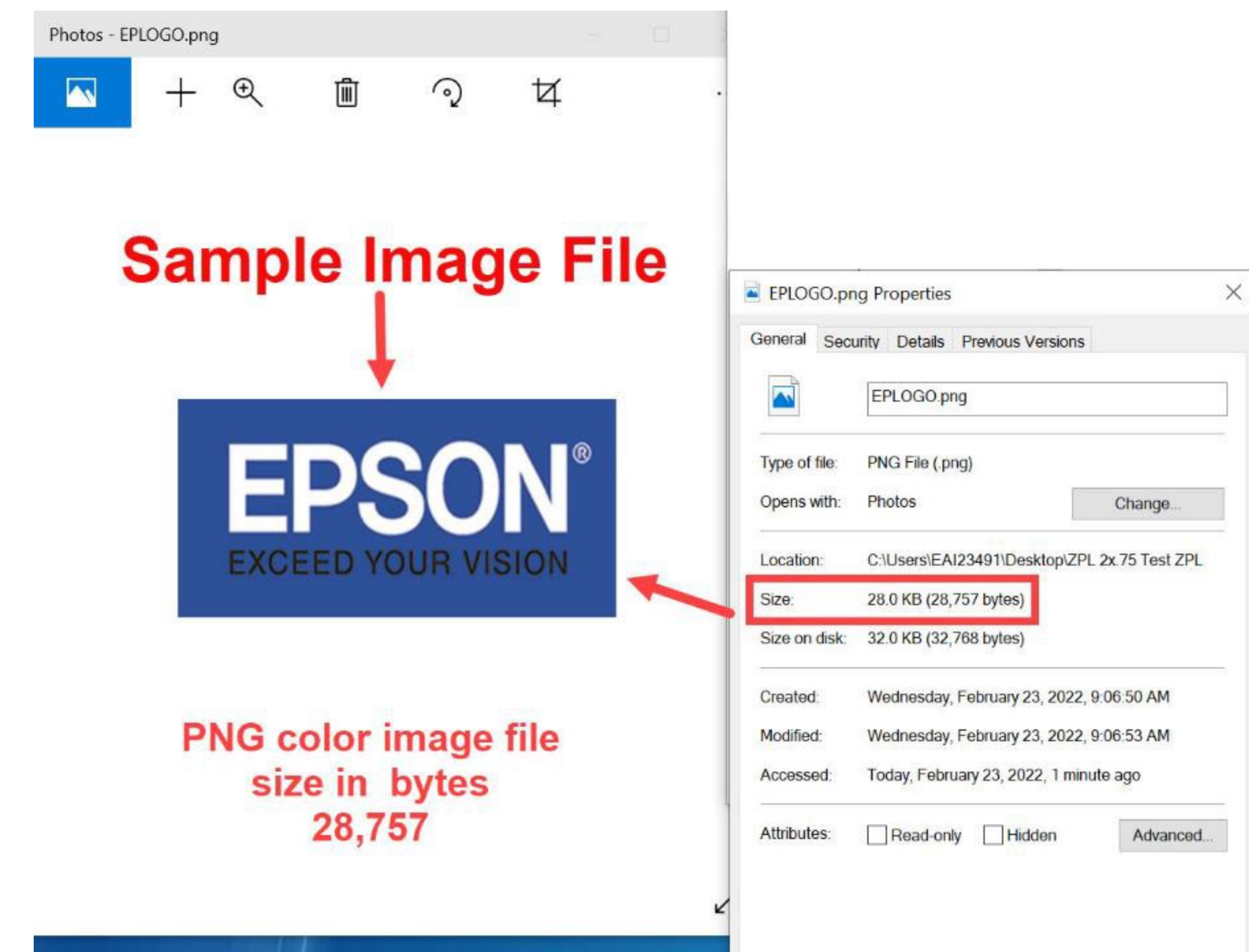


Combining Color Images in a ZPL Data Stream



Setting Up a Color PNG Image to Print Using ZPL

- ZPL II is natively a monotone printer language, but Epson has included the ability to print and colorize ZPL by adding special features to their ColorWorks ESC/Label code.
- Along with the ability to colorize text and objects, color images can also be combined in the ZPL code allowing a customer to dynamically print color images within their ZPL architecture.
- The process outlined here is a manual method used to explain the basic steps needed to add color images to a ZPL data stream. C#, .Net and Java developers can make use of the ESC/Label image registration and printing commands to develop specific color printing applications within a ZPL framework.
- To begin, a PNG image should be set to the correct size and resolution. If printing at ZPL native 600, 300 or 203 dpi set the PNG image resolution accordingly.
- Determine the byte size of the PNG image by using the image Properties.
- The correct image byte size information is critical for registering the image to the printer.



Combining Color Images in a ZPL Data Stream, Preparing the Printer

CW-C6500A Series PrinterSetting Version 1.3.0.1

Media settings

Layout settings

Position adjustment

Print results adjustment

Store data in the printer

Background image settings

Print head maintenance

Detailed settings

Printer settings

Print Head Alignment

Panel settings

Operating Time Settings

Nozzle check settings

Advanced settings

Initialize printer

Printer information

Settings save or restore

Option

Calibration

Adjust media detection sensor: Start

Replace settings from printer using ZPL II commands

Replace settings from printer using ZPL II commands: Set...

Replace settings from printer using ZPL II commands

The printing size and position will change if this setting is changed.

Replace settings from printer using ZPL II commands

Resolution of the printer in use: 300 DPI

☐ Use in Monochrome Printing Mode

Turn on a checkbox when you replacing from a printer using ZPL II commands.
Turn off when using a printer driver for the CW-C6000/C6500 Series.

Adjustment

Vertical positioning: 0.0 %

Horizontal positioning: 0.0 %

☐ Font replacement Setting...

Font width: 100 %

☐ Fix character code table Character code table not selected

Default settings

Set ZPL Resolution

ZPL Sizing Adjustments for Fonts & Graphics Spacing

Model name:

Port: 192.168.1.253

- The Epson C7500, C6000 and C4000 Colorworks series printers are natively capable of parsing and printing ZPL II print data using the native ESC/Label printer language.
- In order to print ZPL II, the printer needs to be configured for the correct ZPL print resolution by using the Printer Setting utility. Each printer series has its own Printer Setting utility unique to the printer and needs to be initiated from the Windows Start menu, not the Windows driver.
- Note that the native ZPL print resolution of 203 dpi does not exactly conform to the Epson's resolution of 200 and for that reason an adjustment panel was added to scale and modify the objects for the C6000 and C4000 series printers.

Using Labelary.com to Set Up a ZPL Shell

The screenshot shows the Labelary.com website interface. At the top is a navigation bar with links: LABELARY, Home, Online Viewer, API, Documentation, ZPL Intro, FAQ, and Support. The main area is divided into two panels. The left panel contains a text area with ZPL II code, including commands like `~DYR:EPLOGO,B,P,28757,0,`, `^XA`, `^FO600,300^IMR:EPLOGO.PNG^FS`, and `^CF0,60`. A red arrow points from the text **ZPL II Text data** and **Should appear like this** to the preview panel. The right panel shows a preview of a label titled "Epson ZPL with Color Image Example". The label content includes the Epson logo, address "1000 Shipping Lane, Plainfield IN 99999, United States (USA)", and contact information for Jane Smith. Below the preview are buttons for "ZPL", "PNG", "PDF", "Multi-Label PDF", and "EPL". The "ZPL" button is highlighted with a red box. Below the buttons is a section for "Linter Warnings (5)". At the bottom of the interface are several controls: "Redraw", "Add image", "Rotate", "Permalink", and "Open file" (highlighted with a red box). Below these are settings for "Print Density" (24 dpmm (600 dpi)), "Print Quality" (Grayscale), "Label Size" (2 x 0.75 inches), "Show Label" (0), and "Total Labels" (1).

ZPL II Text data
Should appear like this
label displayed in B/W

Open the example 2 x .75 inch ZPL file named Epson ZPL Shell.prn using Labelary .com. Configure the settings for resolution (Print Density) and size. The ESC/Label image registration command `~DYR:EPLOGO,B,P,28757,0,` is at the top and includes the image name and byte size. The ESC/Label image drawing command is also included `^FO600,300^IMR:EPLOGO.PNG^FS`


- The ZPL text and design data can be created and displayed using the Labelary.com website. There is no support for color.
- The sample label to the left was set up to be 2 x .75 inches at 600 dpi.
- Using ESC/Label, the `~DY` command is used to register the color image to the printer's memory.
- Insert the `~DY` Label image registration command before the "`^XA`" command which in ZPL determines the beginning of text, barcode and graphic data.
- The `^IM` command is used to print the registered image and also supports positioning within the label.
- Save the data as ZPL and change the extension to .prn.

The ~DY Command Stores the Image Data

Command	Function identifier	Command name	Description	Classification	Command code	Description of parameters	Definition range for ESC/Label
~DY		Save file	Downloads the graphic or font data to the printer.	Graphic	~DYd:o,f,x,t,w,data	d: Storage drive	d = R/E/B/A R: Volatile memory E: Non-volatile memory B: Optional memory A: Optional memory
						o: File name	ASCII code within 8 characters
						f: Data format	f = A/B/P A: ASCII/ZB64 B: Binary P: PNG(ZB64)
						x: Extension type	x = E/G/P/T/BGD/UCL E: TTE G: GRF P: PNG T: TTF BGD: BGD UCL: UCL
						t: Graphic data size [byte]	t > 0
						w: Data size per line [byte]	w > 0
						data: Data	ASCII or binary (Varies based on Parameter f)

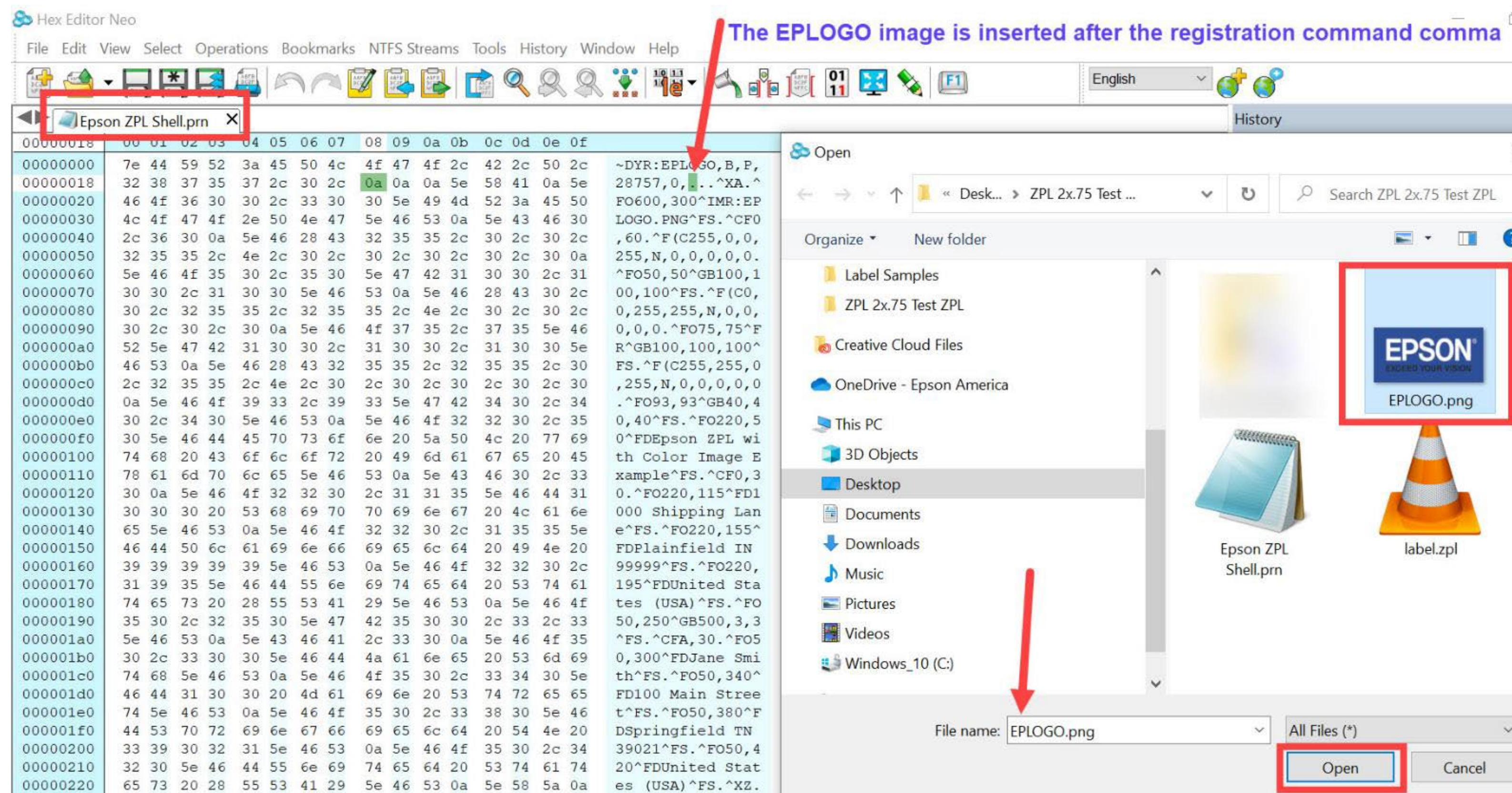
- The ESC/Label command for registering an image is ~DY. The ~DY command needs to have parameters defined for Storage drive, File name, Data format, Extension, image data size in bytes and Data size per line if not a PNG file and the image data comprised of binary hex with ANSI encoding.
- The ~DY parameters we will use for the example image is ~DYR:EPLOGO,B,P,28757,0,
- In the case of the code listed above, the image is to be stored to the printer’s volatile memory (parameter R) and will stay in memory until power is lost or a command is used to erase it.

The ^IM Command Prints the Image Data

Command	Function identifier	Command name	Description	Classification	Command code	Description of parameters	Definition range for ESC/Label
		Draw graphic file with position	Renders the graphic file to the field.	Graphic	^IMd:o:x	d: Storage drive	d = R/E/B/A R: Volatile memory E: Non-volatile memory B: Optional memory A: Optional memory
						o: File name	ASCII code within 8 characters
						x: Extension	x = GRF/PNG

- The ^IM command informs the printer to print the previously stored image from the printer's memory in a location somewhere on the label determined by the ^FO command preceding it.
- The ^IM and ^FO command to print the example file is ^FO600,300^IMR:EPLOGO.PNG^FS
- Another ESC/Label command to use for printing is ^IL but it does not position the image data on the label.

Working With A Hex Editor to Insert Color Image Data



***Do not use Notepad to save or edit the file because the encoding will be lost, use Notepad++ instead for editing.**

- Use Hex Editor Neo to insert the PNG binary hex image data to the ZPL data shell.
- Begin by selecting the dot after the location of the comma from the ~DR command for image registration as this is where the binary hex image data will be inserted.
- Open the PRN shell file saved from page 4 using the Hex Editor. Select File, Open, Open File...
- Select Edit, then Insert Mode.
- Next, select Insert File... and browse to the PNG file listed in the ~DY command.
- Select Open and the binary hex image data populates and displays in Red.
- Select File, Save As... and save the combined file with a new name with the .prn extension.

Using a Hex Editor – Columns Explained

Hex Editor Neo

File Edit View Select Operations Bookmarks NTFS Streams Tools History Window Help

Epson_ZPL_Color_Sample.prn

Address	00	01	02	03	04	05	06	07	08	09	0a	0b	0c	0d	0e	0f	ASCII
00000000	7e	44	59	52	3a	45	50	4c	4f	47	4f	2c	42	2c	50	2c	~DYR:EPLOGO,B,P,
00000010	32	38	37	35	37	2c	30	2c	89	50	4e	47	0d	0a	1a	0a	28757,0,%PNG....
00000020	00	00	00	0d	49	48	44	52	00	00	01	2c	00	00	00	96IHDR.....-
00000030	08	02	00	00	00	eb	39	22	85	00	00	00	09	70	48	59ë9".....pHY
00000040	73	00	00	5c	46	00	00	5c	46	01	14	94	43	41	00	00	s..\F..\F.."CA..
00000050	18	07	69	54	58	74	58	4d	4c	3a	63	6f	6d	2e	61	64	..iTXtXML:com.ad
00000060	6f	62	65	2e	78	6d	70	00	00	00	00	00	3c	3f	78	70	obe.xmp.....<?xp
00000070	61	63	6b	65	74	20	62	65	67	69	6e	3d	22	ef	bb	bf	acket begin="i»¿
00000080	22	20	69	64	3d	22	57	35	4d	30	4d	70	43	65	68	69	" id="W5M0MpCehi
00000090	48	7a	72	65	53	7a	4e	54	63	7a	6b	63	39	64	22	3f	HzreSzNTczkc9d"?
000000a0	3e	20	3c	78	3a	78	6d	70	6d	65	74	61	20	78	6d	6c	> <x:xmpmeta xml
000000b0	6e	73	3a	78	3d	22	61	74	6f	62	65	3a	6e	73	3a	6d	ns:x="xmp:ns:m
000000c0	65	74	61	2f	22	20	78	3d	78	6d	70	74	6b	3d	22	41	eta/" x:xmptk="A
000000d0	64	6f	62	65	20	58	4d	20	20	43	6f	72	65	20	37	2e	dobe XMP Core 7.
000000e0	31	2d	63	30	30	30	20	37	39	2e	37	62	61	66	63	66	1-c000-79.7bafcf
000000f0	30	2c	20	32	30	32	31	2f	31	30	2f	31	33	2d	30	30	0, 2021/10/13-00
00000100	3a	34	31	3a	32	38	20	20	20	20	20	20	20	20	22	3e	:41:28 ">
00000110	20	3c	72	64	66	3a	52	44	46	20	78	6d	6c	6e	73	3a	<rdf:RDF xmlns:
00000120	72	64	66	3d	22	68	74	74	70	3a	2f	2f	77	77	77	2e	rdf="http://www.
00000130	77	33	2e	6f	72	67	2f	31	39	39	39	2f	30	32	2f	32	w3.org/1999/02/2
00000140	32	2d	72	64	66	2d	73	79	6e	74	61	78	2d	6e	73	23	2-rdf-syntax-ns#
00000150	22	3e	20	3c	72	64	66	3a	44	65	73	63	72	69	70	74	"> <rdf:Descript
00000160	69	6f	6e	20	72	64	66	3a	61	62	6f	75	74	3d	22	22	ion rdf:about=""
00000170	20	78	6d	6c	6e	73	3a	64	63	3d	22	68	74	74	70	3a	xmlns:dc="http:
00000180	2f	2f	70	75	72	6c	2e	6f	72	67	2f	64	63	2f	65	6c	//purl.org/dc/el
00000190	65	6d	65	6e	74	73	2f	31	2e	31	2f	22	20	78	6d	6c	ements/1.1/" xml
000001a0	6e	73	3a	78	6d	70	3d	22	68	74	74	70	3a	2f	2f	6e	ns:xmp="http://n
000001b0	73	2e	61	64	6f	62	65	2e	63	6f	6d	2f	78	61	70	2f	s.adobe.com/xap/
000001c0	31	2e	30	2f	22	20	78	6d	6c	6e	73	3a	78	6d	70	4d	1.0/" xmlns:xmpM
000001d0	4d	3d	22	68	74	74	70	3a	2f	2f	6e	73	2e	61	64	6f	M="http://ns.ado
000001e0	62	65	2e	63	6f	6d	2f	78	61	70	2f	31	2e	30	2f	6d	be.com/xap/1.0/m

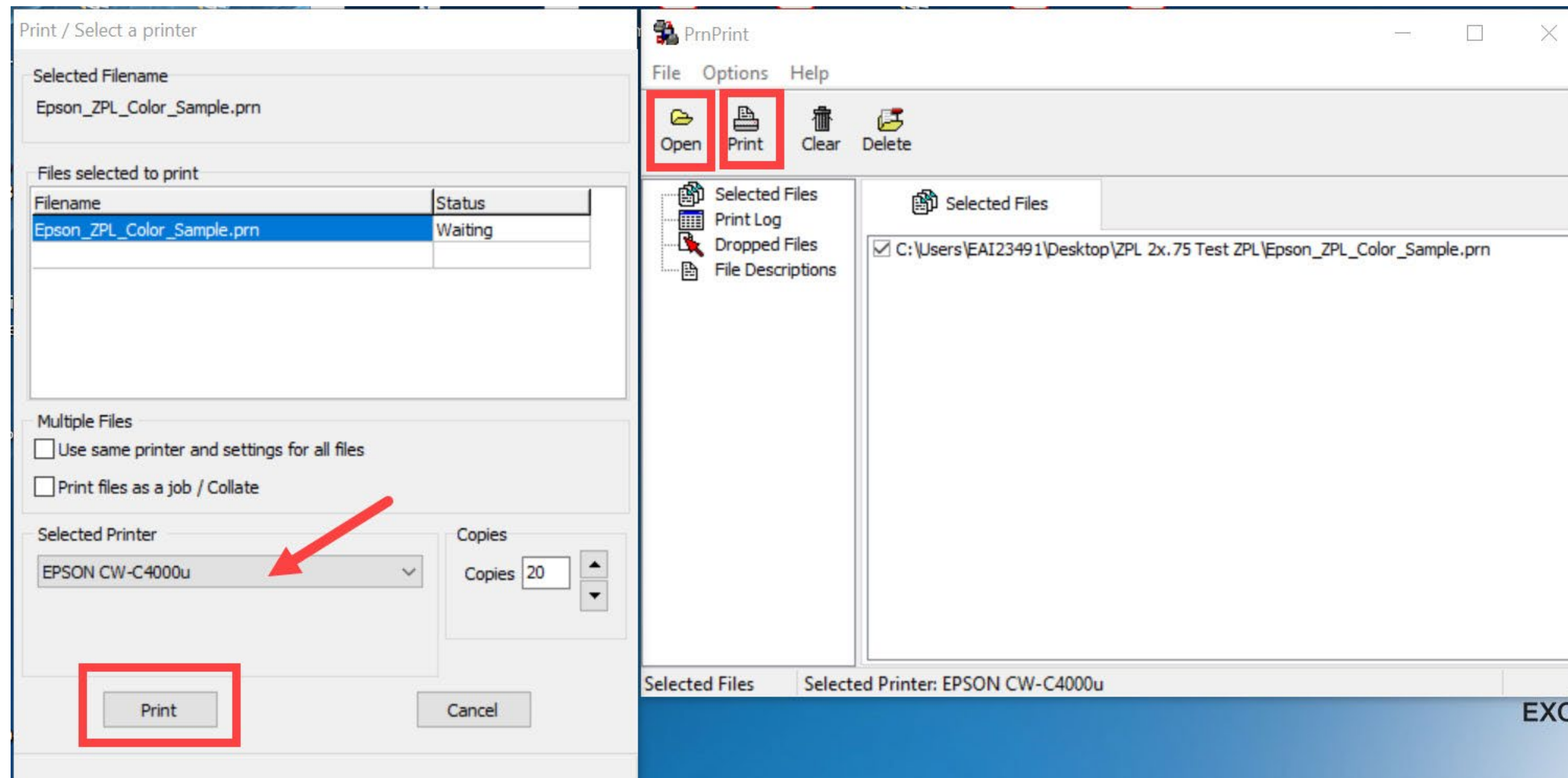
1) Data position

2) Binary data in hex

3) Binary character encoding, ANSI in this case. This is how the image data appears in the ZPL data stream.

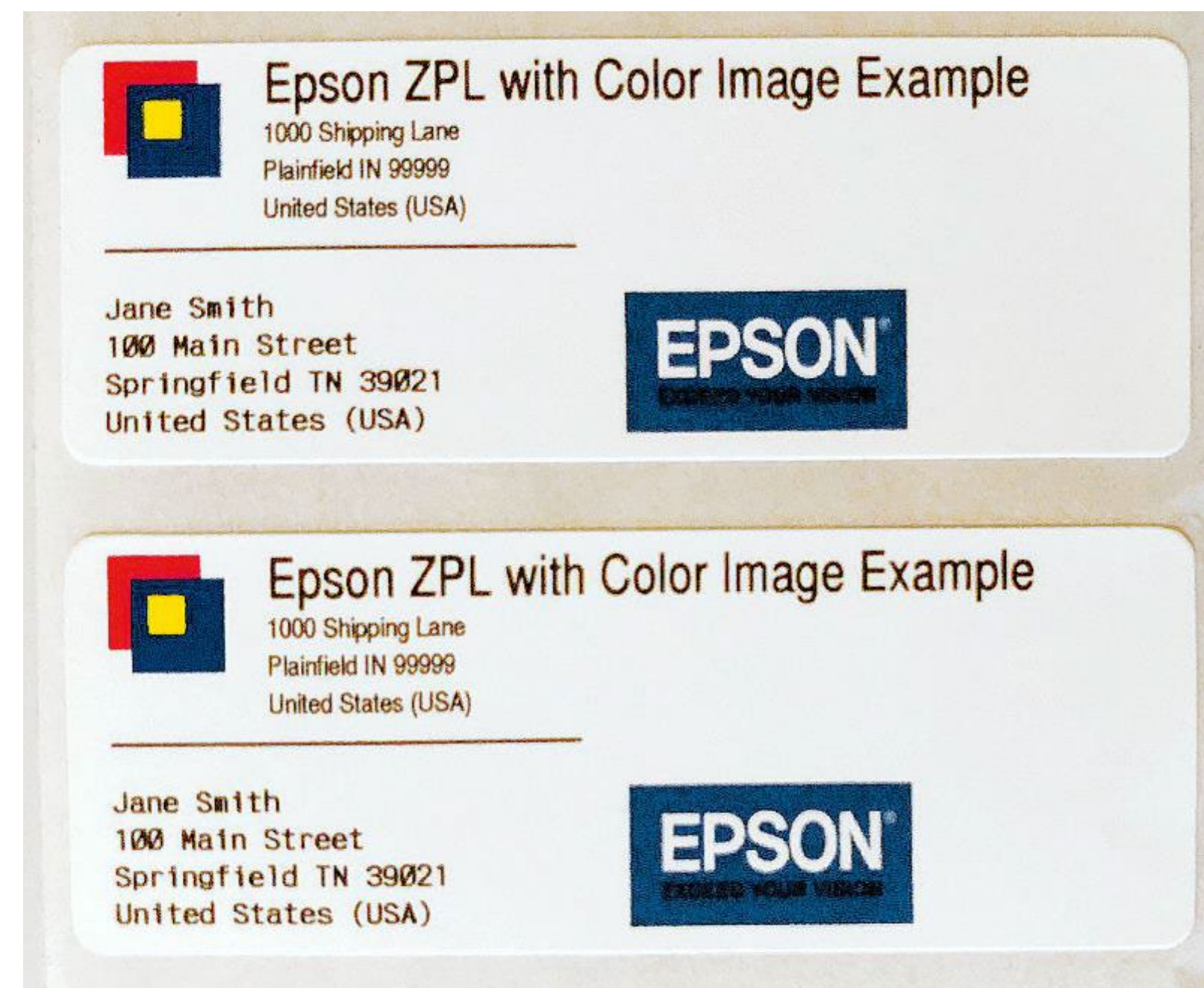
- The binary color image data that is inserted to the ZPL file appears like a random mess of strange characters with occasional strings of recognizable words.
- *The finished file can be opened in Notepad but can't be saved.

Printing the ZPL Based PRN File

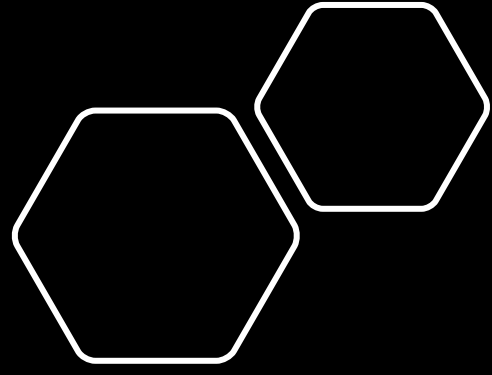


- Now that the ZPL and binary image data have been merged, it's time to print the prn file.
- Using a small executable named PRNPrint, it's easy to send PRN files to a printer because it bypasses the Epson driver settings and only uses the connection to pass the PRN text data to the printer.
- Other print methods are to use a Generic Text driver or a Zebra type printer driver set to pass-through mode.
- The Epson ColorWorks printers can parse and print the ZPL code as well as the binary image data.

ZPL File Printed on a ColorWorks C4000



- Finished ZPL sample printed on the Epson ColorWorks C4000 printer.



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