

# **Getting the most from your Printer and Scanner**

## **February 2015**

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# Introduction

In this class there will information coming from several sources as follows:

- This document
- Links in this document to various web sites

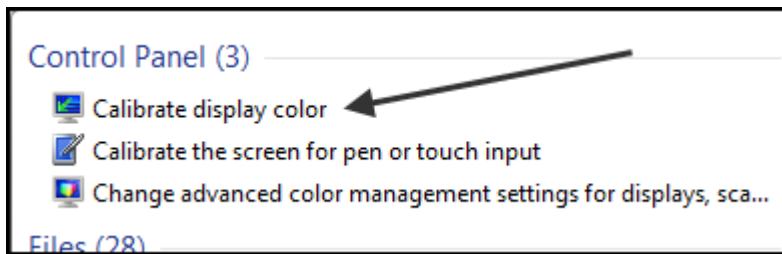
## A little color theory - simplified

Here's the problem – your browser renders color one way and your printer and camera another. Printers, scanners and displays have their own color personalities. To overcome this, professionals purchase equipment for calibrating their devices.

Most of us do not want to spend the money to do this and may experience something other than true color. Also, no matter how much money you spend you can only approach true color. The primary reason for this is that our displays use additive colors and printers use subtractive colors. In other words, displays mix Red, Green and Blue to obtain their colors. Specifically, an equal amount of Red, Green and Blue create white.

A printer, on the other hand, uses Cyan, Magenta and Yellow and an equal amount of all three creates black. Since this doesn't well in practice, printers use a black cartridge to print black. In fact, some new printers have additional colors to improve the printing of flesh tones and shades of gray.

In general, consumers can ignore most of this with today's printers and still come close to real color. For those of you with Windows 7 or 8, you can click Start and type calibrate and click Calibrate display color at the top as shown below. Just follow the instructions and you will be a little closer to seeing real color.



To pursue this on your own look up such terms as the following on the Internet:

- sRGB color
- RGB color
- Adobe RGB (1998)
- Color profiles
- Color calibration
- Pantone Huey
- Color target
- Color Gamut

## Tech Support numbers

- Canon 1-800-OKCanon (800-652-2666)
- Dell 1-800-727-1100
- HP 1-800-474-6836
- Epson Printers 1-562-276-7550
- Epson Scanners 1-562-276-4382
- Brother 1-877-276-8437
- Lexmark 1-800-539-6275

## Printer Types

- LaserJet – mostly used for high volume printing in black and white. Photo printing in color not quite as good as ink jet
- InkJet – there are basically 2 classes including All-in-One and stand-alone. Stand-alone printers can have excellent quality for color prints but All-in-Ones are catching up.

## Printing Methods

- Print to paper  
This is the most common method and is discussed below.
- Print to PDF  
Adobe Acrobat sets the standard for this but at quite a cost. For free solutions see <http://www.bullzip.com/> and <http://www.techsupportalert.com/best-free-pdf-writer.htm>.

## Buying a printer

- What are the factors to consider – not necessarily in order – that depends on you
  - Tech support and web site information
  - Ink costs – more important than initial cost
  - Print quality
  - Features such as wireless, ADF, number of cartridges, footprint, speed, support for iPad printing called AirPrint.

Do your homework. Read reviews at Staples, Amazon and [www.dpreview.com](http://www.dpreview.com) to name a few.

I like Canon the best; they answer the phone and speak my language. I like Dell the least since their tech support is atrocious and their wireless printers are hard to set up. Epson is good and I avoid Brother and Lexmark. Your mileage may vary.

For inexpensive ink costs you might try LD Ink. For ink replacement I have no problem with 3<sup>rd</sup> party companies but for my color printer, I want to know the pedigree of the ink regarding longevity and color shifting. Several years ago I switched from Epson to Canon and haven't looked back. Though I admit that my wife's HP Envy 4500 has performed flawlessly.

Just for fun call Dell's tech support at 877-601-3086 and see how far you get – then call Canon at 800-OK-Canon.

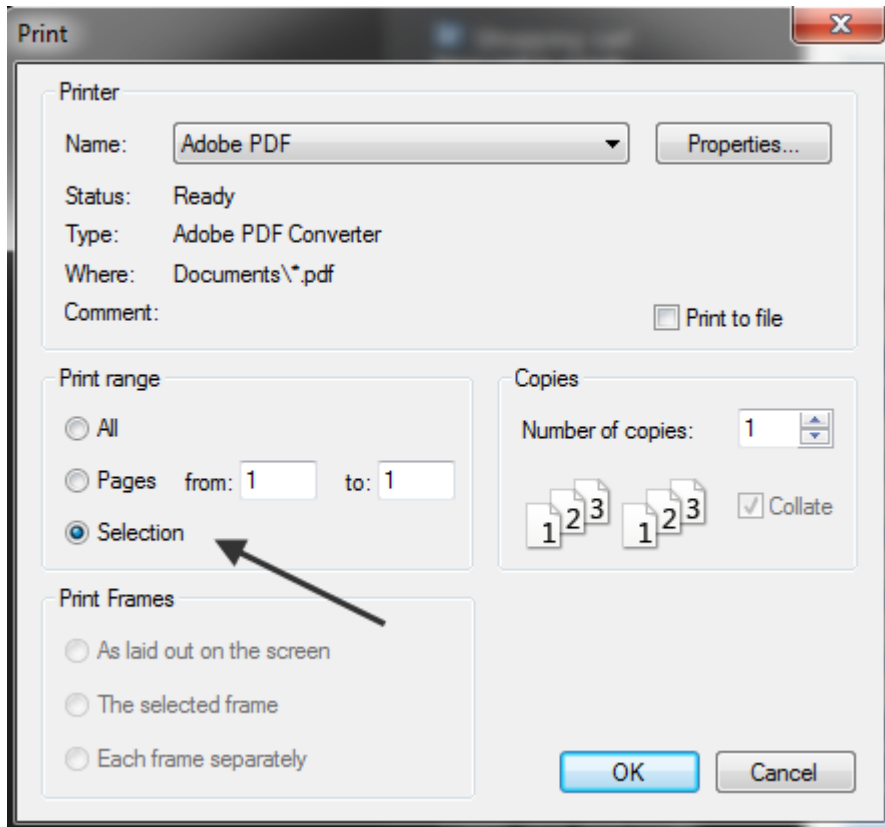
## My Favorite Printers

- Canon MX870 – now available as the MX922

- Canon MX 5320 3-in 1 Wireless \$149
- Canon MX 882 4-in one Wireless \$199

### Printing from the Internet

- Sometimes it's necessary to click File, Page Setup to change to Landscape before printing.
- Click File, Print Preview before printing
- You can select a portion of a web page and then click File, Print and choose Selection as shown below



- Frequently you will find a link on a web page labeled Print as shown below. Clicking this won't print but will open a printer-friendly web page. From here you can click File Print.



- You can also use [www.printfriendly.com](http://www.printfriendly.com) to print web pages.

## Printing Photos that last

- In order to get high quality prints that will last, even though it's more costly, you should use paper and ink recommended by the printer manufacturer. If longevity is not an issue inexpensive paper is fine.

## Printing tips

- Which resolution to use when printing pictures
  - If you are using Photoshop Elements you should use a resolution of 240 pixels per inch or more. This means that if you image is 1024 pixels wide by 768 pixels high, you can only print an image that is roughly 4" by 3".

## Printing with Photoshop Elements

- This will be demonstrated in class
- All about Resolution – see article [here](#)
- All about scanners – see article [here](#)

# Scanning

## Introduction

There are at least three classes of things you can scan:

1. Flat objects including pictures, newspaper articles, etc.
2. Slides and 35 mm film
3. 3D objects including jewelry, coins, etc.

There are 3 basic ways to initiate a scan:

1. Using the buttons on your scanner
2. Using the software that came with your scanner
3. Scanning into a graphics program such as Photoshop Elements and IrfanView (free)

## Manufacturers

- Plustek at [www.plustek.com](http://www.plustek.com)
- Epson at <http://bit.ly/epsonscanners>
- Canon at <http://www.usa.canon.com/cusa/consumer/products/scanners>
- Kodak at [http://graphics.kodak.com/docimaging/us/en/products/document\\_scanners/index.htm](http://graphics.kodak.com/docimaging/us/en/products/document_scanners/index.htm)

## Why Scan?

- To make an electronic copy – allows modification, preservation
- To facilitate electronic searching
- To save paper and storage space
- Allows archiving and backup (Marriage license, etc.)

## Recommended scanners

- Canon LiDE 210 currently \$79 at Staples
- Epson Perfection V600 Photo \$229

## Scanning Activities

- Scan old photos
- Scan receipts
- Scan a recipe and convert it to text using OCR (Optical Character Recognition) and possibly modify it.
- Faxing or Copying documents

## Copying an article or page from a book

You can make a copy of an article or a page from a book using any of the following:

- Use a digital camera
- Use a special book scanner
- Use a wand scanner
- Use a flatbed scanner

## OCR

- Abbyy Fine Reader is one of the best programs available at <http://finereader.abbyy.com/>. It's not cheap but it's the best - \$169
- PaperPort also works well available at for \$99 to \$199
- You can perform OCR online for free at <http://free-online-ocr.com>
- Paperport is all you need to do everything including Document Management

## Resources

- **Read this first** - the best web site for scanning tips is [www.scantips.com](http://www.scantips.com). It gets a little technical but this site has been around forever and contains a lot of information.
- Your printer or scanner help files
- Great site for photo restoration [here](#)
- Scanning info [here](#)
- Great tutorial at <http://jnevins.com/tutorials.htm>
- Here's a Help site for Epson scanning  
[http://files.support.epson.com/htmldocs/prv5ph/prv5phug/projs\\_3.htm#S-00900-00210](http://files.support.epson.com/htmldocs/prv5ph/prv5phug/projs_3.htm#S-00900-00210)

## Types of scanners

### Traditional Flatbed Scanners

- Work with Reflective Light

### Film or Slide Scanners

- Work with Transmitted light
- Capable of much higher resolution
- Can be more expensive

### Combination scanners

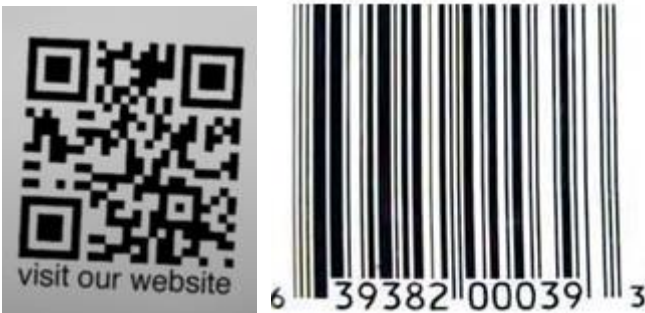
- Has 2 light sources for prints and slides (Epson 1200 Perfection U Photo)  
Important specifications
  - Resolution  
Usually stated as dpi or dots per inch  
HP 6200 specified as 1200 dpi Hardware Super Sampling, 600 dpi optical
  - Color or Bit Depth  
Usually stated as so many bits  
HP 6200 specified as 36-bit
  - Maximum Scan Size  
Usually 8 ½ by 11 or 11 by 14
- Typical Image Processing Capabilities  
Exposure adjustment, sharpening, scaling (actually re-sampling), color adjusting



## My Setup



I have the Epson Perfection V500 Photo scanner which scans normal documents, slides and negatives. I also have the Canon MX870 All-in-One which scans normal documents. It also has an ADF (Auto Document Feeder) for scanning multiple-page documents including double-sided. In addition, I'm trying out the VueScan Wand Scanner. Of course my iPhone can scan Bar Codes and QR Codes.



I use Adobe Photoshop for my scanning software and occasionally use Paperport software for scanning receipts, etc.

## Terminology

- TWAIN – interface between hardware (scanner) and Windows. When you install a scanner. The word TWAIN is not an official acronym; however, it is widely known as "Technology Without An Interesting Name." The official website notes that "[this name] continues to haunt the standard." The word TWAIN is from Rudyard Kipling's "The Ballad of East and West" — "...and never the twain shall meet..." — reflecting the difficulty at the time of connecting scanners and personal computers.
- ADF – Automatic Document Feeder
- OCR – Optical Character Recognition. Various software programs can read a scanner image and convert the printed image to actual text.
- DPI – dots per inch or the resolution of a scanner. 300 to 600 is usually adequate for scanning documents or prints. 4200 dpi is recommended for slide or film scanning
- PDF – Adobe's Portable Document Format or the file type most software uses for saving scanned documents.
- Dither - Dithering is the process of juxtaposing pixels of two colors to create the illusion that a third color is present. That's how a printer with only six cartridges can print hundreds or more colors.
- Resolution – this has several uses. One is the number of dots per inch of your computer monitor and varies from 80 to 95 pixels per inch. It can also be specified as 1024 by 768 pixels. The second use is the resolution of a digital camera and is usually specified as megapixels. Another use is that of a digital image opened in an image editing program and is usually specified as so many pixels wide by so many

pixels high. These dimensions may be the same as that of your digital camera before being altered.

Most humans cannot discriminate differences in an image printed at greater than 200 dpi. All printed material including magazines and books have images printed at a resolution between 70 to 300 dpi.

The highest dpi required to see an image clearly on a PC screen is 72 dpi. For a print on paper that number increases to approximately 240 dpi. However, you need more dots from your printer than this since there will be dithered composite of colored dots.

- Negative – refers to film negatives – light passes through and is inverted
- Positives – refers to slides – light passes through
- Reflective – process used to scan a photo – light is reflected for the photo's surface
- WIA – Windows Image Acquisition - try to avoid this and use a TWAIN interface instead
- Native Interface – you may be asked whether or not to use the scanner interface supplied by the software and the scanner's native interface. The native interface usually provides more options
- Bed – the glass screen that documents are placed on. Also called the platen.
- Grayscale – image in 256 shades of gray
- Line art – consists of 2 colors namely black and white
- Color Depth – most scanners scan in 24-bit colors. This is  $2^{24}$  or 16,777,216 colors. Some scanners scan in 48-bit color but not all software is compatible. Note – most Windows 7 PCs and modern displays use 32-bit color depth (but can be set to 16-bit).

## My Scanning activities

Epson – scanning slides, photos, objects and film

Canon – scanning multiple page documents, black and white text and receipts

iPhone – scanning Bar Codes and QR Codes

## Resolution ABC's

Assume you are scanning a 1-inch square object

For Printing

1. If scanned at 200 dpi & printed at 200 dpi, output will be 1" by 1"
2. If scanned at 400 dpi & printed at 200 dpi, output will be 2" by 2"
3. If scanned at 200 dpi & printed at 400 dpi, output will be ½" by ½"
4. Must scan at 1600 dpi & print at 200 dpi for output to be 8" by 8". In other words, to enlarge by 8 times, you must scan at 8 times the final output resolution. This obviously spreads the dot far apart and results in a spotty or pixilated image.

For viewing on the Screen

1. If scanned at 200 dpi, the output on a screen using a monitor set at 800 by 600 width will be 1/4 of the screen or 200 pixels wide. The height will be 1/3 of the screen.
2. Must scan at 800 dpi to completely fill screen width

## Select a Suitable Resolution

The best scanning resolution depends on the purpose of the scan.

When you specify a high resolution, the number of pixels increases and the scanned image becomes finer in texture. However, increasing the resolution causes the file size to increase. For example, an 8.5 x 11-inch original scanned at 300 dpi can produce a 24MB file. The same original scanned at 72 dpi creates only a 1.3MB file. Large files take longer to process and print, so select the lowest possible resolution that produces acceptable quality.

Specify a suitable resolution according to your scanning purpose. Recommended resolutions for scanning print material:

PURPOSE	RESOLUTION
Web pages	96 dpi
Sending E-mail	96 to 150 dpi
Printing	300 dpi
Saving as A PDF file	300 dpi
Sending Fax	200 dpi
OCR (Optical Character Recognition)	300 dpi

Use Target Size to specify the output size of the scanned image.

If you are enlarging your image, you must increase the resolution (dpi) proportionally to maintain the resolution of your original. Try scanning slides at 1200 dpi or higher.

If you reduce the size of the image on a page, it does not decrease its file size.

## Resolution and Storage Size Examples

A 5x7" image scanned at	Will take up approximately
300 dpi	9.02 Megabytes
600 dpi	36.1 Megabytes
1200 dpi	144.2 Megabytes

## Scanner Specifications

### Epson Scanner

- Photoelectric Device Color Epson MatrixCCD® 12-line sensor
- Resolution 6400 dpi optical; 6400 x 9600 dpi hardware
- Maximum Resolution 12,800 x 12,800 dpi
- Effective Pixels 54,400 x 74,880 (6400 dpi)
- Hardware Bit Depth Color: 48-bit internal/external
- Grayscale: 16-bit internal/external
- Optical Density 3.4 Dmax – range between darkest and lightest parts of image
- Scaling (zoom) 50 – 200% (1% step)
- Transparency Unit 35mm Transparency Adapter
- Film holder — 12 negatives, 4 slides
- Buttons 4 buttons: Scan, E-mail, Copy and PDF
- Maximum Read Area 8.5" x 11.7"
- Light Source ReadyScan LED technology
- Scanning Speed 16.98 dpi High-speed Mode

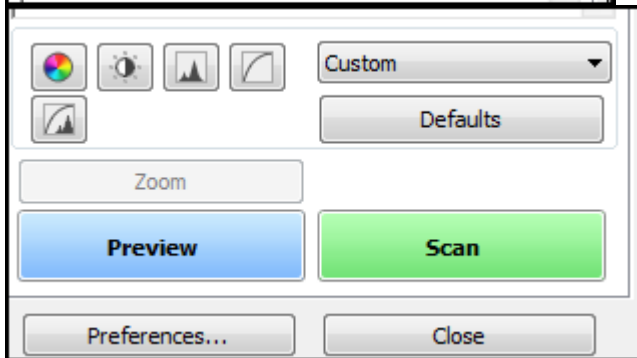
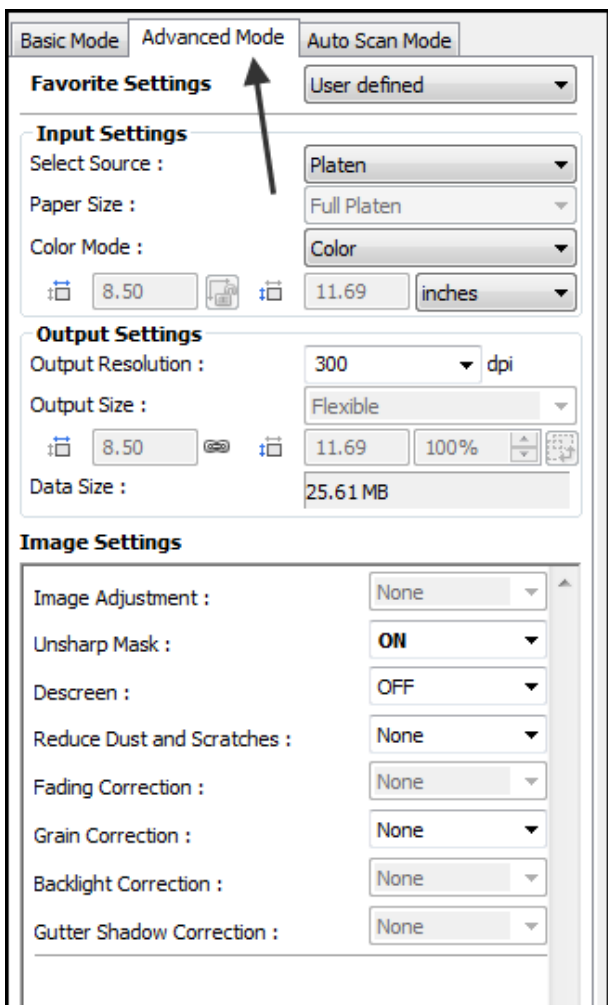
- Monochrome 12.0 msec/line
- Full color 16.98 msec/line

## **Scanning Options**

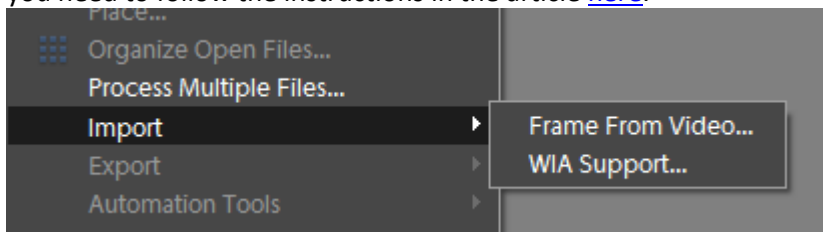
With an AIO or dedicated scanner you usually have three choices. You can use the buttons on the scanner, the software installed when you install the scanner or use a graphics program. Here are the options explained:

### **Using a graphics program**

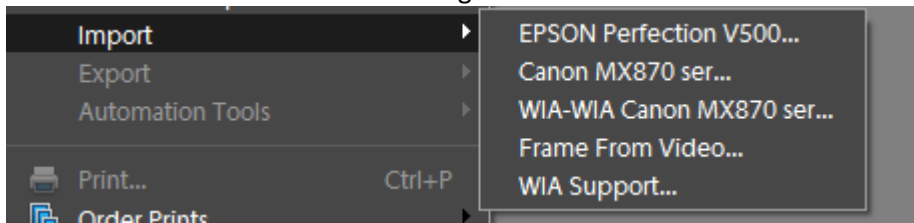
- Zoner Photo Studio (free) – click File, Acquire
- XnView (free) – click File, Select TWAIN Source
- IrfanView (free) – click File, Select TWAIN Source, and then click File, Acquire. You should click Preview first, and then you can crop the portion that you want to scan. You can also change any of the settings including dpi (dots per inch). Don't forget to click File, Save as and choose a format such as .jpg. The figures below are for a Canon scanner and will vary with manufacturer.



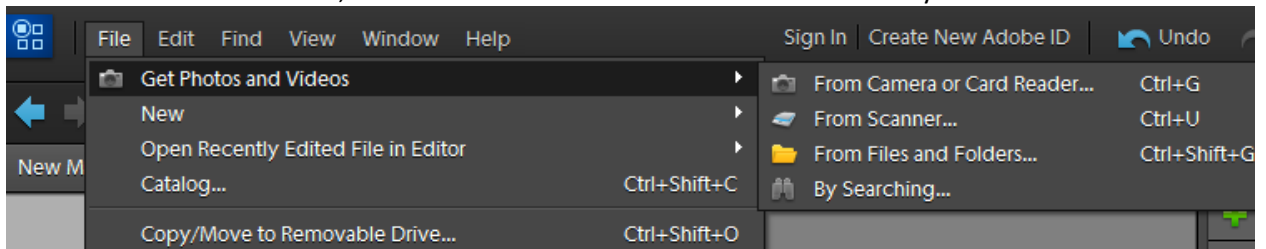
- Scanning with Photoshop Elements – if you click File, Import and see options like the figure below, you need to follow the instructions in the article [here](#).



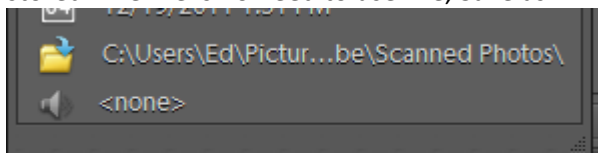
- Here's what it looks like after following the instructions referenced above



- You can also scan directly into the PSE Organizer without making the change above. Click File, Get Photos and Videos and next, select From Scanner. In the next window select your scanner.



Once the photo is in the Organizer right click it and select Properties to see where the photo was stored. There is no need to use File, Save as.

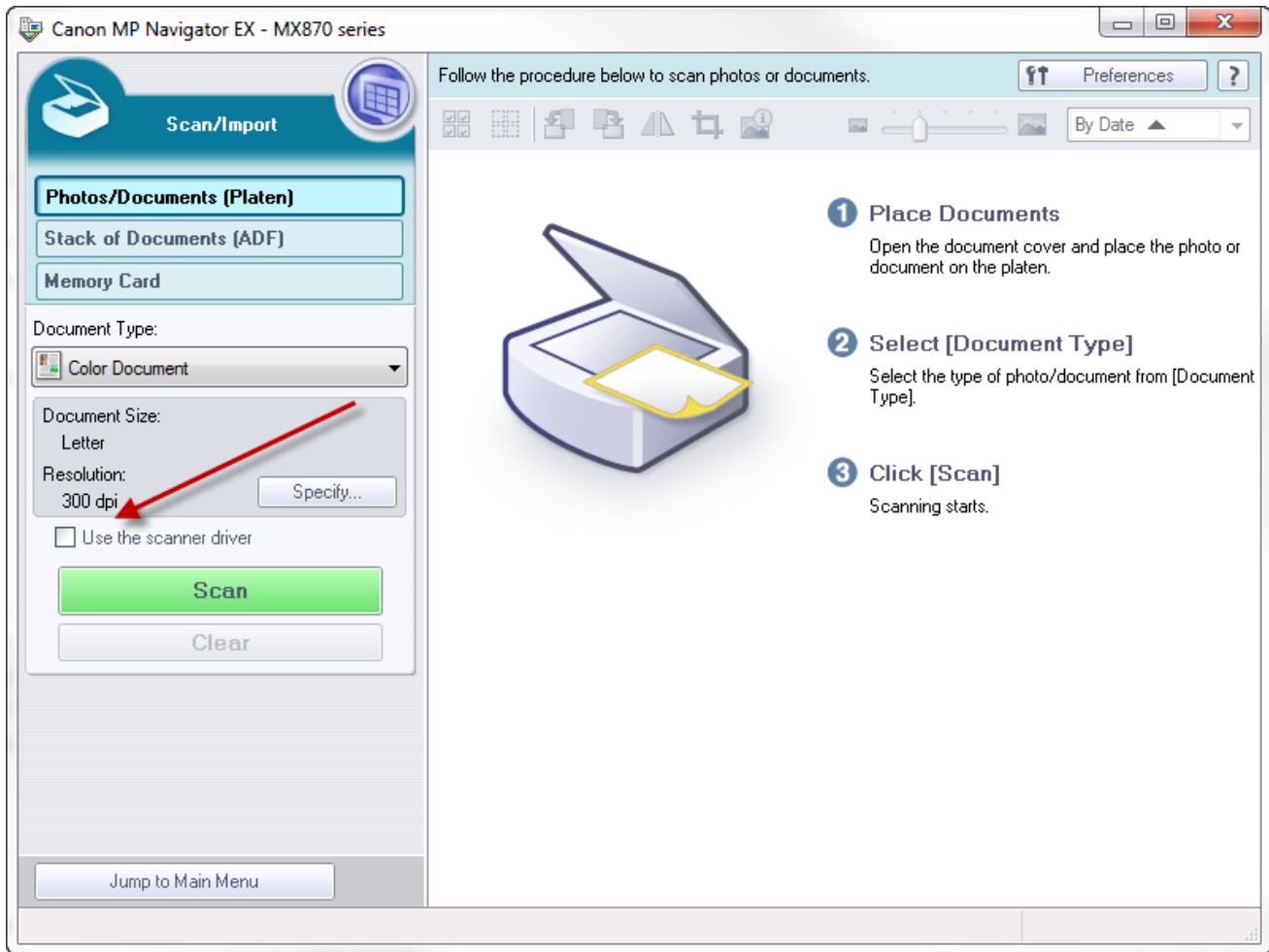


## Use the scanner buttons

The option for using the scanner buttons on an AIO will not be covered here but will be explained in class. I don't recommend this method since every printer and scanner functions differently.

## Use the Scanner software installed by the manufacturer

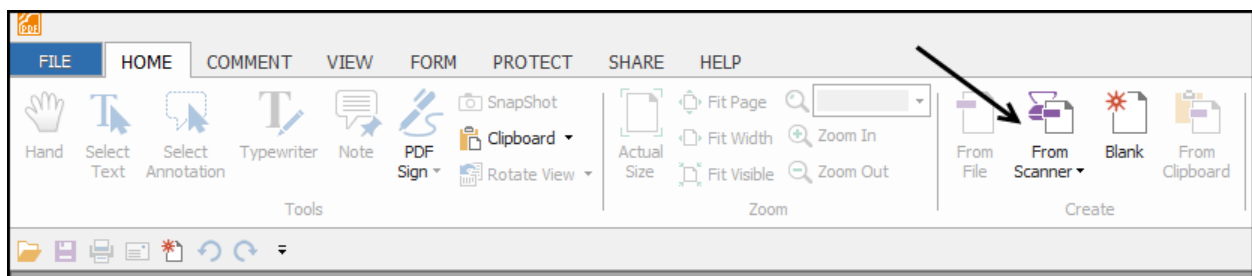
The Canon MX870 installs a program called MP Navigator. When you launch this program a window opens as shown below. To get a lot more control place a check in Use the scanner driver as shown below. This will give you a lot more control. Other manufacturers may provide similar features. Below is the window that opens with the Canon MX 870 MP Navigator software.



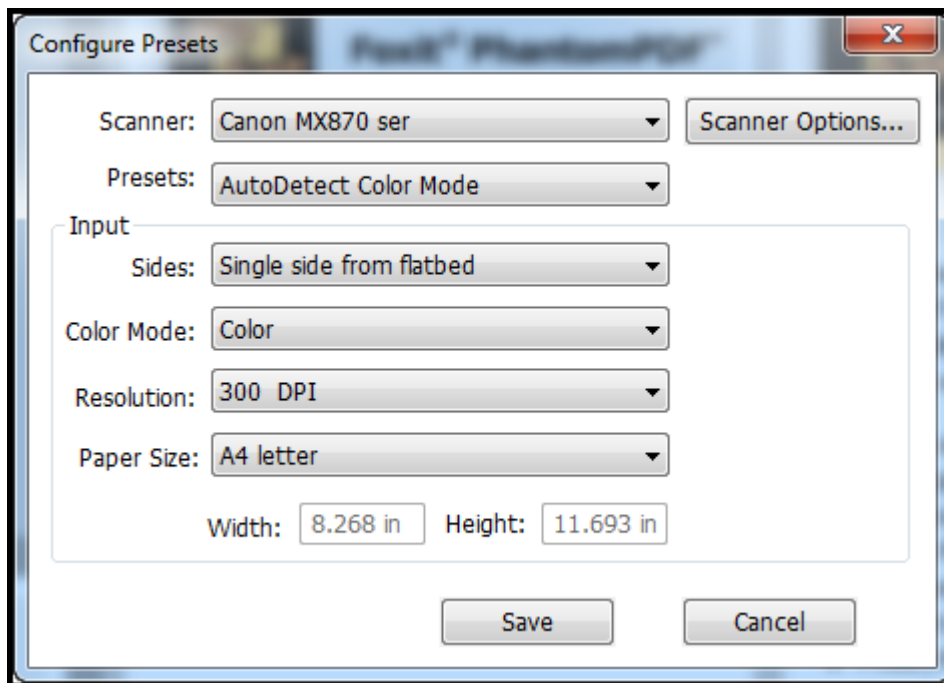
## Scanning to PDF

First of all, you can save any Word document as a PDF using Office 2010 and up and you can also use Word 2007 by installing the Add-in at <http://www.microsoft.com/en-us/download/details.aspx?id=7>.

Getting a document into a PDF format can be done with any All-in-One Printer/Scanner that supports that function. Another way is to download the portable Foxit Reader at [http://portableapps.com/apps/office/foxit\\_reader\\_portable](http://portableapps.com/apps/office/foxit_reader_portable) or the regular version at [http://www.foxitsoftware.com/Secure\\_PDF\\_Reader/](http://www.foxitsoftware.com/Secure_PDF_Reader/). When you run the program, just click From Scanner as shown below. Next, just select Configure Presets to tell the program what scanner you use.



Next, just select Configure Presets to tell the program what scanner you use. See figure below.



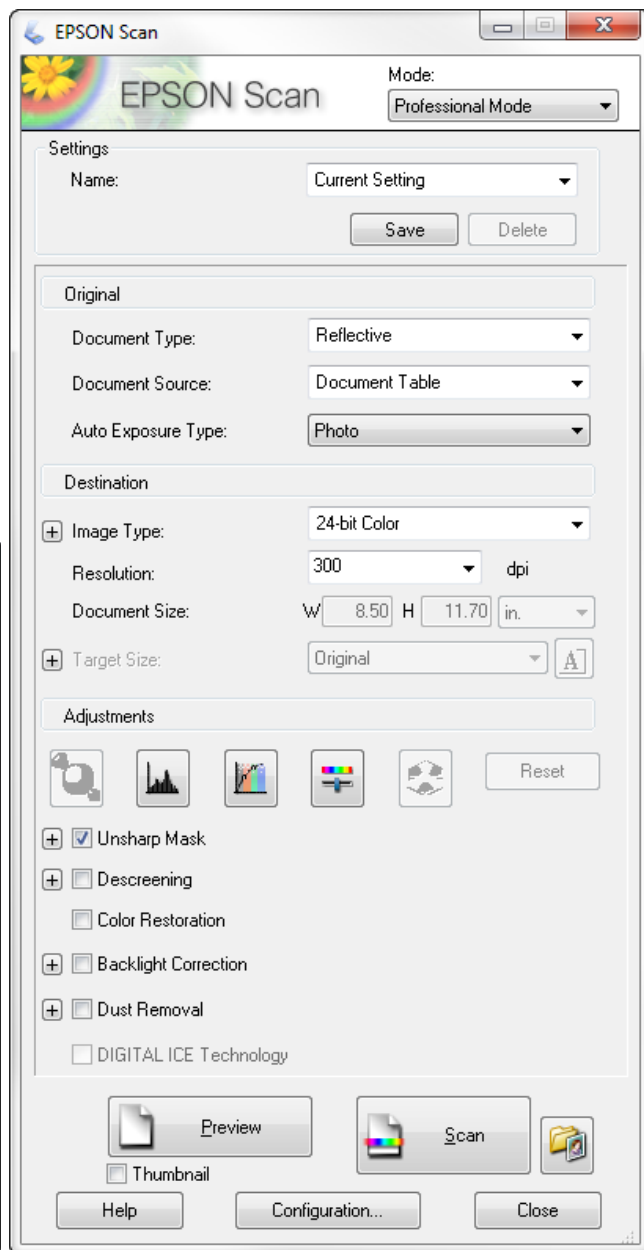
### Using a dedicated scanner

These offer various options including the use of scanner buttons and importing into graphics programs. Some models also install scanning software on your PC. For example, if click Start, All Programs, Epson, Event Manager the window shown below on the left opens. Notice that it is in the Basic Mode. By clicking the drop down box and selecting Professional Mode, the window shown on the right opens. This gives you a lot more control.





Basic Mode



Professional Mode

## Scanning Multiple Pages

One advantage of scanning with AIOs is that they have an ADF (Automatic Document Feeder). The method for scanning multiple pages including double-sided pages varies with the AIO and OCR software. Some hardware supports ADF Duplex scanning which makes it easy. With a dedicated scanner, you may be able to purchase one with an ADF and obtain one as an optional accessory.

## Scanning Slides

See tutorial from HP [here](#)

See article on various methods [here](#)

Scanning tips

- Start with a clean slide – use compressed air
- Resolution should be at least 2400 dpi. If you want to print a slide that is only 1.25” by .875” at a print size of 8” by 10” you need a magnification of 8X. If you want to print at 240 dpi you need to scan at 8 to 10 times that.
- You may have to color correct or remove scratches depending on the age of the slide.
- You can use a scanner with an option for scanning transparencies or use a dedicated slide scanner. Scanners such as the Epson Perfection V500 photo or the more recent V600 are perfectly adequate and cost \$179. Of course you can spend much more. AIO’s do not usually have the ability to scan slides.
- If you use a slide tray when scanning multiple slides, some software/scanner combinations will scan each slide into its each image file. Most current products will do this.

### Scanning with the free XnView or IrfanView

- It’s available at <http://www.xnview.com/en/index.php> and a portable version is available at [http://portableapps.com/apps/graphics\\_pictures/xnview\\_portable](http://portableapps.com/apps/graphics_pictures/xnview_portable).
- Just click File, Acquire and you’ll be on your way. Scans can be saves in almost any format. This is an excellent alternative for those who do not have Photoshop Elements.
- IrfanView is available at <http://www.irfanview.com/> and a portable version is available at [http://portableapps.com/apps/graphics\\_pictures/irfanview\\_portable](http://portableapps.com/apps/graphics_pictures/irfanview_portable).

### Scanning newspaper articles

Scanning newsprint can be challenging since the blank ink from the backside can show through. The way to prevent this is to place a piece of black construction paper on top of the article. Next, open the image in Photoshop Elements and increase the Brightness and Contrast. This will render the paper closer to pure white.

For better results, while using PSE, choose Filter, Despeckle to lessen the effect of little dots showing up. Or – try removing Dust and Scratches. Below are two versions. Notice that if you remove the noise, the image is not as sharp.



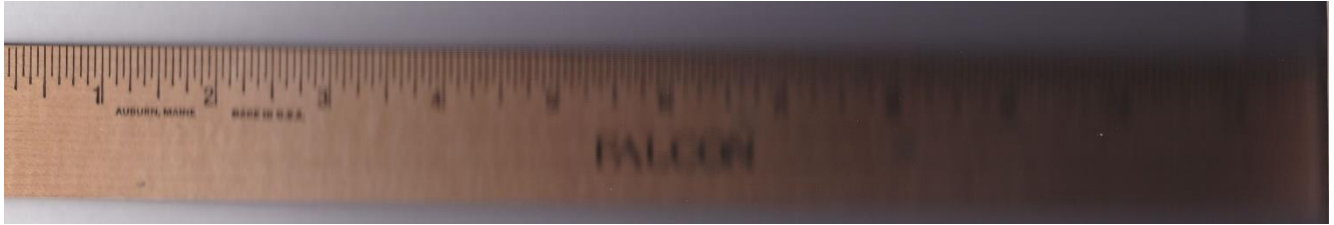
## OCR (Optical Character Recognition)

You may want to scan a newspaper article or other printed material and make it editable. This requires the use of OCR software. This may be bundled with your scanner but you might have to obtain it separately.

For a review of OCR software [http://www.simpleocr.com/OCR\\_Software\\_Guide.asp](http://www.simpleocr.com/OCR_Software_Guide.asp).

## Scanning objects

Depth of field – below are two images scanned with a Canon AIO and an Epson dedicated scanner. The ruler was raised on the scanner from a height of zero at the 1” end to a height of 1” at the 12-inch end. You can see the obvious difference. The Epson scan is at the bottom. It’s obvious that the depth of view for the Canon AIO is essentially zero. The color is off also.



Canon scan



Epson scan

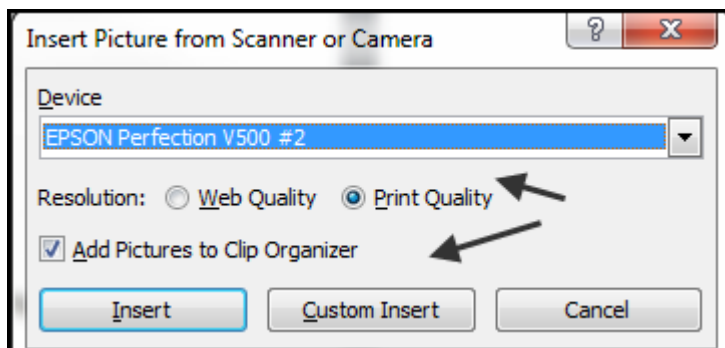
Conclusion – if you want to scan objects including coins or jewelry, a dedicated scanner may be the way to go.



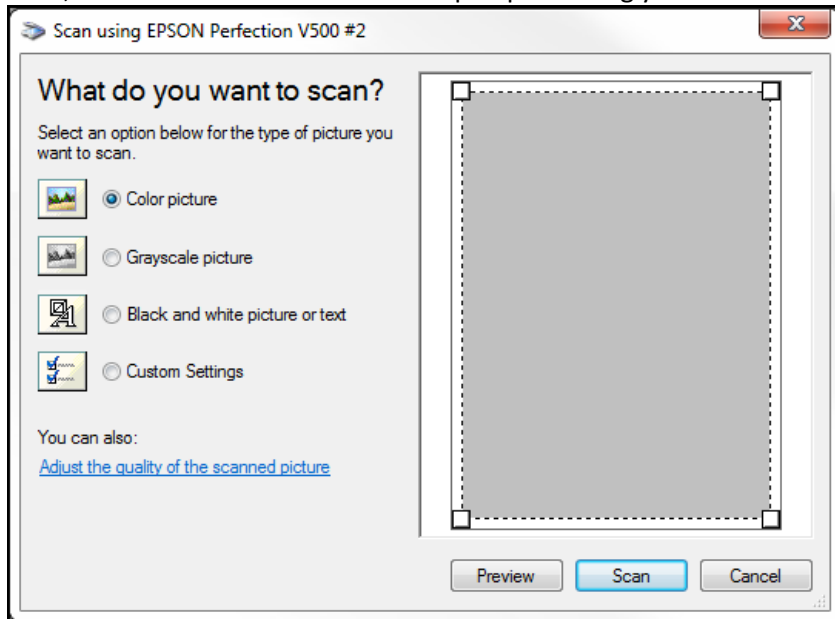
Epson scan of jewelry

## Can you scan directly into Word 2007 and Word 2010

You can – but – you have to follow the instructions [here](#) and [here](#). If you choose to do this, here are some tips. Select “Print Quality” and then choose “Custom Insert”. See the figures below.



Next, the window shown below will open presenting you with several options..



## Specialized Scanners

- Fujitsu has some [here](#)
- See more [here](#)
- See a Business Card scanner [here](#) and [here](#)
- Business card scanners
- Book scanners
- Portable scanners including Wand Scanners
  - Search VuPoint scanner on Amazon