CAMERA RAW? – WHAT'S THAT?

Forget about JPEGs. You should be working with raw files, editing your photos at their most molecular level.*

Why RAW?

"RAW" is not an acronym for anything: in this rare case, "raw" literally means "raw" ("unprocessed", that is) and the explanation for this term resides in the way digital cameras work. (Please see the referenced .pdf files from Adobe for full details about ACR and jpg compression.)****

RAW files are never touched. The settings for what you see on screen are stored in a separate file. In Adobe Camera RAW these files are called "sidecars" or "xmp's" with the extension ".xmp". They reside alongside and in the same directory as the sensor image.
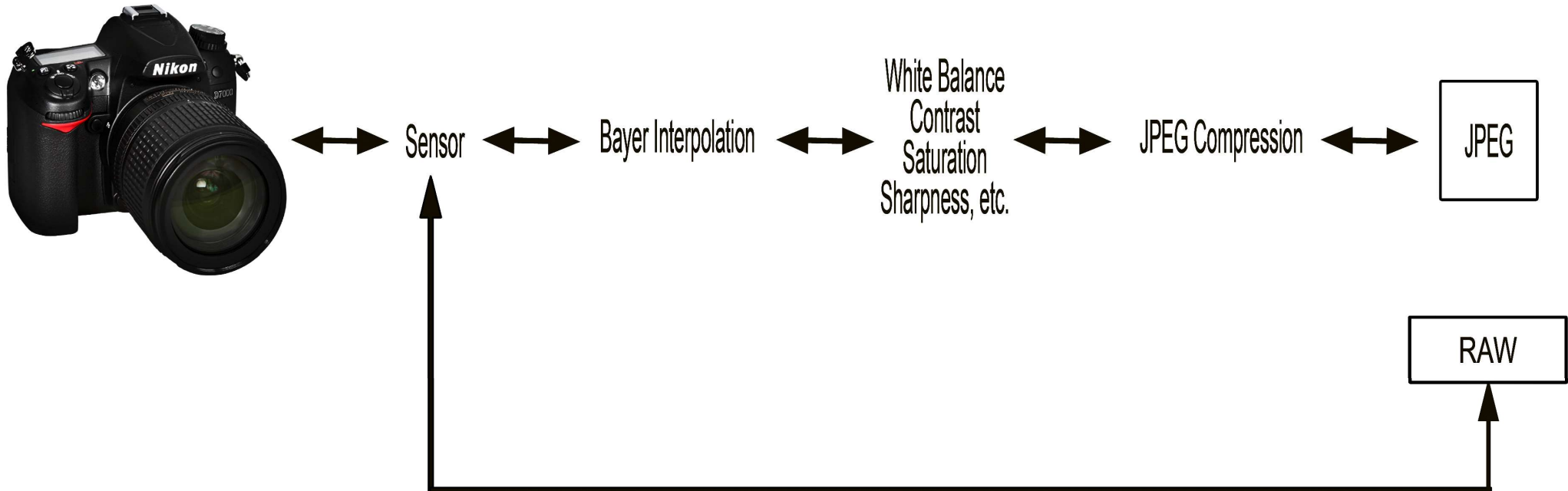
Sensor Data
with camera specific extension
(.nef = Nikon shown)

20100206-_DSC0038.xmp

20100206-_DSC0039.NEF

20100206-_DSC0039.xmp

20100206-_DSC0040.NEF

20100206-_DSC0040.xmp

20100206-_DSC0041.NEF

.xmp file
Image Settings
(Sidecar)

- **Camera RAW is generally intended for foundational work. Send more intricate work to Photoshop. (Example – layers work needed, special filter applications, etc.).**

- **One can create and store a photo as a RAW file, then, based on that RAW file, create an infinite number of versions of that photograph using "dark room software". Software which is either existing or yet to come, such as Photoshop, GIMP, Paint Shop Pro, etc., or whatever software has yet to be dreamed of.**

- **Camera RAW is great for fast global adjustments and sometimes some specific adjustments and tweaks of individual files.**

- **Camera RAW is great for applying global batch adjustments, such as "white balance" to a group or even a full library of photos.**

- **Some other global adjustments to keep in mind are the removal of sensor crud from an entire group of images at once, or exposure changes, and sharpening, to name a few. You may copy and paste the settings from one photo (.xmp file) into an entire group of photos.**

The difference between RAW and JPG in the camera.

Sensor ⟷ Bayer Interpolation ⟷ White Balance Contrast Saturation Sharpness, etc. ⟷ JPEG Compression ⟷ JPEG

RAW

Available RAW Eitors

There are many ways to view and edit your RAW files. Below listed are some of the major ones. Some are easy and straight forward, while others are not and some are designed for Linux operating system(Open Source), but are completely usable on other systems as well. Some are cost free and independent of other editing software, while others are provided and work in concert with purchased package editing software, (i.e., Adobe Photoshop is packaged with Adobe Bridge and Adobe Camera RAW).

- Able RAWer
- Canon Digital Photo Professional
- Nikon Capture NX2
- Adobe Camera Raw
- Adobe Lightroom (uses same engine as ACR with different interface)
- Adobe Photoshop Elements
- Capture One
- Breeze Browser
- ACDsee
- Bibble 5 Pro

- Olympus Maste
- Irfanview
- Ufraw (Open Source) works with GIMP
- dcraw (Open Source) plugin for GIMP and basis for many other open source RAW file editors.
- Rawstudio (Open Source)
- blueMarine(Open Source)
- Qtpfsgui(Open Source)
- Raw Therapee(Open Source)
- Lightzone(Open Source)

Camera RAW is:

Advantages:

Non-destructive
- Is completely non-destructive. Because you are not changing pixels, as in jpg, but changing sets of instructions.
- RAW is lossless. All originally recorded information is retained permanently.

Flexible
- Editing doesn't increase your file size.
- Totally undoable. No history – just change the sliders back to default.
- Not limited to just RAW format. - ACR can process raw, dng, tiff, jpg formats as well.
- All ACR tools are available when porcessing all file formats.
- Shooting in RAW gives you the opportunity to take advantage of future progress in image processing as you will always retain your original sensor data in a RAW file.

Fast
- Changes happen immediately.
- There is no render time and no save time.
- Batch processing of global changes to multiple images.

Creative
- Change saturation, clarity, hightlight, shadow, black, and white as you like. Go grayscale. Incorporate camera and lens calibration effects, and grain and vignetting additions and adjustments.
- Create HDR compositions from one image with ACR.
- You may even be able to create HDR Toning effects in ACR if you are tallented enough.

Disadvantages:

- **Less frames per second when shooting.**
- **Larger file sizes require larger capacity memory cards.**
- **Must be processed in order to print, distribute, or publish to web.**
- **Requires a software learning curve.**
- **Requires some processing skills.**
- **Batch processing and/or loading multiple files may tax slower machines and require more computer RAM to keep your software running smoothly.**

Difference between Camera RAW processing and jpg processing:**

A Raw file is…

- not an image file per se, and it will require special software to view.
    - typically a proprietary format (with the exception of Adobe's DNG format).
    - at least 8 bits per color – red, green, and blue (12-bits per X,Y location), though most   DSLRs record 12-bit color (36-bits per location).
    - uncompressed (an 8 megapixel camera will produce a 8 MB Raw file).
    - the complete (lossless) data from the camera's sensor.
    - higher in dynamic range (ability to display highlights and shadows).
    - lower in contrast (flatter, washed out looking).
    - not as sharp.
    - not suitable for printing directly from the camera or without post processing.
    - read only and non-destructive - all changes saved in.xmp "sidecar" file or as JPEG or other image format).
    - sometimes admissible in a court as evidence (as opposed to a changeable image format).
    - waiting to be processed by your computer and not ready for the grocery stores processing machine.

By comparison a JPEG is…

- a standard format readable by any image program on the market or available open source.
    - exactly 8-bits per color (12-bits per location).
    - compressed (by looking for redundancy in the data like a ZIP file or stripping out what human can't perceive like a MP3).
    - fairly small in file size (an 8 megapixel camera will produce JPEG between 1 and 3 MB's in size).
    - lower in dynamic range.
    - higher in contrast.
    - sharper.
    - immediately suitable for printing, sharing, or posting on the Web.
    - not generally in need of correction most of the time.
    - able to be manipulated, though not without losing data each time an edit is made – even if it's just to rotate the image (the opposite of lossless).
    - processed by your camera.

- These differences lead implicitly to situations that require choosing one format over the other. For instance, if you do not have much capacity to store images in camera, then shooting in JPG will allow to capture 2 or 3 times the number that you would shooting in RAW. You might also consider this idea if you are at a party or some other event after which you want to share your photos quickly and easily. Many reporters shoot exclusively in JPG format for speed and ease of getting their work to their publisher.

- On the other hand, if capacity is not an issue at all, you might consider shooting in RAW + JPG, just to cover all the possibilities. If you cannot or do not want to do any post processing, then you simply have to shoot in JPG.

- Taking a picture in RAW is only the first step in producing a quality image ready for printing. If quality is of the utmost importance, and you want to get every bit of performance your DSLR can offer, then you should be shooting in RAW.***

There are some major differences between RAW and JPG files and formats that are worthy of note:

- RAW files contain raw data right off the camera's sensor. The settings you chose in your camera (like exposure, contrast, sharpening) are NOT applied until you import them through either the manufacturer's edit software or a converter like Adobe Camera Raw. Once imported into the software, you have the option to change, nullify or accept those settings. In other words, you have the option to import the raw, unprocessed data into your image editor as the camera sensor detected it. Usually in 12 bit to 16 bit data width per pixel.
- On the other hand, an image which has been converted by the camera into JPG has already had all of those settings applied by the processor in the camera. These settings may be great BUT the camera may also have over sharpened, over boosted the saturation, made the image too contrasty, etc. Most of the damage in not easily undoable. JPG images are 8 bit max, therefore the extra data is thrown away and along with it goes subtle data which can not be recovered. JPG is also a lossy compression. Each time you save the image, you degrade it - only slightly if compression setting is high (12) but more so as you lower the setting (increase the compression).
- Making a curves or levels adjustment to a 16 bit RAW file vs and 8 bit JPG file has major noticeable differences. Transitions in RAW are much smoother leaving fewer gaps in a typical histogram.
- If you feel uncomfortable archiving files in proprietary RAW formats, save archival copies as TIFF with lossless LZW compression as this is a universal format that has been around forever, or as .psd. If you decide to save as .jpg for space considerations, use the highest settings (11 or 12).http://www.retouchpro.com/forums/input-output-workflow/14257-pp-raw-versus-jpeg.html

Adobe DNG format:

The public archival format for digital camera raw data

- **Raw file formats are extremely popular in digital photography workflows because they offer creative professionals greater creative control. However, cameras can use many different raw formats — the specifications for which are not publicly available — which means that not every raw file can be read by a variety of software applications. As a result, the use of these proprietary raw files as a long-term archival solution carries risk, and sharing these files across complex workflows is even more challenging.**

- **The solution to this is Digital Negative (DNG), a publicly available archival format for the raw files generated by digital cameras. By addressing the lack of an open standard for the raw files created by individual camera models, DNG helps ensure that photographers will be able to access their files in the future.**

- **Hundreds of software manufacturers such as Apple and Google have developed support for DNG. And respected camera manufacturers such as Leica, Casio, Ricoh, Samsung and Pentax have introduced cameras that provide direct DNG support. Learn more ›**

- **In addition to the Digital Negative Specification, Adobe provides the free Adobe DNG Converter, which easily translates raw files from many of today's popular cameras. Software developers and manufacturers can download the complete DNG Specification (PDF, 486k) .DNG is supported by Photoshop from Photoshop CS to CS6, Photoshop Elements 3 to Photoshop Elements 10 and all versions of Photoshop Lightroom.**

Key Benefits of DNG Format

For photographers:

- **DNG format helps promote archival confidence, since digital imaging software solutions will be able to open raw files more easily in the future.**

- **A single raw processing solution enables a more efficient workflow when handling raw files from multiple camera models and manufacturers.**

- **A publicly documented and readily available specification can be easily adopted by camera manufacturers and updated to accommodate technology changes.**

For hardware and software manufacturers:

- **DNG removes a potential barrier to new camera adoption, since raw files from new models will be immediately supported by Photoshop and other applications.**

- **The DNG format allows R&D savings by reducing the need to develop new formats and by simplifying camera testing.**

- **A common format allows greater control over the quality of conversions by third-party applications.**

- **The specification allows the addition of private metadata to DNG files, enabling differentiation.**

Usable links, required reading and credits:

*http://www.maximumpc.com/article/features/raw_editor_showdown_5_apps_put_test

**Image idea derived from Linda.com

***http://digital-photography-school.com (*by Richard and Rebecca from* Finn Productions)

http://www.lynda.com/Photoshop-CS5-tutorials/for-photographers-camera-raw-6/61903-2.html

****http://wwwimages.adobe.com/www.adobe.com/content/dam/Adobe/en/products/photoshop/pdfs/understanding_digitalrawcapture.pdf **(required reading)**

****http://wwwimages.adobe.com/www.adobe.com/content/dam/Adobe/en/products/photoshop/pdfs/linear_gamma.pdf **(required reading)**

http://www.adobe.com/products/photoshop/extend.displayTab2.html