# Digitising Your Past – Film Scanning With Digital Camera

After a harrowing two weeks trying to get home from France during the COVID-19 madness, I found myself under strict 'house arrest' for a further two weeks and so had much time on my hands to get to those projects you want to do but never get to. One such project was to scan my collection of film images from over 30 years of shooting advertising campaigns. I wasn't going to digitise every single frame, just the interesting ones – let the proverbial images of cans of beans against white, fade into oblivion! Even at that, this would be a monumental task, especially if the films were scanned with my old 4870 Epson scanner, which, I initially thought, would be perfect for the task since it is capable of scanning film at high resolutions. Most of the images I wanted to digitise were recorded on 4x5 inch (5x4) positive transparency film, which is a pretty big original, and so I chose a moderately high scanner resolution setting of 2,400ppi at 4x5 inches – this creates a 9,600x12,000 pixel 659mb 16-bit file!

Rant: Notice I said ppi and not DPI – ppi means pixels per inch whereas DPI stands for dots per inch. A digitised image is made up of pixels not dots. Dots are used to construct process printed images and roughly speaking one printing dot is created from four image pixels.

Unfortunately 2,400ppi created a big problem – it takes a lot of time to create a high-bit* scan of a 4x5 inch (5x4) sheet of film. How much time? In the case of my Epson 4870, about 10 minutes! At this rate I'd have to ask the government to extend my incarceration for a whole year or two!

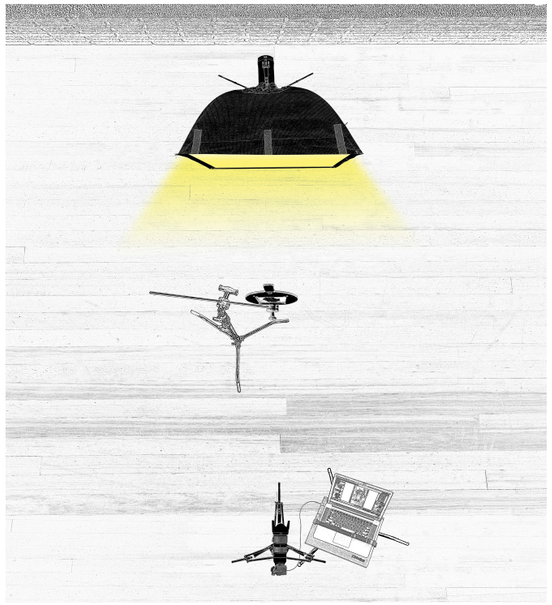
***High-bit:**
High-bit means 48-bit which breaks down to 16-bits per channel.

So why is the Epson so slow? It is slow because it scans the image with a linear array – a linear array is made up of only three rows of sensors (one each for Red, Green, and Blue) that slowly moves down the film digitising the image one line at a time. Way too slow for the amount of film I wanted to digitise! But then I came up with a brilliant idea, why not use my 61 megapixel digital camera to take advantage of its 'area-array' imaging sensor which would allow me to sample the whole surface of the film in a single instant (an 80th of a second to be exact)? – see a sample Image 001 recently taken with this camera of a 4x5 inch transparency from my 1990 film archive.

An area-array means that the imaging chip has both horizontal as well as vertical rows of sensor sites, effectively covering its whole surface area rather than just one measly line. With the exception of the Sigma camera which is fitted with a Foveon X3 3-layer imaging sensor, there is a disadvantage to area-array systems. The disadvantage is that when an area-array camera captures an image in the usual way – which is captured in just one exposure through a red, green, blue checkered Bayer Filter fitted over the sensor – it captures monochromatic data only, and so to create colour, the colour has to be interpolated after the fact from the Bayer Filter influenced monochromatic data.

On the other hand, my scanner can capture true colour. True colour because each point of the film is scanned for Red, Green, and Blue independently, therefore, or at least in theory, should capture colour more accurately. But, if you are willing to spend a little more time, you can set the camera to shoot in 4-shot mode (if it has such a feature) that creates one exposure for each channel (Red, Green, Blue, plus an extra Green for luminance), thus capturing true colour. If you require ridiculously high resolution, then you could shoot in 16-shot mode (providing your camera sports this feature) which does the four shots four times, each time moving the sensor one pixel to capture more pixels for extreme resolution with true colour. In the interest of speed, I determined that shooting in one shot mode was more than adequate in terms of quality. And on the subject of quality, I set my camera to capture 'Uncompressed RAW' files so as to have high-bit images without compression errors; this would allow more freedom to tweak colour and contrast in post.

To economise on time for this project, I set up my film digitising factory to be as fast and efficient as possible as well as comfortable to work with. With this in mind, I decided against the most common set-up which places the film on a light-box table and requires the camera to be positioned parallel to the table, making shooting down on it necessary. Having long since sold my light-box, I did my set-up with the film and camera positioned perpendicular to the floor (see Image 003). For my set-up I positioned the height of the camera, the film, and the light source so that no bending or standing on tippy toes would be necessary to see and work. This set-up has the added benefit of fewer surfaces to collect dust and also makes it harder for gravity to drag dust down onto the upright film surface.



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To capture the sharpest image, I needed a lens that was super sharp at near distances. In my arsenal of lenses, the 180mm f 3.5 macro was my best choice – super sharp at f8.0 or f11.0 and really sharp in close at a 1:5 reproduction size. 1:5 means that the subject appears on the camera's sensor at ⅕ of its actual size and it was this repro-size that I recorded these 4x5 inch films at. Also, the fact that the lens had a longer focal length, meant that the lens could sit a comfortable distance away from the film allowing lots of room for swopping out images without bumping the camera.


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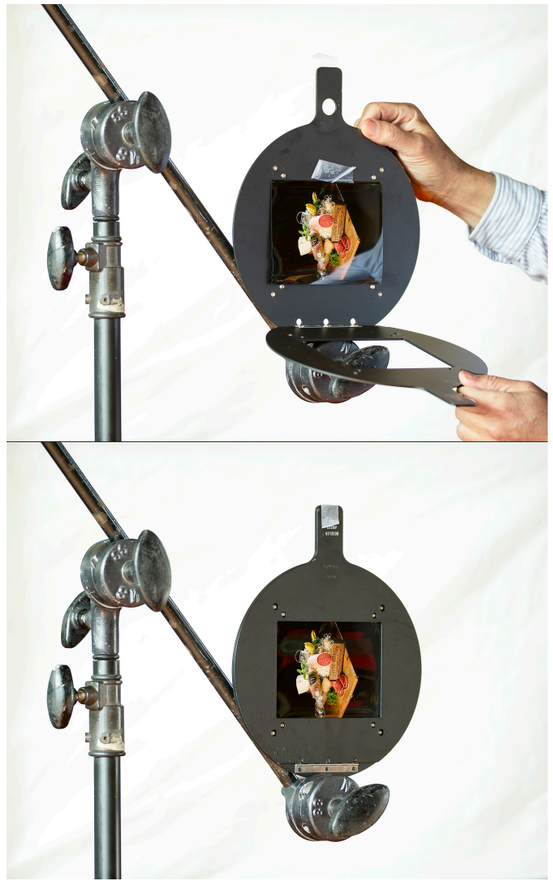
To save time recomposing and focusing for each new film, I 'bolted' the camera in place on a sturdy tripod. To hold the images in place, an old Beseler film holder left over from my darkroom days was used (see Image 004). I could have used the plastic film holder from the Epson scanner or made a DIY frame from a piece of heavy card stock with a 4x5 inch rectangle cut out of its centre, but I felt that the Beseler was better since it was made of rigid steel. The Beseler is shaped like two flat frying pans with a 4x5 inch rectangle cut out of the middle. These two 'frying pans' are hinged together at one end opposite to the handle so that a film can be sandwiched inside the assembly allowing it to be lit and viewed through the rectangular cutout. This film holder was secured to a boom-arm on a light stand. The clamp of the boom-arm was attached to the holder's outer rim just below the hinge so that the handles were positioned at the top of the assembly and the hinge at the bottom. This way I could easily open the holder without removing it from the stand to swop out films.

To back illuminate the film image, a 60x90 cm or 2x3 foot soft-box was placed behind the film. Its placement needed to be far enough away from the back of the film so that its front white nylon surface is out of the camera's DoF, otherwise any folds or imperfections on the white fabric might record on the digital capture.

When you photograph the film, you are really photographing the bright white glowing fabric of the soft-box through a coloured 'filter,' that 'filter' being the image on the film. If you don't have a soft-box or octabox, you can fire light through a suspended white fabric such as a scrim or even a bedsheet, or you could even point a light directly onto a white wall behind the film set-up. Since you are shooting directly into the light-source, check for lens flare and if necessary, block areas of the light source appearing around your film holder with flags or dark fabric.

To set exposure I pointed a reflective meter at the soft-box's white front fabric, then dialled the strobe power up and down until the meter read 3 ³⁄₁₀ stops brighter (f32.0 ³⁄₁₀) than the camera's f11.0 aperture setting. If using long duration lighting such as LED or tungsten, then dial the shutter-speed on the meter until it reads the same as camera aperture setting, then reset it to 3⅓ stops longer speed. If you don't own a hand-held meter, you could use your in-camera meter, but only if you are not using strobe or flash.



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## Bio

**Dave Montizambert lectures internationally on lighting, digital photography and Adobe Photoshop. He is also a published author having written two books on lighting and digital photography (www.montizambert.com) plus numerous magazine articles on these topics in North America, Europe, Russia and Asia. Dave also creates lighting and Photoshop tutorial DVDs for www.software-cinema.com & www.PhotoshopCAFE.com/video and authors 'Dave On Demand' (www.montizambert.com) lighting tutorial based photo-training. Dave is available for lectures and workshops in your area and can be reached through www.montizambert.com.**

If you can find an image from your catalogue of film files that has a neutral ¾ tone (light grey), photograph this first, then set your white balance in your Raw processing software off this tone. Now apply this white balance to all subsequent image files that are from this same film stock.

And finally, what about quality – which is better, the camera or the scanner? Check out the 'as is' unmanipulated comparison of side-by-side images in Image 002. In the end I thought that the scanner's captures were a bit better, but not by a lot! Reproducing an image creates a generation loss which is mainly a build up of contrast. The Epson scanner did a better job in this regard, whereas the camera suffered from a little more contrast build-up. This was easily fixed in post with no noticeable degradation since my camera, like most late model digital cameras, has high dynamic range. But even at that, I still couldn't make it look quite as good as the scanned version. If I didn't have the scanned version to compare to, I would have thought that the camera capture was the bomb! My final choice would be the camera since its speed cuts the process to a mere fraction of the time. But, if there were only a few images to digitise, I would opt for the scanner due to its slightly better image quality and the fact that it is ready to go – there is no set up of camera, lighting, and film holder. Well that's it, now you can eat up hours and hours of down time and then use all those newly digitised legacy images to bore your family, friends, and clients to death!

### Digital Camera Film Scan Set-up Specs

- Camera: Full-frame mirrorless with 180mm macro lens.
- Camera Exposure with strobe/flash: f11.0 at ¹⁄₈₀s.
- Metering: f32.0 ³⁄₁₀ reflective reading off main-source white fabric.
- Film: Ektachrome 100+ 4x5 inch transparency.
- Main-light Distance (front white fabric to film): 56 cm/22'.
- Camera Distance (film to camera imaging sensor): 96.5cm/38'.
- Set-up Heights for strobe-tube, film middle and imaging sensor from floor: 140 cm/55'.
- Light Source: 60x90 cm or 2x3 foot soft-box with inner diffusion baffle installed.


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