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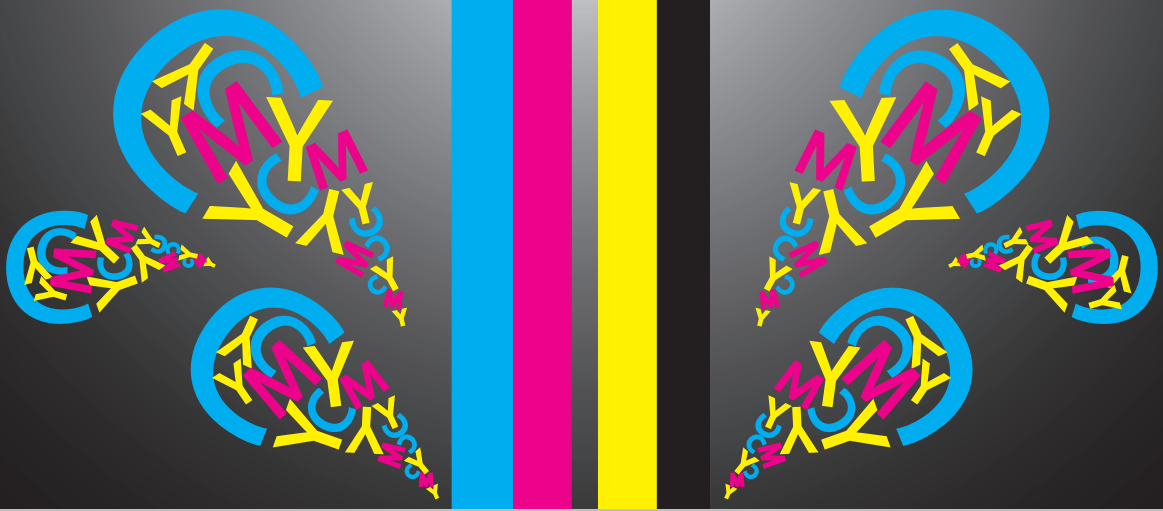

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Avoiding Planned Obsolescence: Legacy Equipment for Digital Photography Education

by Chris Lantz, Ph.D. • Western Illinois University

Introduction

Manufacturers use the principle of planned obsolescence to introduce new product categories simply to make new profits and not because the older equipment is not useful. This article will provide six examples of obsolete digital photography standards and equipment that are quite usable today but at a small fraction of the cost of current technologies. These standards include: four-thirds Digital Single Lens Reflex (DSLR) cameras; Nikon DSLR cameras for manual focus film lenses; Digital-Through-The-Lens flash metering (DTTL); external light sensor flash for digital photography; internal light sensor Through-The-Lens (TTL) flash for digital photography; and film based close-up equipment for digital cameras. These six topics will comprise the sections that follow.

Note: Used prices provided are averages from 2015, and are given as a guide to educators on purchasing used equipment in this time period.

Four-thirds DSLR cameras

Micro ⅓ is a current interchangeable lens mirror-less camera system (Lantz, 2015). It is defined as mirror-less because it does not have a mirror box to optically view through the lens. The image is viewed on the back of the camera LCD screen for a micro ⅓ camera using live view. Four-thirds is the older interchangeable lens system that predates micro ⅓. Four-thirds has a different lens mount that is incompatible with micro ⅓ without an adaptor. For most four-thirds cameras the image is viewed trough an optical viewfinder eyepiece.

Some newer DSLR cameras have an eyepiece where a small electronic viewfinder provides the image. For this article the older optical single lens reflex (SLR) or DSLR for digital cameras will be described. An image projected directly from a lens is upside down and backwards. The image in the camera eyepiece comes directly from the lens but is flipped right-side-up with a mirror box or prism on top of the camera. A 45-degree mirror reflects the image into the mirror prism on top of the camera, reversing the image right reading. It is easier to focus with the mirror box optical viewfinder in direct daylight because external LCD screens often wash out in bright light. Top of the line professional cameras such as the Nikon D4 have optical viewfinders for this reason.

Even though the older four-thirds cameras have a mirror box, they have more space in the design specification for manual focus lens adaptors. Current mirror box DSLRs such as Nikon require a manual focus lens adaptor with an optical element that degrades the quality of the lens. This lens element is not required for four-thirds or micro ⅓ cameras. The lens adaptors for four-thirds cameras are thinner than micro ⅓ because of the space taken up by a mirror box in their design.

For some manual focus lenses the aperture cannot be easily controlled apart from the film camera they were designed for. One example is Canon breach-lock manual focus lenses where apertures are built into the thicker micro ⅓ adaptors. There is no room for this aperture mechanism and the Canon breach lock ring for the thinner four-thirds adaptors. Four-third mount adaptors are available for Pentex-K, Pentax M-42 screw mount, Minolta and Nikon ($12).

Wide-angle photography is not possible for four-thirds and micro ⅓ with most film lenses. Wide-angle photography is impractical because the angle-of-view is reduced by a crop factor. For example, a 28mm wide-angle manual focus film lens with a crop factor of (1.5×) becomes a near normal 42mm four-thirds lens. The crop factor is defined by the difference between the four-thirds sensor size and the larger 35mm film size with converted film lenses.

Four-thirds auto focus lenses can be used on current auto focus micro ⅓ mount cameras with a $27 adaptor. Wide-angle photography is possible with auto focus four-thirds lenses adapted to auto focus micro ⅓ mount cameras. This lens and adaptor combination is bigger and heavier than current micro ⅓ kit lenses but has a higher build quality. Many four-thirds lenses and micro ⅓ adaptors include metal lens mounts. Four-thirds lenses and adaptor combinations retain their auto-focus capabilities but not vibration reduction. It is better for students to learn available light photography without vibration technology anyway because many current professional digital cameras do not use vibration reduction.

Four-thirds cameras can be $35–50 for a good condition camera body that ranges in resolution from 8–10 megapixels (MP). The 8–10 MP resolution is more than adequate for using older film lenses. The Olympus E-300 is

one of the original four-thirds cameras ($35). The four-thirds kit lens it came with is the Olympus Digital 14–45mm f 3.5-5.6 ($40). A kit lens is a low cost zoom lens bundled with the camera. The Olympus Digital 14–45mm is a non-ED glass kit lens that works well at 8mp or 10mp.

A newer, smaller and lighter example of a four-thirds camera is the 10 MP Olympus E-410 ($55). The build quality is lower than the E-300 but it is lighter and has a larger camera display. The newer four-thirds kit lens it came with is the Olympus ED Digital 14-42mm f 3.5–5.6 ($45). Olympus ED glass is low dispersion glass that increases the resolution of the lens. The newer four-thirds ED lenses work on the E-300.

The E-300 camera will not turn on with one of the newer ED lenses mounted on the camera. If this occurs remove the battery and reinsert it. Then get into the habit of removing the newer ED lens and turning on the camera before mounting the lens. The newer four-thirds ED glass lenses have a plastic mount and are better build than current micro ⅘ kit lens. Another lens that was often bundled with the E-410 is the ED 40–150mm f4-5.6 ($40). Aftermarket four-thirds lenses were also made such as the Sigma 18–50mm f3.5–5.6. This lens is a good low cost choice with a metal lens mount ($25) (figure 1).

The E410 and E300 four-thirds cameras are in the front row. The E-410 has a lens converter with a 50mm M-42 screw mount lens on it (left). In the back row are two four-thirds zooms: a Sigma 18-50mm and an Olympus 40–150mm (included for size reference). On the right in the back row is a micro 4/3 camera with a four-thirds 14–42mm kit zoom mounted on the camera with a four-thirds to micro 4/3 adaptor.

Figure 1

Nikon DSLR cameras for manual focus film lenses

All Nikon professional digital cameras, except the D1, have a lens parameters feature used for manual focus lenses. A manual focus lens does not have a chip and electrical contacts on it. The f-stop range and focal length of the manual focus lens is not communicated to the digital camera's metering system for this reason. There is an option in the camera menu for the user to identify f-stop and focal length for several manual focus lenses on the Nikon D2 through D4. The D200 is the least expensive camera with this lens parameters feature ($175). This camera has a 10mp resolution (figure 2).

The Nikon D300 is the same as the D200 but with 12 MP and a live view function ($250). The Nikon D2X is perhaps a better choice than the D200. The D2X has a 12MP resolution and uses both the DTTL and newer ITTL flash standards but has a higher cost ($300). The significance of DTTL will be covered in a later section of this article. The best used camera would be a D3 with its larger Nikon FX 35mm sized sensor with no crop factor for film lenses. The D3 and D4 can use wide-angle film lenses with a full angle of view but the current cost for a well used D3 is $1000.

Nikon manual focus AIS lenses work on digital cameras without the lens parameter feature but the photographer

The Nikon D200 is the lowest cost DSLR camera with the lens parameters feature.

Figure 2

cannot use the light meter on these cameras. The exception is the Nikon D1. Nikon AIS refers to a mechanical aperture indexing between the manual focus lens and digital camera body (Lantz, 2015). Exposures can be estimated or a hand held meter can be used and then checked on the camera display for cameras without a lens parameter feature. Older Nikon AI lenses also work on Nikon digital cameras but don't use Nikon Non-AI lenses since they damage the lens mount.

Although the Nikon D1 does not have a lens parameters feature, it does allow the user to meter their exposures with manual focus lenses with the aperture priority and manual setting. The Nikon D1 has a 2.6 MP resolution, D1H has 2.7 MP and D1X has 5.4 MP ($35–80). The D1 is adequate for virtually all manual and auto-focus film lenses. The D1 is also a good resolution match for catalog photography that is a small part of an 8½ x 11 page or web product photography. This camera can use an inexpensive Nikon EH-4 AC adaptor ($15). An AC adaptor is an important feature because the D1 uses NiCad batteries that have a more limited life than lithium-ion batteries. Generic batteries are available new for the D1 ($20–30). Most other Nikon cameras have expensive AC adaptors that cost more than a used D1. The D1H is a good choice for sports photography with a rapid-fire rate of three frames per second (figure 4). The D1 has a high top shutter speed of $\frac{1}{8000}$. This is useful for stopping fast moving action or getting shallow depth of field effects in daylight. The D1 is also is a good choice for infrared photography (IR) without modifying the camera. Its early pale blue IR

Nikon Speedlight SB-50DX strobe mounted on a Fuji S3 camera. The SB-50DX is pointed down with its diffuser covering the pop up flash built into the S3 camera. This is the configuration to use for close-up photography.

Figure 3

Nikon Speedlight SB-28DX mounted on a Nikon D1H camera. The SB-28DX is almost the same strobe as the more current SB-800 except it uses the older DTTL standard instead of the ITTL standard for the SB-800. The Nikon SC-23 cord can be used for off-camera flash with both ITTL and DTTL.

Figure 4

blocking filter was not as strong as filters on later cameras. This camera uses the older DTTL flash standard that will be covered in the next section of this paper.

DTTL flash metering

Through-The-Lens (TTL) refers to metering flash with a sensor inside the camera body. TTL was widely available for film-based cameras since about 1980. Digital-Through-The-Lens (DTTL) flash metering is the older Nikon digital camera standard compatible with the D1 and D2 cameras and well as the Fuji S2 and S3 Nikon mount cameras. The Fuji cameras are a good choice because the S2 (6 MP) is $50–75 and the S3 (12 MP) is $80-100. The current standard is I-TTL. The least expensive ITTL strobe on the used market is the SB-600 or SB-800 ($150–200). There are new low cost off-brand I-TTL strobes but these have poor build quality and less flash power ($80). Nikon, Metz or Nissin branded used or new equipment is a better solution based on the author's experience.

Examples of older DTTL flashes include the Nikon SB-50DX ($25) and Nikon SB28 DX ($50). The SB-50DX uses "123" three volt batteries (figure 3). Low price rechargeable "123" batteries are available for $20 for set of four with a charger. The SB-50DX is a small form factor flash that has a tilt and bounce feature. The tilting function of this flash is unique in that it tilts down with a built in diffuser covering the pop up flash in the camera for use in close-up photography. The SB28DX functions in an almost identical fashion when compared with the newer SB-800 but it is used with older digital cameras such as the D1, D2, Fuji S2 and Fuji S3 for DTTL strobe photography (figure 4).

External light sensor flash for digital photography

Older strobe equipment used a sensor on the flash body itself to calculate exposure. This was called a quenching system because the flash pulse was turned off in real time when the cell on the strobe body received the correct amount of light. Such older flashes made from 1980–2001 are often noted as having a potential to damage digital equipment because of a higher sync voltage. The author has never experienced a problem with sync voltage damaging electronics in digital cameras but results could vary. An adaptor that lowers potential higher sync voltages is the Wein Sync Saver ($30 used).

The advantage of using these older film-based strobes is low cost. The older Vivitar 283 flash has a guide number of 80, making it a powerful strobe at a very low cost ($15) (figure 5). The current Vivitar 283 is not the same as an older used Vivitar 283 since it is a TTL flash.

To use the old Vivitar 283 for digital, set the ISO/ASA of your digital camera on the circular scale on the side of the flash unit. Then pick a color mode that matches the aperture needed. The effective minimum and maximum range in feet and meters is provided on the round scale for each aperture and color setting. The color mode from the side scale is set on the front of the flash unit with the rotating dial on the sensor. Set your digital camera exposure mode to manual and the shutter speed to the sync number (usually 1/60, 1/125 or 1/250). Look in your camera manual to find the sync shutter speed number. This flash has a tilt function and many bounce flash accessories are available at a low cost. Bouncing the flash off a white roof of an interior room or a white card with an adaptor produces a softer edge light.

A Vivitar 285 flash is the same as the 283 except it can accommodate different lens focal lengths.

Figure 5

Another classic film flash that works well with digital photography is the Metz line of handle mount flashes. Metz handle mount flashes usually sell for around $35. The Metz CT-1 is a powerful but basic handle mount flash. The circular top scale inner dial is set with your digital camera ISO and then the outer dial is used to read out the aperture to be used. There is a normal and a wide-angle pointer. Wide angle refers to an accessory used to spread out the light for a wide-angle lens. The CT-1 has a PC sync cord that plugs into a PC flash terminal on the camera. If your digital camera does not have a flash terminal than a hot shoe to PC terminal adaptor is available for a low cost. A Wein sync saver could be used with a PC terminal. Once the aperture is set the quenching exposure system will turn off the light automatically and in real time. There is no need to set the aperture again because the exposure is controlled by the flash unit. The top scale of the Metz flash will have an effective minimum and maximum range in feet and meters for a given f-stop setting.

The effects of the quenching external light sensor system can be observed by pointing the strobe close to a bright subject and then pushing the test button. The recycle time of the flash will be very quick because not much light was put out by the strobe for a close bright subject. If the strobe is pointed at a far distance from a dark subject the strobe will take a considerable amount of time to recharge the capacitors. This is because the strobe used much more energy for a brighter light pulse for a dark and distant subject.

Internal light sensor TTL flash for digital photography

The Metz CT4 is used with the SCA 390 adaptor for film based TTL on the Hasselblad camera (figure 6). Although it is designed for film TTL it can be used with a digital camera back mounted on a medium format camera. The Hasselblad 503CX ($250) and 553 ELX ($250) are examples of medium format cameras with built in TTL sensors. Some would consider this more trouble than it is worth because a digital photographer can range-in exposures with test shots. An exception to this may be close up photography. TTL automatically compensates for aperture size, extension tubes, bellows and filters added to the lens because it reads the light transmitted through the lens. Hasselblad made a complex close-up sliding scale guide for manual exposure calculation without TTL ($10 used). This worked only with Hasselblad branded equipment.

The imaging chip on a digital camera back is a different density than film stock. Tests need to be made in order to modify exposures to use a film TTL system for digital. Set the top inner circular dial of the CT-4 to your digital back ISO and then set the main dial to TTL. Set the shutter speed to any setting (except B) with a Hasselblad C, CF or CB lens with a leaf shutter.

Leaf shutters in Hasselblad C lenses sync at all speeds. Syncing at all speeds is a useful feature to balance available light with flash lighting. Set the sync setting on the lens to X-sync. Then set the desired f-stop based on depth of field requirements. Take a test shot and evaluate the exposure. Modify the exposure using a different ISO setting on the top dial of the Metz flash and camera body until the desired effect is achieved. Don't use the f-stop to change exposure because the exposure will be the same at

Hasselblad 503 CX with a Metz 45 CT-4 handle mount flash, 60mm Ziess Distagon C lens and Phase One Lightphase digital back ($250). The Hasselblad is attached to the Metz with the SCA 390 adaptor. The strobe can be bounced off a card for indirect light or can be mounted off-camera on a tripod for a closer distance as in figure 7.

Figure 6

Hasselblad TTL close-up set-up used for the cat toy photos in figure 8. This is the same equipment as in figure 6 except a 10mm extension tube was used ($35). The Phase One Lightphase digital back is connected to an Apple laptop with a firewire 400 cable and it is controlled by and Phase One Capture One software (free download for digital back DB version).

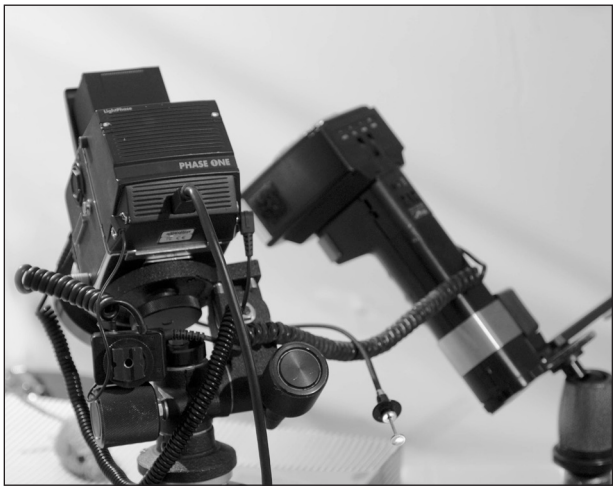

Figure7

The Hasselblad and Metz CT-4 TTL flash used in figures 6 and 7 was used for these two photos. F-5.6 was used for the photo on the left. A small pen light is at the back of the shot on the left. F-22 was used for the shot on the right with the pen light still on but not showing as much exposure at f22. The settings on the flash and camera were at ISO 800 and the digital back ISO was set to ISO 100 in Capture One DB software. The shutter speed was 1/30 with low ambient room light. In both shots only the f-stop changed all other settings on the camera and flash were the same.

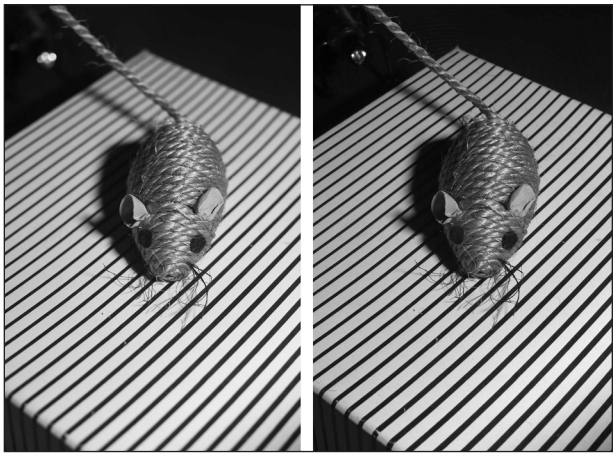

Figure 8

all f-stops with a working TTL system. Don't change the exposure with the shutter speed either because shutter speed only controls ambient light and not flash lighting. Use a lower ISO if the test exposure is too dark and use a higher ISO if the exposure is too bright.

The example in figures 7 and 8 used ISO 800 for both f5.6 and f22. When the aperture was changed from f5.6 to f22, the TTL light cell in the camera read the much dimmer light and increased the duration of the flash pulse to compensate automatically. Make note of your final ISO setting, f-stop, shutter speed and brightness level of the ambient light in the room and use this for future close-up photography.

Film based close-up equipment for digital cameras

Possibly the most simple form of close up equipment from the film era is the close up diopter. These are magnifying lenses that screw on the front of the lens filter threads. A close up filter is used to bring the camera closer to the subject when the lens is at the closest focusing distance. The kits range in power from one to four and the lenses can be stacked in descending order for greater magnifications.

The quality of the lowest priced new close-up lenses is rather poor, especially at wide-open apertures ($15–25 for a set of three). The major camera makers in the film era made higher quality filters that (in 2015) could be purchased on the used market for a low cost ($10–15 each). Nikon made close up filters with high quality optical glass that was coated to prevent flare from reflection. Hasselblad made Ziess Proxar filters that were available in coated "T*" black ring and uncoated chrome ring filter versions. The advantage of the close up filter over other low cost close up methods is that in camera ITTL or DTTL is maintained.

Another film era category of close up equipment are extension tube sets. Extension tubes are hollow tubes that extend the distance between the lens and camera. Extension tubes produce a higher quality close up image with less flare when compared with close-up filters. Nikon mount auto-focus extension tubes maintain ITTL or DTTL exposure automation ($70 for a set of three). Auto-focus tubes have both a mechanical aperture connection and electrical contacts to identify the lens and supply power for auto focus. Manual focus AIS extension tubes work with Nikon DSLR cameras but not with ITTL or DTTL ($25 for a set of three).

A more flexible option to the extension tube is the close-up bellows. There is more flexibility on the actual magnification factor with a bellows when compared to the fixed length extension tube. The bellows is a hollow adjustable spacer between the lens and camera body. Nikon has an AIS aperture coupled bellows PB-6 that works with Nikon DSLR cameras but not with ITTL or DTTL.

Another useful option for close up photography from the film era is the Vivitar 2X Macro Focusing Teleconverter ($25). This has a focusing ring on it that acts as a variable extension tube. This Vivitar extension tube teleconverter is Nikon AIS so it is not compatible with ITTL or DTTL since it has no electrical contacts. The concept of using a teleconverter with close-up photography is that the subject will be a greater distance from the camera at a given magnification. This increased distance between the camera and subject allows more room to set up lighting equipment. This is better for most close up photography than a ring light because a lighting direction and ratio can be established. Flat light from a ring light at a very close distance is not a natural looking lighting pattern (figure 9). A standard auto focus teleconverter can be used to maintain ITTL or DTTL but no variable extension tube version is available.

Film-based close up equipment that is useful for digital photography. On the left is a Nikon PK-11 8mm extension tube with Nikon close-up filter set behind it. On the right is an autofocus extension tube set with the Vivitar Variable Extension Tube Teleconverter behind it. At the back of the photo is a Nikon bellows unit with a manual focus 55mm 3.5 Micro lens and a Nikon D200 camera.

Figure 9

Conclusion

How can a photographer use low cost equipment to fulfill current digital photography needs? This is a question many photography educators and professionals ask because of the high cost of new equipment. Also, studying the equipment and standards of the past is important for many photographers to consider.

References

Lantz, C. (2015). Using 35mm film lenses for micro-four-thirds digital cameras. *Visual Communication Journal*. 2–9.

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