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*Medium Format Cameras for Digital Photography*

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# Medium Format Cameras for Digital Photography

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

## Introduction

Medium format camera systems can use a wide variety of replacement medium format digital backs. The digital backs fit on medium format cameras in place of the interchangeable film magazine they were designed for.

Obsolete medium format cameras are compatible with older low cost tethered backs that are connected to a laptop with a Firewire cable. The Firewire backs can be used in the field with a small laptop.

Many medium format cameras have the advantage of having extensive lens systems. These lenses were originally designed for film-based photography but work well with digital backs. Medium format lenses provide a unique shallow depth of field look. German lenses such as *Ziess and Schneider* provide a high contrast sparkle to imagery for *Rollei and Hasselblad* medium format cameras. Japanese optics have a high resolution specification for *Hasselblad-H, Mamiya, Fuji GX or Bronica*.

Obsolete medium format camera systems compatible with older low-cost digital backs include *Hasselblad 200/500/2000, Mamiya 645 Super/Pro/TL, Mamiya 645 AF/AFD Mamiya RZ-67, Mamiya RB-67, Bronica ETR/SQ/A/Ai, Rollei 6000, and Fuji 680 GX/II/III*. These eight medium format brands have exceptional pricing on commonly used lenses such as the 50mm, 150mm or 250mm. Used lens choice with these cameras are far wider than with new medium format cameras. The camera, lenses and digital back options will be described as a guide in selecting medium format equipment in the following sections of this article.

## Hasselblad 500 Series

The *Hasselblad 500 series* cameras include the *500C, 500CM, 503CX, 503CW, 500EL, 500ELM, 500ELX, 553ELX and 553ELD*. The 500 series cameras use leaf shutter lenses with the *C, CF, CFI and CB* designation. Many older digital backs can be adapted to work with the 500 series cameras. There is a different three-pin trigger cable needed for digital backs for the EL series because these have built in motor winders like the *Hasselblad's* used on the Moon (figure 1). The other cameras in this series use a more common mono/micro/mini plug to PC flash sync cable as a trigger cable. This later cable is easy to find because it was also used with strobe equipment.

The *Hasselblad 500 EL, ELM and ELX* camera had an AC adaptor that is important because these cameras used expensive NiCad batteries. A 9V adaptor is available but 9V batteries can be expensive because they are depleted quickly in an EL. The newer *553ELX* can be a better buy because it used longer lasting AA batteries, but no AC adaptor is available for this camera. Look for broken *553ELX's* because the spring battery contacts could get compressed if AA batteries are left in the camera and do not make connection. Bend these out for a low price. The *553ELD* is not a good value because these cameras are the only option for some of the less reliable digital backs. This keeps prices high for those that need a replacement ELD camera. The accessory winder *500 series* cameras such as the *503CW and 503 CXi* are expensive because the winder has a stereo-mini-connector that later digital back adaptor kits worked with.

There is also a *2000* and newer *200 series* of *Hasselblad* cameras that have an electronically controlled shutter in the camera that syncs with flash-only at 1/60<sup>th</sup>. The *200* and *2000 series* cameras were designed primarily for F-series lenses. The *2000* and *200 series* cameras also work with leaf shutter *C-series* lenses on the C-setting on their shutter speed dial. *C-series* lenses sync with flash at all

A Hasselblad 555 ELX with Sinarback and Sinar EL trigger cable.



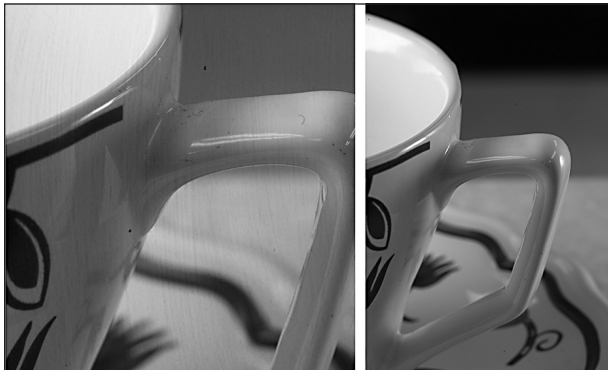
Figure 1

speeds. The C-setting bypasses the focal plane shutter in the camera and uses the leaf shutter in a C-series lens. The 200 series cameras are expensive because some of their focal plane shutters were converted to work with digital backs and flash equipment. The 2000 series cameras are a good bargain because they do work with all Hasselblad 500 digital backs on the C-setting with C-series lenses but also work with the F-series lenses without flash (\$200–350 for FC and FCW). Flash works with 2000 series cameras with F-series lenses with a PC sync cord splitter, but only on slow shutter speeds such as one second.

The Phase One Lightphase is a low cost 6 megapixel (MP) back. The Lightphase is often used with an external hot mirror filter on the lens. A hot mirror or infrared blocking filter is needed with some older backs because their pale blue filters on top of the sensor cloud up and need to be removed (figure 2). Sometimes white clouding can be removed with warm water and soap on the outside of the glass filter. If on the inside of the glass filter use lighter fluid to dissolve and remove it. This is residue that is caused by high temperatures on a rubber gasket between the blue glass and the sensor. This residue is not always removable when the glass is etched from long exposure to heat. Two rows of screws are removed on the Lightphase and the filter lifts off. There is a clear glass filter over the chip package.

All but the earliest Lightphase backs had this blue filter. The back with “BB00” starting off the serial number should be avoided unless it is \$100 or less. Don’t assume that a Lightphase without the blue filter is an undesirable one. Check the serial number since the filters on later backs were removed and not cleaned. The earliest “BB00” backs need a Phase One “Firewire Repeater” accessory.

**Before damaged IR cut filter removal on the left and after on the right.**



**Figure 2**

Get the Lightphase backs that start in “BB01, BB02 and BB03” since these don’t need a repeater. Later Lightphase backs work with the current version of Phase One Capture One software. Download the Capture One software and then install the DB or digital back version when given the option in the install software screen. Contact Phase One - they will need your back serial number for a free DB license.

Another digital back to use with the Hasselblad 500 series cameras is the Sinarback 43. The Sinarback 43 digital backs will be mentioned in each section of this paper because they are used with mount plates and adaptor cable kits that make them work with all the mentioned cameras. The Sinarback 43 is a Firewire back and is 11 MP. It works with freely downloadable Sinar CaptureShop 6 software. The Sinarback 23 needs a fiber-optic PCI card and works best on CaptureShop 4 that is no longer downloadable on Sinar.ch (Lantz, 2014).

This is a good time to buy Hasselblad equipment because some are speculating that 120 medium format film will be discontinued before 35mm (Richards & Klutch, 2015). This speculation has been ongoing for ten years with new types of 120 film appearing in the marketplace. Medium

**The Hasselblad 150mm Sonnar telephoto lens with a shallow depth of field effect at f4.**



**Figure 3**

format lens prices are lower for the common *Hasselblad* lenses and the availability of film does not affect digital back use. Common lenses include the *150mm Sonnar* (figure 3), *250mm Sonnar* (figure 4), and *50mm Distagon* (figure 5). The *120mm S-Planar C-series* lens is a good alternative normal lens because it is a macro optimized lens that needs an extension tube or bellows to work at macro focus ranges.

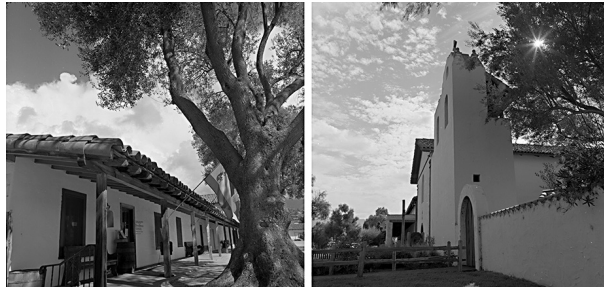
Many *Hasselblad* users could only afford one lens and the *80mm Planar* was the standard lens bundled with the camera. The leaf shutters and focus mechanisms in the *80mm Planar Hasselblad* lenses are worn out in many cases because the *500 series* cameras were so reliable. The *Hasselblad C-series* lenses have mechanical *Prontor leaf* shutters that need to be periodically serviced like a mechanical wrist watch. The *Prontor* is a reliable German shutter that was picked to be used on the moon but it is mechanical and is less accurate than a well-made electronic shutter.

The advantage of the mechanical shutter is that it is more serviceable than electronic shutters. Some within-the-lens electronic shutters were meant to have a shorter life because they were meant to be replaced and not serviced. Neither electronic nor mechanical within-the-lens shutters for medium format cameras are available new. With



**Figure 4**

**A Hasselblad 50mm f4 Distagon C-series lens was used to spread out perspective on the roof line on the left photo and the church wall in the foreground on the right photo.**



**Figure 5**

medium format lenses, shutters are not as easily swappable between lenses as with a large format cameras.

## Hasselblad H1

The *Hasselblad H1* is the earliest in the current series of *Hasselblad* cameras leading up to *H5*. The *H1* is an auto focus camera that uses *Fuji*-made *H-series* lenses. Lenses for the *H1* fit on current series *H5* cameras so used prices are high. *H-series* cameras wear out faster than *500 series* *Hasselblad* cameras. This leaves surplus digital backs on the used market, sometimes for a lower price. The most affordable back for this camera is the *Phase One H-101*, with an 11 MP tethered back. The *H1* camera does not work well with the *H-101* back. Rechargeable lithium 123 batteries have a different voltage that makes the *H-101* more reliable.

Another digital back that works with the *H-series* cameras and is sometimes available at a low price is the 22 MP *Sinarback 54M*. This back can be unreliable due to its gold contact connections, which work with interchangeable back adaptor plates (figure 6). The back will stop working with one adaptor plate and then work with a different plate for another camera. Switching to different plates such as the *H-series* plate can clear up the problem but results vary.

*Hasselblad* acquired the Danish digital back company *Imacon*. The last *Imacon* backs are the same as the earliest *Hasselblad* backs and can sell for a lower price. There is a less expensive *Imacon* model that has a screen that displays only histogram information. The newer *Imacon* backs that fit *H-series* cameras are also a good value because their IR filters cloud up. Look for condition issues that can help keep prices low for competitive bidding.



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A Sinar mount plate is used to adapt a Sinarback to a variety of medium format cameras. This plate is for a Sinarback 54M to Hasselblad-H camera. A Sinarback 42 was used to take this product photograph.



Figure 6

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### Mamiya 645 Super, Pro or Pro TL

Many consider *Mamiya* cameras as film-only with no digital back possibilities. This is not true. *Mamiya 645 Super*, *645 Pro* and *645 Pro TL* can be used with *Megavision* and *Sinarback 23/43* but these also work with *Imacon Flexframe* and *Colorcrisp* backs. These are not very robust cameras and break often, but are inexpensive. Think of them as disposable commodities and pay accordingly. Avoid *Mamiya 645*, *645J* or *645E* cameras because none have an interchangeable film magazine and can't use digital backs. Recommended is *Mamiya 645* lenses including the 80mm 1.9, 80mm f4 macro (figure 7), 120mm f4 macro, 150mm f5.6, and 300mm f5.6 (figure 8). *Mamiya* auto focus zooms covered in the next section have a slight edge in sharpness over some of the manual focus zooms but this may be caused by wear on older lenses.

The *Megavision S3* or earlier digital back is not recommended. One *S3* model only worked with *Mac OS 8.6* and an older *Macintosh G3* beige tower with a propriety PCI card of an old ROM revision. Later propriety PCI cards and *S3* backs worked with *Mac OS 9.2.2* but not *Mac OS 10*. The original disk that came with the back is also nec-

essary to get "blemish files." The capture software is not available for download.

In the past *Megavision* sold their more recent *Windows* version of capture software. It has been a while since the old *Macintosh* version of their capture software has been available for free download. Old software is useful in testing hardware in order to determine if it is worth spending money on more current software. The *Sinarback 43* Firewire back with a *645 Pro TL* adaptor plate is recommended since the *Sinar CaptureShop 6* software is available for free download. The *645 Pro TL Sinarback*

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A 80mm Mamiya Macro manual focus lens was used to photograph this baby Rolleiflex camera on a Megavision S3 digital back. The TLR Rolleiflex cameras do not work with digital backs.



Figure 7

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A Mamiya 300mm f5.6 ULD manual focus lens was used on a Mamiya ZD camera for this photo. This image shows the dynamic range possible with a medium format sensor.



Figure 8

plate is hard to find but easy to search for on on-line auction sites. It is sometimes available in other countries and is easy to ship to the US because mount plates and cables are small and not fragile.

### **Mamiya 645 AF, and AFD**

The *Mamiya 645 AF* is *Mamiya's* first auto focus medium format camera with its own series of auto focus lenses. *Mamiya* was acquired by the Danish company *Phase One*. The *Mamiya 645 AFD* was the first in a series of auto focus cameras made for digital backs. The later series cameras work with *Mamiya's* own discontinued series of digital backs and other companies more recent digital back offerings. The author uses a *Mamiya 645 AFD* camera with the *Sinarback 43* Firewire back. *Mamiya* manual focus lenses work on the auto focus *Mamiya* cameras and this increases the number of lenses available for the camera.

Most of the manual focus lenses are inexpensive and of good optical quality. Some of the more recent *N-series* manual focus lenses have the same glass as the older ultra low dispersion (ULD) marked auto focus versions. One example is the 210mm f/4 N manual focus lens that produces the same results as a 210mm F4 ULD AF auto focus version. The authors favorite budget priced auto focus lenses are the 80mm 2.8 AF, 105–210mm 4.5 ULD AF and the 55–110mm 4.5 AF. The auto focus on the longer telephotos and zoom lenses is turned on and off by pulling the focus ring in and out as well as the control on the camera. The auto focus gear in the camera is nylon and can strip, making the camera unreliable. Parts are still available for *Mamiya* AF cameras in many cases.

### **Mamiya ZD**

The *Mamiya ZD* is the first generation of medium format camera that that did not have a removable digital back and film magazine. This is a completely redesigned medium format camera body that used 22 MP medium format digital back electronics. Current medium format cameras of similar design have 50 MP sensors and are made by *Leica* and *Pentax*. This is a more popular camera design today for manufacturers because the end user needs to buy a completely new camera to upgrade to a newer imaging chip. *Phase One* still uses the older interchangeable digital back upgrade concept with their recent camera design. The old *ZD* uses standard *Mamiya* auto focus and manual focus lenses. The *ZD* uses lithium-ion video camera batteries.

### **Mamiya RZ**

The *Mamiya RZ67* is a bulky 6 x 7-cm medium format camera from the early 1980s. The sensor in a medium format back is closer to 645-cm than 6 x 7-cm. Viewfinder masks are used to provide the correct cropping for all digital backs that have a crop factor. Viewfinder masks can easily be drawn by hand but the original mask is nice to have if they come with the back. The *RZ* has an electronic shutter that syncs at all speeds. It made a good choice for the multi-shot *Sinarback 43/23* or the *Imacon Flexframe* described in an upcoming section. *Imacon* or *Sinarback's* can use multi-shot to increase resolution with multiple exposures. The *RZ* had limited tilt/shift camera movements possible with an expensive lens adaptor for the 110-250mm lens range. Recommended lenses are the 140mm f/4.5 L-A Macro, 180mm f/4.5 portrait focal length telephoto lens, 250mm f/4.5 telephoto, and 50mm f/4.5 wide-angle. A winder is necessary for a digital back if the back is controlled or tethered by *Sinar CaptureShop* or *Phase One Capture-One*. A back adaptor plate was available for *Phase One Hasselblad* backs to the *RZ*. A *Sinarback* plate was also available for the *Sinarback 23/43* and *54M*. Since the *RZ* was a popular camera many other newer digital backs had adaptors or models to fit the *Mamiya RZ*, and the later series *RZ* cameras.

### **Mamiya RB67**

In the 1970's the *RB67* was an inexpensive camera with a mechanically controlled within-the-lens leaf shutter that synced at all speeds. Current camera bellows will show holes because of age and prices thus have dropped. This is good news because black tape can be used to patch bellows. There was a rare *Sinarback* mount plate for the *RB67*. The *Leaf C-Most* digital back also had a *RB-67* mount model. *Leaf* was an American company acquired by *Phase One*. Recommended *RB67* lenses include the original 1970s *Sekor-C* lenses, such as the 90mm F3.8, 127mm 3.5, and 360mm 6.3. They are heavy but have robust build quality and are reasonably sharp even with a digital back at 6 MP.

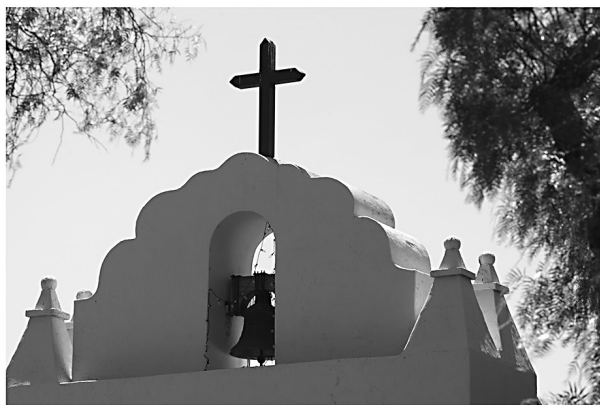
### **Bronica ETR**

The *Bronica 645 ETR* is another camera that is considered only a film-based camera. The *Sinarback 23/43* had a mount plate for the *Bronica ETR* and *Megavison* made a *S3* model for the *ETR*. There is also an adaptor to use *Hasselblad* digital backs on a *Bronica ETR* made by

*Kapture Solutions*. The later *Bronica ETR PE* lenses were made by *Tamron*. The *ETRS Zoom Zenzanon-PE* 45-90mm F4-5.6 is made by *Tamron* and is a good choice. The *Bronica ETR* wide-angles are small sharp lenses that are not overcorrected rectilinear lenses like *Ziess Distagon* for *Hasselblad*. The *ETR* camera is worth getting just for a 40mm f4 and 50mm 2.8mm for this reason (figure 10). The *ETR* close-up auto-bellows is fully coupled with the electronic shutter in the lenses and is inexpensive. *Bronica* also made some accurate meter prisms that are now low in cost. All *Bronica ETR* lenses have accurate electronic leaf shutters that sync at all speeds. The 500mm f8 lens for *ETR* is a sharp and compact lens (figure 9). The common *Bronica ETR* lenses are often sold at low prices. This is

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**A 500mm focal length was used to take both photos. On the top a 500mm f8 Bronica lens was used on a Bronica ETR camera and on the bottom a 250mm Sonnar was used on a Hasselblad with a 2x Komura teleconverter. Both cameras used the same Sinarback with different adaptor plates attached.**



**Figure 9**

especially true with the 75mm and 150mm focal length lenses.

The original *ETR* is a good choice, but the *ETRS* and *ETRSi* are often broken. The *ETRSi* had film TTL flash metering. Watch out for slipping shutter speed dials and electronic connection problems with the lenses, grips and prisms. The *ETR* has many gold contacts on the prism, lens, and bottom of the camera. These contacts can easily get out adjustment because of a loose screw, dirty connector, or broken mounting bracket. If a potential owner is willing to replace missing screws and parts from a donor camera than the *ETR* can be a good choice. The mount on *Bronica ETR* lenses must be protected from impact damage. They have small metal pressure pins that can easily be bent inwards and then the lens does not mount on the camera. Look for bargain lenses that do not mount because these pins can be adjusted if care is used not to break the pins off the lens mount. *Bronica* made the *SQ*, *SQ-A*, *SQ-B*, *SQ-AM*, and *SQ-Ai* series of 6 x 6-cm cameras for which a rare *Sinarback* adaptor was available. Avoid the *SQ-AM* because lenses can get locked on the camera if the camera does not power up. The *SQ-Ai* is necessary for tethered shooting with *Sinar CaptureShop* and the remote plug on its removable motor drive option. The *Bronica GS-1* 6 x 7-cm camera did not have a digital back adaptor solution available.

### **Rollei 6000**

The *Rollei 6000* is a camera system made by a recently bankrupt company in Germany and can be acquired on the used market for lower prices. Its biggest strength is

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**A Sinarback 43, a Bronica 50mm F2.8 wide-angle lens and a Bronica ETR camera was used for this photo.**



**Figure 10**



that high quality *Ziess* and *Schneider* lenses are available for it. The lenses had accurate electronic leaf shutters that sync at all speeds. Its biggest disadvantage is its NiCad batteries running the camera. One can rebuild battery packs with standard NiCad cells at a low price and the *6000 series Rollei* cameras can be a bargain.

*Rollei* had an ill-fated partnership with *Sinar* to produce the *Hy-6* camera and this camera used a lithium-ion battery. The *Hy-6* was not as reliable as the *6000 series* cameras and this probably caused both companies to seek bankruptcy protection. The *Sinarback 23/43* had a *Rollei 6000* adaptor plate and sync cord. This also works on the original *Rollei SLX* camera body.

*Phase One* had a rare *Lightphase 6000* model as well. More current *Phase One Rollei* model backs also fit on the *6000 series*. The oldest *Rollei SLX* lenses work on all models of the camera including the *6008 AF*. Current manual focus lenses are needed to use metering functions in the higher end *6008/AF* model.

The *Imacon Flexframe 3030* and *4040* digital back system had a *Rollei 6000* model. There is also an *Imacon* model of *Rollei* back that works only with the rare *X-Act2* bellows camera but looks like a *6000* back. The *Imacon Flexframe* has a SCSI computer interface. It uses a Firewire cable as an interconnect cable between a SCSI control box and digital back but is not a Firewire back. The *Imacon IR-cut* filters can't be cleaned but come off easily.

*Imacon Flexframe* has a multi-shot option in software. The slowest shutter speed possible with the *Imacon* is one-half second (not one second like the *Lightphase* backs). The control box has a laptop battery. Keep the battery in place to hold ROM memory in the control box and not as a portable solution. Don't take out the removable laptop battery or unplug the control box for long periods once the back software is set up on the computer. This is because the volatile ROM data gets corrupted in the control box/software. Install the software on a new computer to get the back running again.

The 250mm f5.6 *Sonnar 6000 series Rollei* lens is multi-coated and compares well with the original *Hasselblad 250mm C-series Sonnar*. The 350mm *Tele-Tessar Rollei* lens is more compact than its *Hasselblad* counterpart (figure 11). The 150mm *Sonnar* has exceptionally smooth out-of-focus areas (figure 12). There are many more 80mm *Planar* f2.8 prime lenses for sale at lower prices for *Rollei* when compared to the *Hasselblad* 80mm (figure 13). This is possibly because there are more *Rollei 6000* series cameras with dead NiCad batteries. For those who

A *Ziess 350mm Tele-Tessar telephoto* was used to take this *Spanish roof detail* on film.



Figure 11

A *Rollei SLX* camera with a *Sinarback 43* and a 150mm f4 *Sonnar* was used at f4 take this photo of a *Linhof* copy camera. The distracting background was blurred using shallow depth of field.



Figure 12

**A Rollei 6001 camera was used with a 80mm 2.8 Planar and an extension tube to take this close-up shot of iron work detail on film.**



**Figure 13**

can't afford a *Hasselblad* 80mm, a *Rollei* can be a good second camera. The price of a complete *Rollei 6000* camera and 80mm Planar is about the same as a *Hasselblad* 80mm.

### **Fuji 680 GX**

The *Fuji 680GX* has front lens board rise and tilt controls like a large format camera. The original *GX* and *GX II* models seem to be the most reliable. The *GX* is a good way to sample *Fujinon* lenses at a low price when compared to the current price of *H-series* *Hasselblad* *Fuji* made lenses.

Aftermarket *Fuji 680 GX* to *Hasselblad* digital back adaptors are common. A cable release adaptor kit is needed for *Phase One* backs from *Kapture Solutions*. *Fuji GX* adaptor plates for *Sinarback 23/43* are available. The *GX* is a good choice for a multi-shot *Sinarback* or *Imacon* (figure 14). Some photographers avoided cameras with mechanical shutters for multi-shot digital backs. This is because their slight inaccuracies can be a problem with multi-shot. Cameras used for multi-shot must have a cable-controlled film transport motor and have the capability for mirror lock up. The *Fuji GX* has all these features.

*Fujinon 680 GX* lenses have electronic shutters that sync at all speeds. Some *GX* rear lens cells screw off for easy dusting of the inner elements. The author's favorite lenses for the *GX* include the 300mm (figure 15) and the 65mm. The *Fuji 680 GX* had a *Linhof* large format lens board adaptor as an accessory (figure 16).

**Figure 14. A Sinarback with a Sinar adaptor plate was used on this Fuji 680 GX. This is the Fibre optic version of the Sinarback in this photo.**



**Figure 14**

**A 300mm F5.6 Fujinon lens was used on a Fuji 680 GX with film for this shot of the old University of California at Santa Barbara campus. Longer focus rails and bellows are necessary for the 300mm. These rails are removed for shorter focal length wide-angle lenses such as the 50–80mm with a bag bellows available.**



**Figure 15**



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The Fuji 680 GX, a Sinarback 23 and a large format lens adaptor was used for this photo. A 90mm Componon-S enlarging lens mounted on a Linhof lensboard was used to take this photo.



Figure 16

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## Conclusion

Medium format cameras are available for a fraction of their original price and their lenses are sometimes available for a small fraction of the original cost. Low cost digital backs can be hard to find. If the buyer is persistent, not too picky about equipment condition, willing to buy from other countries, and tethered shooting is acceptable then digital backs with even rare camera mount plates can be productive options.

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## Graphics

- Be sure that submitted tables and other artwork are absolutely necessary for the article.
- Write a caption for each graphic, include captions in a list at the end of your Word document.
- Electronic artwork is preferred and should be in PDF or TIFF format.
- Send all artwork files and hard copies of these files with your submission.

## Tables

- Set up tables in separate documents, one document for each table.
- Do not attempt to make it “pretty.” Use the default Word style “Normal” for all table text. Do not use any other formatting.

- Do not use hard returns inside the table (“enter” or “return”).
- Get the correct information into the correct cell and leave the formatting to the designer.
- Tables will be formatted by the designer to fit in one column (3.1667" wide) or across two columns (6.5" wide).

## Artwork

- Scan photographs at 300 ppi resolution.
- Scan line drawings at 800 ppi resolution.
- Screen captures should be as large as possible.
- Graphics should be sized to fit in either one column or across two columns.
  - ◆ One column is 3.1667" wide, two columns are 6.5" wide.
  - ◆ Graphics may be larger than these dimensions, but must not be smaller.



## Manuscript Guidelines

### ***Eligibility for Publication***

Members of the Graphic Communications Education Association, or students of GCEA members, may publish in the *Visual Communications Journal*.

### ***Audience***

Write articles for educators, students, graduates, industry representatives, and others interested in graphic arts, graphic communications, graphic design, commercial art, communications technology, visual communications, printing, photography, desktop publishing, or media arts. Present implications for the audience in the article.

### ***Types of Articles***

The *Visual Communications Journal* accepts four levels of articles for publication:

1. Edited articles are accepted or rejected by the editor. The editor makes changes to the article as necessary to improve readability and/or grammar. These articles are not submitted to a panel of jurors. The decision of the editor is final.
2. Juried articles are submitted to the editor and are distributed to jurors for acceptance/rejection. Juried articles are typically reviews of the literature, state-of-the-art technical articles, and other nonempirical papers. Jurors make comments to the author, and the author makes required changes. The decision of the jurors is final.
3. Refereed articles are submitted to the editor and are distributed to jurors for acceptance/rejection. Refereed articles are original empirical research. Jurors make comments to the author and the author makes required changes. The decision of the jurors is final.
4. Student articles are submitted by GCEA members and are accepted/rejected by the editor. These articles are not submitted to a panel of jurors. The editor's decision is final. Please be aware that poorly written student papers will be rejected or returned for editing.

### ***Submittal of Manuscripts***

All manuscripts must be received by the editor no later than December 15<sup>th</sup> to be considered for the spring *Journal* or by June 15<sup>th</sup> to be considered for the fall *Journal*. Include digital copies of all text and figures. Prepare text and artwork according to the instructions given in these guidelines. Be sure to include your name, mailing address, e-mail address, and daytime phone number with your materials. E-mail all materials to the editor (address shown below).

### ***Acceptance and Publication***

If your article is accepted for publication, you will be notified by e-mail. The *Visual Communications Journal* is published and distributed twice a year, in the spring and in the fall. Printed copies are mailed to GCEA members. A PDF version of the *Journal* is published online at [www.GCEAonline.org](http://www.GCEAonline.org).

### ***Notice***

Articles submitted to the *Journal* cannot be submitted to other publications while under review. Articles published in other copyrighted publications may not be submitted to the *Journal*, and articles published by the *Journal* may not be published in other publications without written permission of the *Journal*.

Submit All Articles and Correspondence to:  
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or check [www.GCEAonline.org](http://www.GCEAonline.org) for contact information  
for the GCEA First Vice-President.

***See following page for style guidelines***