



FLAAR Reports

Nicholas Hellmuth

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Large Format Quality

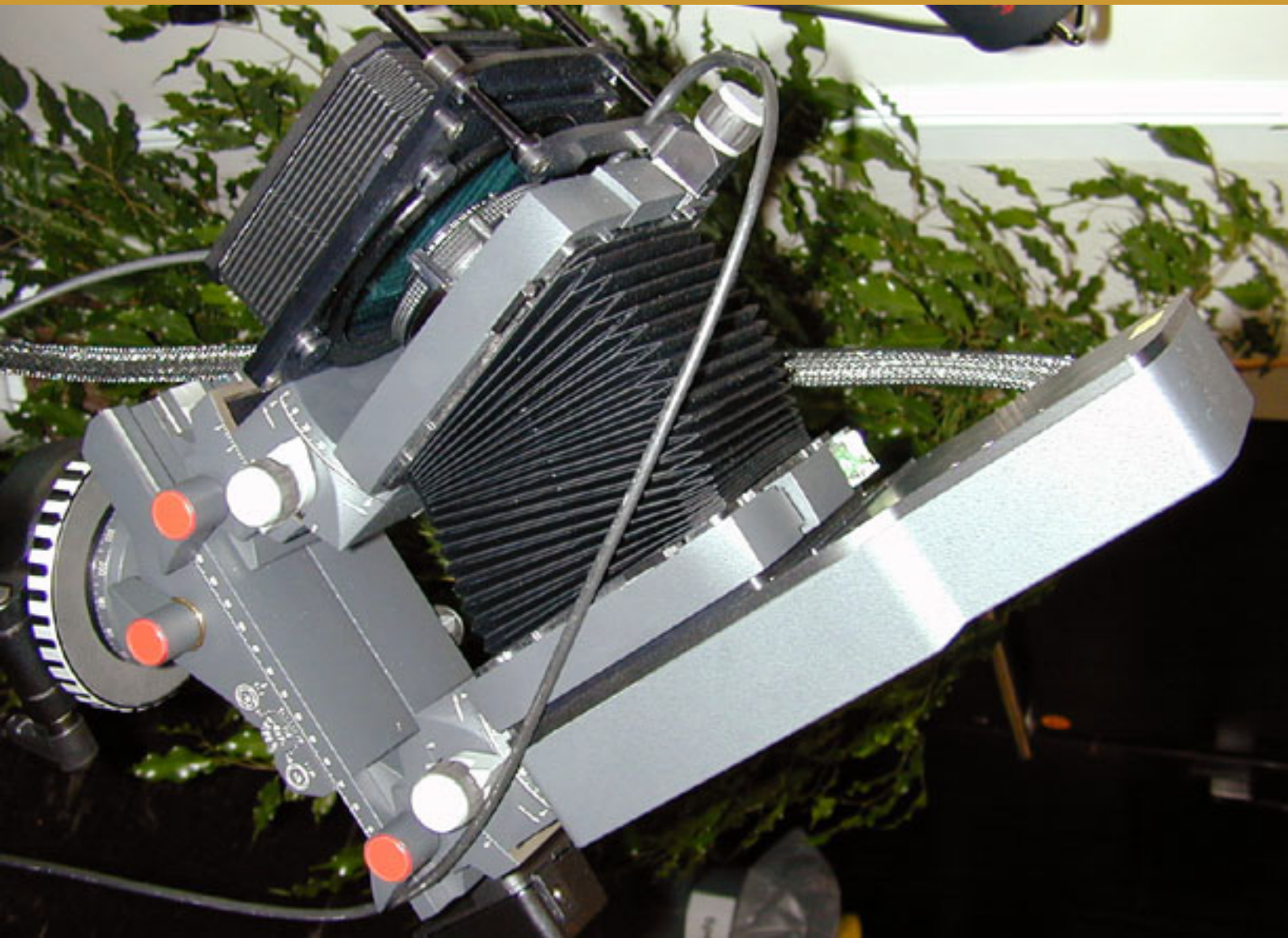
BetterLight, Anagram, Kigamo and Phase One

Part III

What Camera to Use

to Photograph Paintings, Maps, Drawings, Posters

So you can print this art as Giclee





Caption for cover page:
Anagramm large format camera

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Introduction

A large format digital scanning back will provide the best image quality for reproduction as a giclee print. If you are a commercial photo lab, a professional photographer, a giclee studio, or in any way intend to seriously produce commercial giclee prints, you need to go to a large format solution.

A 4000K BetterLight back, on a good solid Cambo Ultima camera, will cost about half of the expense of a medium format back on a medium format camera.

Large format digital cameras utilize a tri-linear scanning technology: one row of red-colored CCDs, one row of blue colored, and one row of green colored sensors scan (move across) a capture area of roughly 7.2 x 9.2 cm (substantially larger than medium format).

There is no international standard for what defines “large format digital” camera backs. As comparison, traditional medium format is 6 x 6 cm (2 1/4 x 2 1/4 inches). Smaller medium format is 4.5 x 6 cm (slightly larger than the size of a 22-megapixel CCD). It would appear that the Kodak CCD comes at a fixed height (72 mm) but the individual manufacturer can decide how far they wish to scan with this. Anagramm scans the least; Kigamo scans the widest. We list file size at 8 bit because this is the file size that counts when you print your image. The Cruse also uses a CCD but is a dedicated turnkey system (has benefits and downsides). The scan backs are fully portable, which means they must be aligned parallel to the painting for each individual setup.



Cambo Ultima camera

Brand	Scan area	CCD	File size
Anagramm	72 x 88 mm (7.2 x 8.8 cm)	6000 x 7250 up to 8000 x 9700	129 MB and up
BetterLight	72 x 96 mm (7.2 x 9.6 cm)	3750 x 5000 up to 10200 x 13800	53 MB at 8 bits, 852 MB at 8 bits.
Kigamo	72 x 102.9 (7.2 x 10.29 cm)	9000 x 12732 up to 12000 x 16980, wow	327 to 583 MB
Phase One	84 x10 mm (8.4 x 10 cm) 3.3 x 4 inches	10500 x 12600	380 MB

The large format camera (BetterLight Super 6K), captures the equivalent to a 48 megapixel image, so more than twice that of any 645 medium format camera.

Leica sold a 35mm-sized tri-linear scanning camera. It failed in the market because it was tethered to a computer, it was very expensive, and its small format was not competitive to the large format models which were more innovative.

There are a few odd-ball scanning cameras other than large format. The Kaiser Scando ICOSS is one. We do not recommend off-brand or unusual cameras. These companies don’t always build them themselves or don’t have their own software team in-house or necessarily even their own hardware people to upgrade them in the future. Stick with a company that is 100% dedicated to tri-linear scanning backs (Anagramm, BetterLight, and Kigamo). In this reference we do not include Phase One since they are dedicated to 1-shot medium format backs. Their large format back was consistently bested by BetterLight in independent tests at PMA trade shows year after year. Eventually Phase One declined even to enter.

Most tri-linear cameras come in several models: 6000 pixels, 8000 pixels, and 10,000 pixels are popular. BetterLight offers an entry-level 4000 model.



The depth of field and sharpness of focus can be variably described, depending on what standard you compare it with. For table top photography with a 6000 model you could achieve the depth of field of about 3 inches (acceptable focus if you want to be serious about focus); 4 inches sort of okay within a flexible definition of focus, and in some situations up to 5 inches. The focus depends on many factors related to the resolution, the lens, and the settings. But it is our experience that stopping down the lens does not produce the same results with digital capture as we are used to with 4x5 film. The problem may also be with the lenses: our 58mm Schneider lens was defective from the factory. Keep in mind these lenses were never made for digital capture to begin with.

The depth of field of the 10,000 pixel version is more limited. The higher the resolution the less depth of field. But if all you photograph is maps or drawings, the 10,000 pixel model may be precisely the model that is best for you. Since oil paintings have a depth of field (the brush strokes) we would recommend the 8000 or 6000 pixel models. Since you may also wish to photograph materials, such as weavings or other objects with texture (which implies depth), you may prefer the model 6000, which is what we use. The model 4000 BetterLight (4K) can be upgraded to the 6000 pixel system.

Anagramm

This German company tends to show their products in the booth with Linhof. Indeed the company, Anagramm Gesellschaft für elektronische Systeme mbH, has their offices in the Linhof factory grounds outside Munich.

What I do not know is how they attempt to align the camera without a Zig-align system. We have done tests at the Malta Centre for Restoration, University of Malta: trying to align with levels and eyeball. This works only superficially. As soon as you enlarge the image, and look at all four corners, at least one, and generally two, of the corners are a few millimeters out of alignment (this is a polite way of saying they are out of focus).

Anagramm is a large format back, here inserted into a medium format camera (the Linhof 679). This size camera is made to hold medium format backs so will cut off a few centimeters of the image area of a large format back, but a Linhof 679 camera is very handy and is a good selection for a studio-ready professional quality camera.



BetterLight

The reason you can trust tri-linear scanning backs from this company is because tri-linear large format digital backs is 100% of what they do. Besides, the company owner/inventor is Michael Collette. He is an evangelist for high quality digital photography.

If you would like to see the results of a scan of your paintings, maps, drawings, or other art, get a sample from Gary Kerr, www.FineArtGiclee.com.

FLAAR has used BetterLight scan backs since 1997 (the days of the Dicomed version). So we have oodles of experience, both with the product and with the owner and associates/colleagues. Their website, filled with practical information, is www.betterlight.com.



Kigamo

The Kigamo appears to have a larger scan area, 72 x 102 mm (7 x 10 cm). Their chips seem hefty also: their model 6000+ offers 9,000 x 12,732 pixels: that is the approximate equivalent to a 108 megapixel camera.

Although Kigamo is a German company, with a German website, www.kigamo.de, the owner is American and the site is entirely in English.



Here is a professional giclee photography studio with a BetterLight and a Cambo Ultima 4x5 camera. You can see more of this studio on Gary Kerr's website, www.FineArtGiclee.com

We are showing the BetterLight from their booth at various trade shows. The camera is at an angle because a trade show booth does not have space to show a giclee set-up, so they are showing a commercial photo studio set-up (table-top photography). If you were photographing a painting you would tend to have the camera pointing straight ahead (with the painting on an easel or on the wall) or have the camera pointing straight down (on a copy stand, with the painting flat on the copy table).



Phase One

Phase One used to make a medium format and also a large format scanning back. The large format version used a Sony sensor. Sony does not make tri-linear sensors any more for the last few years. We do not know if Phase One has upgraded to the Kodak chip or has stopped production. Either way, the heart and soul of Phase One is in medium format backs.



We can't show too much of Kigamo products since we do not have one ourselves and do not often see them at trade shows.

PowerPhase and PhotoPhase are listed as “discontinued.” This is precisely as we predicted last year. Phase One makes great products; the people are knowledgeable (we have visited Phase One headquarters in Copenhagen many years ago). But their specialty was medium format 1-shot backs, not large format. BetterLight got higher ratings in independent tests several years in a row (until Phase One stopped entering against BetterLight).

The discontinued medium format PowerPhase offered 7000 x 7000 in tri-linear mode. The large format version was 6,000 x 8400 pixels (144 MB basic file).

The discontinued PhotoPhase was a modest 5000 x 72000 pixel back.

However as of January 2005, Phase One was still offering their (PowerPhase) FX+ scan back. They claim it has “more information than an 8x10” but we challenge them to produce a better photo than we can with a traditional 8x10 camera. 8x10 film gives vastly superior sharpness of focus and depth of field. We have used an 8x10 Linhof, both in the studio and out on location in remote areas of Mexico. I doubt any digital camera can equal the quality of an 8x10 chrome.

Scan area is 8.4 x 10 cm, which is quite large. Result is a 24 bit RGB of 380 MB from a 10,5000 x 12,600 pixel chip. Color depth is 14 bit, typical for all scan backs. The specs do not indicate whether this is a left-over Sony chip or a new Kodak chip. I would hope it is a new Kodak CCD, since the Sony is no longer available as a replacement.

Phase One has a solid reputation, but we feel you are more likely to get innovative upgrades from a company that is 100% dedicated to tri-linear scan backs: Anagramm, BetterLight and Kigamo.

We should add that the Cruse is also a tri-linear large-format scanning back. Here is an example of a company that also is completely dedicated to scan backs (no 1-shot Bayer Pattern here either). We cover the Cruse in separate reports.



Cameras to hold your Scanning Back

If you go to Photokina, PMA, or PhotoPlus trade shows you will see dozens of brands of large format cameras. Any large format camera can hold any tri-linear scanning back; the backs are designed to slip into the back of the camera the same way as would a film container for 4x5 Fujichrome or Ektrachrome or a Polaroid back.

The following classes of large format camera exist. There are no formal designations, and I have not really seen anyone else try to classify the mass of cameras that exist, so this classification will surely be modified as time goes on, but we don't shirk from tough tasks, so here is our first go at this (first go, after many years of using enough different cameras to understand the differences).



35mm camera body on a large format camera body using a large format lens.

You can use a large format (4x5 inch) camera to hold a 35mm camera body or to hold a medium format back, just as well as to hold a wide format back. The large format back (Anagramm, BetterLight, Kigamo, Phase One) simply slide into the same slot as you would traditionally have inserted your film. No adaptor is required. To use a medium format back you have to buy a sliding adaptor. These cost about \$2,500. To use a 35mm camera you have to buy a different adaptor, probably about \$2,000, more or less. The reason for using a 4x5 camera is to get access to Schneider and Rodenstock lenses. Another advantage of a large format camera is that they are easier to align with a Zig-Align accessory system.

1. wooden cameras with brass fixtures usually lack zero detents. Overall these beautiful traditional cameras are the worst kind for digital photography because they are not accurate enough in alignment. They were plenty okay for 4x5 film, and are great for photographing landscapes out on location because they fold up for ease of transport, but a digital sensor requires more precision and does not accept any part of the camera being in inaccurate alignment with other parts. Most cameras, even if not wooden, if they have sliding mechanisms for tilts and swings and raise and fall, should be avoided for table-top or reprographic photography. It is the sliding mechanisms which are inaccurate, because each side of the camera is too independent of the other side (so the film plane is lopsided). All it takes is being a few millimeters off and the sensor is out of focus at that point.
2. cameras (of any material) with an L-shaped structure. In an L-shaped camera (such as all Linhof studio cameras, such as the Technikardan) one side will slump with the weight of the digital scanning back. Again, the camera is lopsided. Plaubel and other cameras are, regrettably, L-shaped. We do not recommend any of these. Too bad, because otherwise the Linhof Technikardan is a great field camera. We have used one successfully for years. The Linhof 679 is more sturdy for holding a medium format back because the Linhof 679 is not-L shaped.

Cameras of Class 1 and Class 2 are okay for digital sensors for landscapes. It is only for technical photography, most scientific photography, and photography of paintings, maps, and drawings for giclee where they are not recommended. But if this is all you have, and you have already paid for them, yes, you can use them with digital backs to get started, but you have to be all the more careful to guard against lopsidedness and alignment.



- professional cameras such as Cambo Ultima, Sinar X, Sinar P, and Arca-Swiss. We have used the Cambo Ultima (have two of them), and have used a Sinar X and Sinar P. We do not have experience with the Arca-Swiss, but it has an impressive reputation. For anything requiring tilts and swings (such as architectural photography and product photography), the Arca-Swiss is unbeatable. But in the meantime, we are content with our two Cambo Ultima cameras. We find them as sturdy and actually longer lasting than a Sinar (the one Sinar we had fell apart; the geared mechanism simply camera simply came apart after wearing out).



Plaubel 4 x 5 L-shaped camera

You cannot attach a medium format back to a large format camera without a sliding attachment. This is because you can't see to frame and focus when the medium format back is present. So there are sliding accessories to allow you to compose and focus, and then, without removing anything, you can easily slide the back into place. Downside is the cost: over \$2000. But this is the only way to attach a unit sized for a 645 camera onto a large format camera.

Several large format cameras, such as Cambo, now allow you to attach a 35mm Canon or Kodak SLR/c, SLR/n. This allows you to use the Zig-align system on the large format camera too, so your 35mm sensor is perfectly aligned.

Summary on Wide Format Backs and Cameras to Hold Them

We are content with our BetterLight and Cambo Ultima. Most users of Sinar and Arca-Swiss are also content. Cambo cameras are available from Calumet Photographic and I believe also from Parrot Digigraphic, imaging@parrotcolor.com. You can obtain information on the BetterLight directly from their web site, www.BetterLight.com.

The Photo Equipment Segment of the FLAAR Series on Giclee

- Part I covers basic entry level cameras to record paintings for subsequent giclee printing.
- Part II covers medium format cameras.
- The present Part III covers large format cameras.
- Part IV covers copy stands (for all sizes of camera)
- Part V covers the Zig-Align system for giclee photography with large format cameras.
- Part VI covers wide format scanners (which we do not recommend, but we added this report since full-page ads in trade magazines are showing this kind of scanner being used to produce giclee. We feel that people should be warned of the downsides).
- Part VII covers the dedicated (turnkey) Cruse reprographic camera, the professional system for a giclee atelier.



Arca Swiss 4 x 5 large format camera



Since our space is limited at Francisco Marroquin University it is not possible to keep the giclee studio out the entire time. We have to pack it up when we are finished, since we use the same space for other photography or printing at other times. So we have not created a full-scale dedicated studio as we have at BGSU.

At BGSU the walls are neutral gray, and there are no brightly colored items on the wall that might reflect their color. At BGSU the giclee studio is shielded completely from outside light. Our windows at UFM are shielded from direct sunlight by the hill (you can see the tropical greenery outside the window to the left). And since we do a gray balance, whatever light that does come from outside is neutralized.

The Cambo camera with BetterLight insert is on top (front) of the Kaiser rePRO stand. Ideally you should have the base level, and then use a carpenter's line level to level the camera and digital insert.

We prefer the repro version of the Cambo camera because it lacks tilts and swings; not only do you not normally need tilts and swings on a copy stand, but also if you have tilts and swings on your camera, that is another way to get the plane of the CCD sensor out of alignment with the plane of the painting

<p>What Camera to Use</p>	<p>Medium Format Quality</p>	<p>Repro Stands and Copy Stands</p>	<p>How to Photograph a Painting using the Zig-Align System</p>	<p>Wide Format Scanners</p>
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Here are a few of the new titles in the giclee series by Nicholas Hellmuth on how to photograph a painting in order to turn it into a giclee print.

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Please realize that all reports are in Adobe Acrobat PDF format. The reader software is free from www.adobe.com/products/acrobat/readstep2.html PDF files are intended to be read on your computer monitor. Naturally you can print them if you wish, but if the photographic images within the reports were high enough dpi for a 1200 dpi laser printer it would not be possible to download them. So the images are intended to be at monitor resolution, naturally in full color. FLAAR itself makes the files available only in PDF format because that is the international standard. We have no mechanism to print them out and mail them. Obviously if you have downloading problems we will try to help, but please realize that we assume you have a 56K modem (or better) and capabilities to handle a basic PDF file.

Appendix A

Report on One Way to Take Pictures of Oil Paintings

Eduardo Sacayón, FLAAR at Universidad Francisco Marroquin
Edited and with Introduction and Commentary by Nicholas Hellmuth

Introduction

The following is a description of the traditional manner of photographing a work of art which is too large for a scanner or even a reprographic copy stand. This setup was at the university in Guatemala, before we had the Zig-Align system.

Equipment

- Backdrop material
- Light stands and pole to hold backdrop material
- 1 tripod to hold the painting
- 2 light stands for lights
- 1 Manfrotto tripod head
- 4x5 camera Cambo Ultima II
- 4x5 camera viewer
- BetterLight Super 6K tri-linear scanning back camera
- Camera lens (180mm schneider)
- Digital infrared filter (indoors)
- 2 Lights (Lowel Total Lights)
- Macintosh Power Book G3 with SCSI connection
- Adobe Photoshop version 6 or later
- View Finder 5.2.2
- Bubble levels
- Gaffer tape (special photography tape)
- MacBeth Color Chart
- Better Light Focusing card

Setup

Prepare a backdrop¹ with absolutely no flaws in it because any unevenness and crease will come out on the photo, and will be difficult to retouch in Adobe Photoshop.

The Kaiser Repro Stand couldn't be used because of the size of the painting, since it was too big, one solution would be using the base bolted to a wall so we could get a higher focal length, or trying a different aperture lens or a different camera with the stand.

Since we didn't have an easel the painting was hung on a light stand, in front of the backdrop, in a vertical position, it is important to have the art in a flat position so the illumination doesn't bounce off the surface producing a flare in the photograph, hence we recommend using the bubble levels.

We tried using Videssence fluorescent lights with Domke balloon white cloths to diffuse the light and eliminate brightness but this also darkens the image so either you change the f-stops or change the iso settings of the camera which gives an image with a lot of noise.

¹ It is unlikely that you will see any backdrop in the final photo. The function of a backdrop is to keep off any unwanted reflections from the wall, furniture or anything else. A neutral gray backdrop is best.

The Lowel DP lights were also tried with the white cloths, but again the image was getting two areas of more brightness causing the painting to look bad as in the picture

So the best results were obtained with the Lowel Tota –lites without any cloths (direct light) set at both sides about 60 – 75 degrees from the painting², due to the lack of space we had to set them really close to the painting at the same height.

The camera was mounted on a Gitzo tripod head, and was positioned about 1.5 m from the painting. All gear was levelled.

We used a 180 mm Schneider lens with an aperture of F/22 with an infrared filter.

The scan back is inserted in the camera and a prescan is made using a small resolution of 12%.

A MacBeth Color Checker was set below the painting for color balance, using the View Finder software, the settings for the tone curve were selected for the black to a value of 25, the middle gray to 120, and the white to 240 using the method described by the manual.

Conclusions

The surface of an oil painting, even the texture of an artist's canvas, may tend to generate too many highlights (from the lighting) If you do not employ a polarizing filter. In most cases you would also need to employ polarizing sheets over the lighting itself.

Recommendations

An easel should be used for this type of photography, with a proper aligning system. At the time we photographed this oil painting we didn't have any aligning system so we used only bubble levels, so as you can appreciate not all corners are focused, as this image shows the corners are slightly out of focus.

We recommend using The Zig-Align system since it is fairly simple to set, and is based on mirrors, aligning camera and art to be photograph, improving the results much more.

² Sheldon Collins.1992. **How to Photographs Works of Art**, pp 140 Fig.11.2