Mercury Stereo System

User Guide

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Introduction to Medium Format Stereo Photography

Stereo (3D) imagery was invented, in drawn form, before photography, and immediately upon the invention of photography, photographers began making stereo images. For decades in the UK, stereo photography was more popular than the mono, or flat, form. There was a large market for it: photographers produced stereographs (prints of stereo images) in standardized forms, as the Victorians would purchase new sets constantly as entertainment. This was an early form of of immersive 3D media. The popularity of stereo photography continued into the 1930s, having spread to the United States. By this time, most major camera manufacturers in Europe were producing various stereo cameras, first for shooting on glass plates, and later, after Kodak developed roll film, on that format.

Medium format is the ideal stereoscopic format, because two 6x6 views (single images) fit together, almost by magic, at the same distance as the human eyes do from one another. This means that they fill a film strip (negative or positive) without any wasted distance between them, maximize the resolution available for human viewing, and produce a "full field" image that, when reproduced at a 1:1 ratio (without shrinking or enlarging), perfectly fill the human visual field with a minimum of optical distortion. This means that, besides all of the regular benefits of medium format, medium format stereo photos shot on slide film produces an unparalleled viewing experience. Think of how entrancing Viewmaster slides (shot on 16mm film) are. If you've ever seen them mounted in a viewer, think how amazing consumer slides and viewers (shot on half-frame 135 film) are. And now imagine eight times the resolution, and a backlit, cinematic image that does away with the viewing window of these other formats and immerses you in the scene, like an imax film image projected right onto your retina. Once you—and your friends—have seen this, you will never want to shoot flat photos again. And of course, even for viewing as stereographs or as digital images on screens or high-resolution VR displays, medium format images are a world ahead of the other options.

Why is it, then, that so few camera companies have produced serious medium format stereo cameras?

This completely baffled me, as a media historian and as a camera designer. This format is perhaps photographic nirvana, and yet no camera manufacturer has really taken adavantage of it. The german companies of the 1920s and '30s (Voightlander, Rollai, Zeiss Ikon) produced medium format glass slide cameras, but those are terribly inconvenient, now as then. Only Rollei went on to produce a version that used 120 film, and this camera, the Rolleidoscope, is insanely overvalued by shooters and collectors today as a result. In any case, WWII devastated the German camera companies, and when they recovered after the war, they focused on smaller, simpler, cheaper cameras with great lenses, and never restarted production on stereo medium format cameras. As a result, the last professional medium format stereo cameras were produced pre-WWII, with built-in lenses that lack anti-reflective coating (one of the most important innovations in photographic lens design ever) and were made using a

relatively primitive version of the Tessar design. These were impressive cameras, just lacking in modern film formats and lenses. After WWII the craze was small cameras and small film formats. Lots and lots of stereo cameras were sold, by dozens of manufacturers (the biggest sellers were the Realist Stereo and the Kodak Stereo). And yet no one (to my knowledge) produced a medium format stereo camera during this period!

The Soviets, flying high after beating the Americans to space with the first satellite, Sputnik, decided they would be the first to introduce a modern medium format stereo camera as well. The parallel was clear enough for them to name it the Sputnik. Produced in large quantities in the Soviet Union starting in 1960, it remains in use by many medium format stereographers today due to a lack of other options. This is despite some pretty severe limitations: it was produced cheaply, out of poor materials, easily loses synchronization between its shutters, and most importantly, utilizes lenses of poor quality. Nonetheless, kudos to the Soviets for producing something, like the other Sputnik, that no one else could seem to manage.

More recently, in 2006 a fly-by-night Chinese company called "3D World" popped up and ambitiously attempted to create a medium format stereoscopic ecosystem, starting with several slide viewers, and then eventually (in 2008) a camera, the TL-120-1. This camera was aimed at a prosumer market, produced cheaply and in a style very similar to the Sputnik. It is not a high end camera and does not make use of high-end optics, but it was at least a modern attempt at a medium format stereo camera, including reflex viewfinder and in-camera reflected light meter. Unfortunately, as fast as they had appeared, 3D World dissolved, leaving behind about a year's worth of produced cameras. A few years later, Holga made a stereo pinhole camera and slide viewer that were even more dreadful than their mono cameras, and it quickly disappeared. The only other cameras have been one-offs by brilliant machinists who hack together and synchronize two mono cameras, custom large format camera conversions, and novelty pinhole cameras.

As a medium format and large format photographer, I saw a way forward. As the Mercury Camera system developed over the last eight years, adding hundreds of different modules to become the most versatile camera in the history of photography, I realized that it could be extended to fill this hole. In fact, customers have asked me, over the years, for a stereo camera. But let me tell you, it is a real engineering challenge! Not to make one camera, but to design a system flexible enough to be considered professional. We worked for the past seven years, off and on, on what would finally become the Mercury Stereo 12. Certain milestones in the Mercury system, such as our Universal Sync Box and Remote Shutter Actuation system, which enables precise electronic actuation of manual shutters, removed roadblocks to our stereo camera. Finally, in 2022, the biggest obstacles had been crossed and a final design took shape. Most of that year was devoted to prototyping and testing the design. I put this camera through more testing than any other Mercury model, partly because there was so much we had to get right, and partly because I've never had more fun with a camera.

The key design goals of the Mercury Stereo 12 were these:

- The camera had to be in a compact, lightweight, 4x5 large format form factor.
- It had to have exchangeable backs, to enable working with ground glass and multiple film formats simultaneously.
- It had to accept industry standard backs that already existed as well as new backs that folks invent. The clear choice here was the Graflok 45 standard used by most modern 4x5 cameras. In particular, the excellent Horseman 6x12 back would, I realized, make the ultimate 120 back.

But the camera also had to be compatible with cheaper 6x12 backs, homemade backs, and 4x5 sheet film.

- It had to have interchangeable lenses. This was the most difficult aspect of the design. No medium format stereo camera save for hacked "twin" cameras have ever had interchangeable backs. But this is a must for professional photography.
- The camera had to be able to stop motion precisely, with perfectly synchronized triggers.
- It had to be compatible with the greatest possible numbers of shutters and lenses available from the history of photography. This was a guiding principal of the overall Mercury system, and it carried over into our Stereo system. We don't want to reinvent the wheel when it comes to lenses. The greatest lens makers out there have produced the greatest possible lenses. We needed to make our camera compatible with as many of them as possible.

The result was the Mercury Stereo 12, a full system that can make use of ground glass (with a full range of accessories), many different film formats (4x5 sheet film, 120 film, 70mm film, and even, experimentally, 135 film in a panoramic format), instantly interchangeable backs (switch from slow film to fast, BW to slide, etc.), and an interchangeable lens system that allows you to use 23 different recommended, legendary lenses, with compatibility with many more to be discovered.

Finally, there is a professional stereo camera for advanced photographers. You don't need to spend thousands of dollars (though you easily can if you want: this camera is compatible with some of the most advanced, expensive lenses ever made). You don't need to scramble for some rare camera from the past with many limitations. If you are a stereographer who no longer wants to be limited by your tools, this camera if for you. If you are a medium format or large format photographer who has never entered the third dimension because no comparable tools were available, this camera is for you. Or if you are a camera tinkerer who would like to build on and innovate with an open platform in the world of stereography, this camera is for you.

I can honestly say that no piece of equipment has ever reinvigorated my love of photography more than this camera. I only hope that it can do half as much for you.

PART I: CAMERA BASICS

Getting to Know Your Camera

The Mercury Stereo 12 is a modular platform, and as such it's difficult to define what a typical, singular camera looks like. But in this section we'll examine an example configuration, noting the most significant features of the camera. Before your camera will look like this and be ready to shoot, you will need to obtain two shutters and lenses, and set up your lensboard. This one-time process is covered in a separate document, Stereo 12 Lens and Shutter Setup.
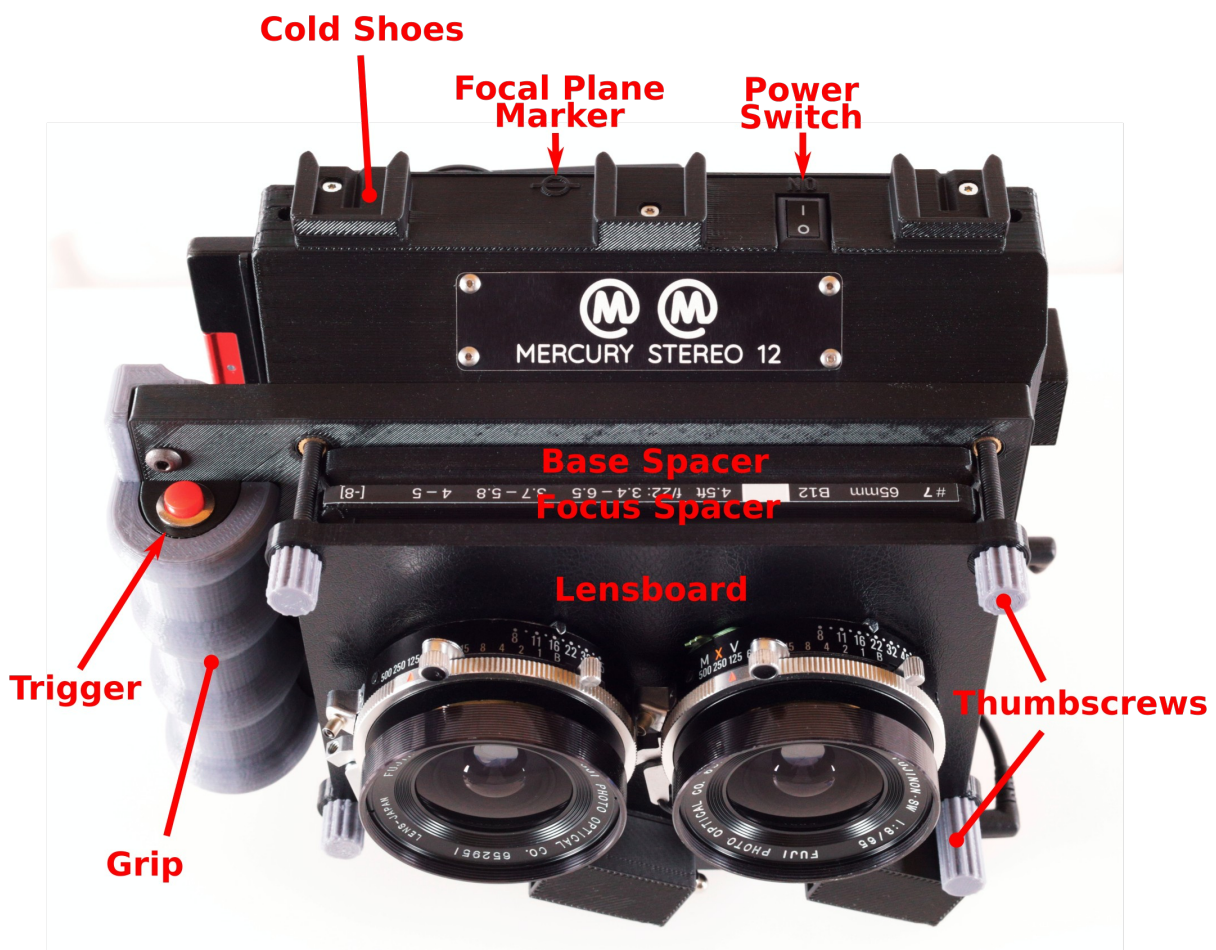
Lensboard (and shutters and lens elements): This configuration includes our Mamiya TLR Lensboard, with two Mamiya TLR shutters and a set of Mamiya C 65mm lenses. Both the shutters and lenses were originally released as part of their Twin Lens Reflex system (1959-1995). These are great lenses, small and compact, designed for the 6x6 format. They come in pairs of matched lenses (though

not with a pair of shutters). The main thing the customer has to do once they receive their Mercury Stereo 12 is obtain and mount two shutters. The lenses then just screw into the shutters. Any set of lens elements (the glasses pieces that screw in) can be screwed into an assembled TLR Lens Board; they can be interchanged at will.

Base Spacer: Behind the lensboard are two spacers. The "Base spacer" has to be matched to the lens. Some lenses, such as the Mamiya C 65mm and Mamiya C 80mm, use the same base, but most lenses have different bases.

Focus Spacer: The second spacer, nearest the lensboard, is the focus spacer. Each spacer produces a zone of focus: the distance between which everything is sharp. Stereo photography is not about focusing on a subject, but rather making sure that your set of most important subjects within the range of depth that is your actual subject, fall within a particular focus zone. As will be covered under "How to Shoot in Stereo" later in this guide, stereo depth perception works best at certain depth ranges, and so in practice, 90% of effective stereo photos fall within one or two focus zones. This means that you usually do not need to change your focus spacer very often, and also don't need very many. In any case, however, a large range are available to purchase or 3D print yourself.

Focus Spacer Information (customizable/optional): Our focus spacers are designed so that a row of a spreadsheet, when printed out and adhered to it, will fit on a flat ridge. This information is the most important thing to a stereographer, and it is customizable to your preferences. Just download our pre-filled spreadsheet with our suggested info for each spacer (particular to each lens), edit it to include or eliminate any info you don't want, then print it out on adhesive paper or vinyl for use with your camera. You can change this info and reprint at any time. Each spacer is reversible, so you can include info for one lens on the top and a different lens on the bottom.

Thumbscrews: In order to change either the base spacer (with a lens change) or the focus spacer (to change your focus zone), simply unscrew the four screws and lift up on the lensboard, leaving the screws in place. Just lift out the spacer(s) you want to change, pop a new one on, and drop the lensboard back in place. The screws should screw right back in. The entire process takes less than 20 seconds. With practice, you can even do this with the camera facing forward on a tripod. Notice that our thumbscrews are color coded to each lens-spacer combination. By default, we include the colors that are compatible with a particular combo on the spreadsheet info line for you to print out. Most spacers for a given lens will take the same screws, but the color on the label will let you know when you need to switch, usually at the extremes of the range. When a "W" is listed, it means that you should use one of our standard washers with that screw. When both a plain box and "W" are shown, it means that either will work.

Power Switch: Turn this on to energize the camera so it's ready to shoot. Turn it off when you're not planning to use the camera for a period of time. If you leave the camera switched on for long periods, it will slowly drain your batteries (over many days or weeks). But it's fine to keep it on for hours at a time while you're actually using the camera. A set of batteries should last for months of shooting.

Cold Shoes: These standard cold shoes (three on top and one on the left side) are for accessories of your choosing, such as accessory range finders, viewfinders, a bubble level, a wireless trigger, an on-camera flash, etc. When you are shooting handheld (instead of with a tripod and ground glass back), a viewfinder is the one essential accessory. We make a basic one for 80mm and longer lenses, as well as two versions of an optical finder for 65mm lenses. Our limited edition deluxe version has bright lines

for 65mm and a larger view for 55mm. For wider lenses, see our website for 3rd party recommendations.

Focal Plane Marker: The line in this symbol marks the position of the surface of the film. When measuring to create focus targets (for optional lens calibration) or when measuring distance to a subject with a laser finder or other method, this is the point you should measure from.

Trigger: This red button triggers the camera. It is designed to be pressed with your right index finger while holding the grip.

Grip: The grip protects some electrical connections, and thus shouldn't be removed. However, it is replaceable should the need arise.
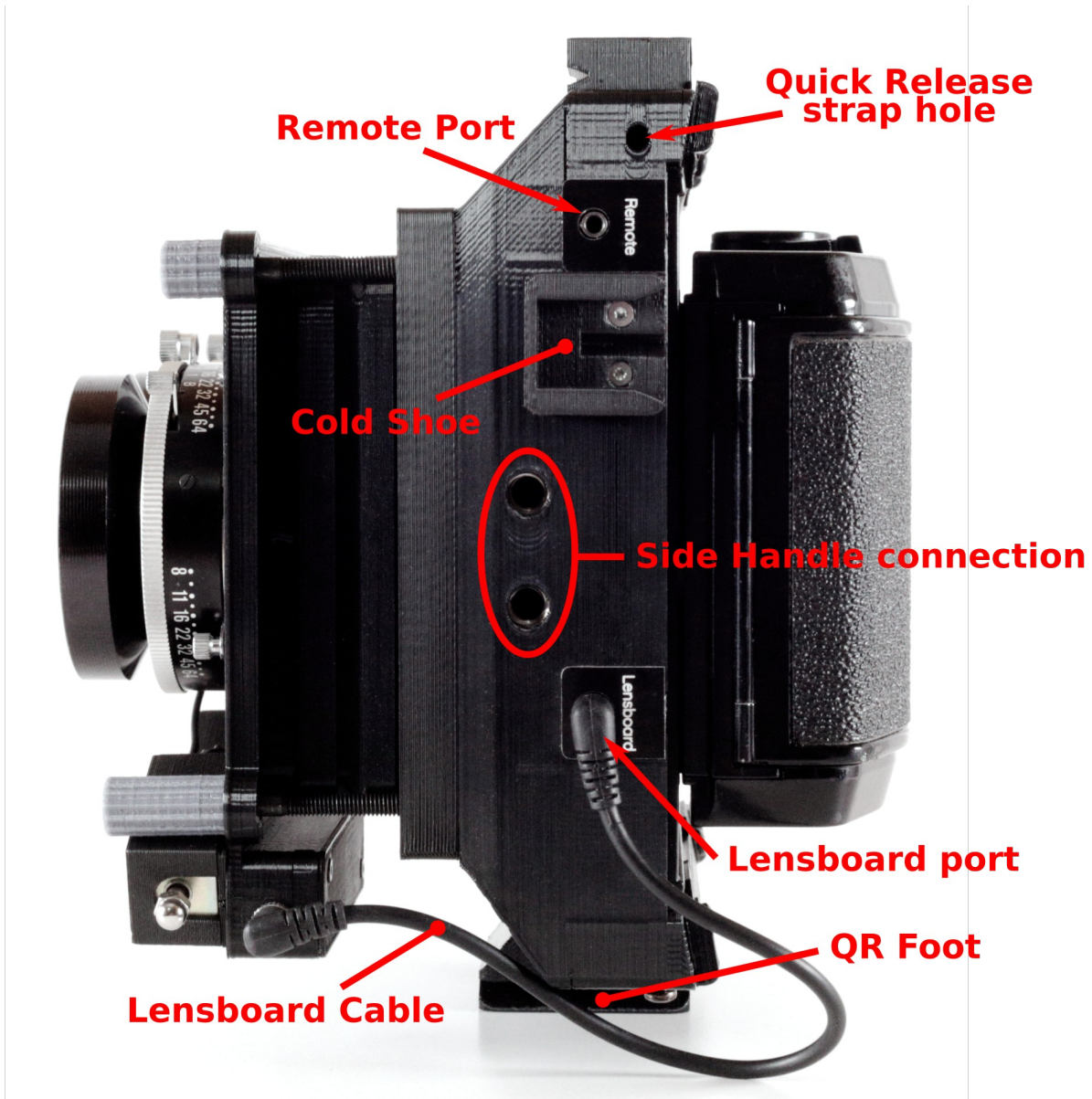
Quick Release Strap hole: Each side of the camera possesses one of these holes, which is

internally curved and designed to accept most quick release straps.

Remote port: This 2.5mm jack allows you to connect a remote trigger. A simple one costs less than $10 (look for Canon Rebel compatibility). We also make a Deluxe Remote with a short cable and a loose-fitting cold shoe foot that can be conveniently stored on top of the camera until you are ready to trigger a shot. This port is also compatible with wireless flash/camera triggers from PocketWizard and others, if you wish to trigger wirelessly.

Lensboard port: This 3.5mm jack is the connection point between the camera and any electronic lensboard.

Lensboard Cable: This 3.5mm stereo Male-Male cable makes the electrical connection between the Stereo 12 body and electronic lensboards. Only disconnect this cable if you are changing lensboards.

Side Handle connection: These threads adhere to the SmallRig side handle specification for cinema cage side handles. There are several options you can choose from to add a left side handle to your camera. From an ergonomic standpoint this is highly recommended for extensive handheld shooting. The handle can be added and removed in seconds, so it is easy to keep the camera more compact for tripod use or transportation/storage. Compatible side handles are listed under Accessories.

QR Foot: The foot of the camera is designed with a built-in Arca Swiss compatible QR plate. It can thus be slotted into any tripod or mount with an Arca Swiss QR base. Such bases are available inexpensively online, and we recommend this system for any tripod. However, if you wish to connect a different type of tripod plate directly to the camera, a standard ¼-20 mounting thread is available at the bottom of the foot. The foot is also useful as a platform enabling the camera to stand upward when sitting on a flat surface such as a table. It is also designed with enough clearance to be easily used with our Hyperstereo Mount (see section later in this Guide).
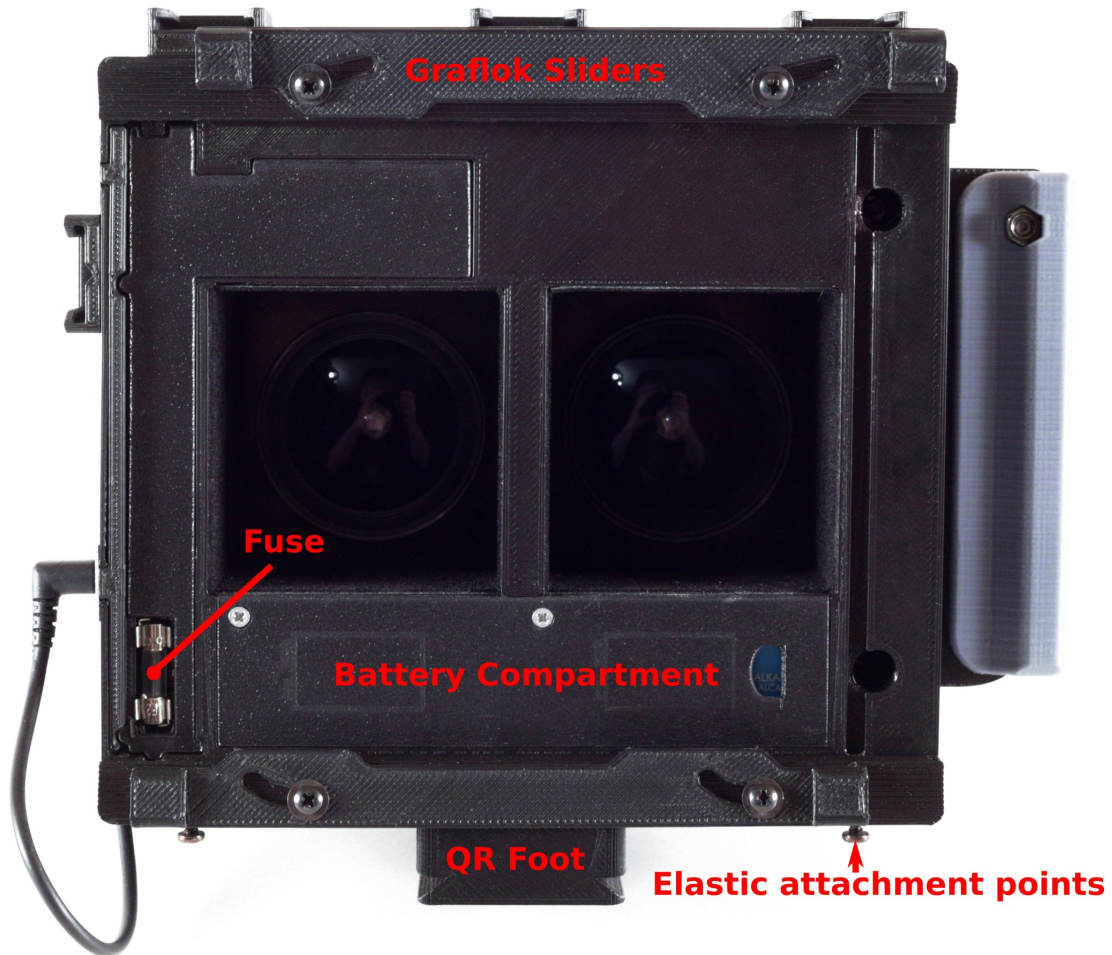
Graflock sliders: This camera adheres to the Graflok 45 standard, and can mount any Graflok 45 compatible back, including the Horseman 6x12 back, the Yi XX 6x12 back, our 3D printable back, our 6x12 modified 70mm back, and of course our range of ground glass backs. *The four screws here should be tightened or loosened to your preferred tightness, enabling all of your backs to comfortably mount, but not easily disengage.*

Fuse: This is a slow-blow 1.5amp 5x20mm fuse in case you ever need to replace it. We placed it at the surface, so all you need to do is remove any back on the camera to get to it for inspection or replacement. This camera uses a fairly powerful 18V circuit and the fuse provides important protection against short circuiting, backwards battery connection, etc.

Battery Compartment: The lid to this compartment can be screwed in with the provided screws, or simply snapped in place. Either way, snap it out to gain access to the batteries. Use only 9V Alkaline or Lithium batteries in this camera, and take great care to insert them properly. They will only snap in place in one orientation, but a momentary press in the wrong orientation can be bad for the batteries, the camera, the fuse, or any of the above! Batteries should last for months of shooting. We recommend using name brand Alkaline batteries. Lithium batteries last much longer, but have less power and can lead to inadequate triggering. Do not use rechargeable batteries—they don't have enough amperage, and their internal circuitry will likely shut them down due to the Stereo 12's unique circuitry.

Elastic attachment points: When using 4x5 camera accessories that aren't Graflok compatible, such as unmodified cut film holders (Graflok-modified ones are available from Mercury Works), you can attach them using elastic/rubber bands. In this case, use two bands, each attached to the front of the top cold shoe rack of the camera (where a groove exists for this purpose) and this bottom screw.

Lens Options

The Stereo 12 "lens stack" consists of a Base Spacer (specific to a particular lens), then a Focus Spacer (which determines your focus zone, or range of in-focus distances), then a Lensboard (specific to particular shutter models), then two shutters, then Lenses (which screw into the shutters).

Mercury Works manufactures the base spacers, focus spacers, and lensboards. You will then add two shutters and as many pairs of lenses as you wish.

Electronic Lensboards

The following electronic lensboards are available for the Stereo 12. Each features a 3.5mm electrical port to connect to the camera body (using the short cable provided with the camera, or any standard 3.5mm Male-Male stereo audio cable).

Mamiya TLR: This popular lensboard accepts two Mamiya TLR shutters from Mamiya Twin Lens Reflex lensboards. The lensboard includes a shutter preview option not available on the original lensboard. To activate it, set one or both shutters to "B" mode, then pull the actuator shaft on the lensboard to fire the shutter (no need to use the electronic actuation). While keeping the shaft pulled, screw a preview screw down into the threads, just enough so that it prevents the shaft from returning to its unfired position. The lens will now remain open until you loosen the screw. When you aren't using preview mode, you can store the preview screws inside the lensboard via the threads on the backside.

Copal 0: This popular lensboard accepts two set-and-release (not "press" style) Copal 0 shutters, of any era and style.

Generic 0: This lensboard accepts all other brands of "0" size set-and-release shutters: Seiko 0 (Fujinon), Compur 0, and Seiko SLV (Horseman/Topcor).

Compur 00, Base 62: This lensboard accepts Compur 00 shutters, placing the lenses at the standard 62mm stereo base to match the human interpupillary distance.

Compur 00, Base 57: This lensboard accepts two Compur 00 shutters, placing them slightly closer together. This has the advantage of enabling you to shoot subjects closer to the camera without causing viewers eyestrain, and also producing larger slides that require less horizontal masking when mounting stereo views. The tradeoff is that less depth will be rendered for farther-away objects.

Graflar 1: This specialty board accepts Graflar #1 shutters, such as the one used in the Optar 65mm

lens.

Deluxe Pinhole: This board requires no lenses; it includes two switchable pinholes. Use the 50mm pinhole with the board mounted to the camera with no front spacers. It has infinite depth of field and an f-stop of 168. Use the 70mm pinhole with a Base 19, 20, or 21, or Focus Spacer #14, for a more "normal" field of view. This option has an f-stop of 200. This lensboard can be actuated via standard "bulb" shooting (hold trigger for duration of the exposure) or via the optional Mercury Trigger Controller, which can set exact exposure times between 1 second and 30 seconds. Do not use the electronic triggering on this lensboard for exposures longer than 30 seconds. For those, lock the actuators open and use the top safety cap to expose.

Manual Lensboards

The Stereo 12 also accepts non-electronic lensboards, including the following:

Pinhole 50mm: This lensboard includes two 0.3mm pinholes instead of lenses. Mount it to the camera with no front spacers to produce a 50mm equivalent field of view. Exposure is accomplished by manually lifting the dual shutter plate and then dropping it back in place when the exposure is finished. (Typical exposures are 5 to 15 seconds, so this is easy to do.)

Pinhole 65mm: This lensboard operates like the 50mm version, but provides a narrower field of view via two 0.35mm pinholes. Mount to the camera using a Base 19 spacer, or whatever you have that is close.

Century: This lensboard accepts two Trioptar 103mm shutters/lenses. This is a readily available, inexpensive lens.   They must be actuated via two cable releases. Because they are "press" shutters, they do not need to be cocked before actuation.

0 Manual: This accepts two "0" sized shutters of any kind. They must be actuated via two cable releases. This is especially useful for "press" shutters, which do not need to be cocked before actuation.

00 Manual: This accepts two Compur 00 sized shutters. They must be actuated via two cable releases.

00 Base 57 Manual: This lensboard accepts two Compur 00 shutters, placing them slightly closer together. This has the advantage of enabling you to shoot subjects closer to the camera without causing viewers eyestrain, and also producing larger slides that require less horizontal masking when mounting stereo views. The tradeoff is that less depth will be rendered for farther-away objects.

Mamiya Manual: This accepts two Mamiya TLR shutters. They must be actuated via two cable releases. Unlike the Stereo 12 Electronic version of this lensboard, no aperture preview method is build-in to this lensboard. Instead, a set of spacers are provided for ground glass use.

Wista Twin: This experimental board requires a vintage Wista Twin lensboard (originally used for ID card photos). The septum on the vintage Twin lensboard must be removed (easily via 4 screws) and

then mounted on this Mercury lensboard. Requires either Base 43 spacer or (recommended) Front Extension Spacer 40 + Base 8. The Wista Twin has a stereo base of 50mm, making it most useful for close subjects.

Compatible Lenses

Most lenses that meet the following requirements are compatible with the Stereo 12:

- Front elements no larger than 60mm in diameter (usually this translates to a 58mm filter thread)
- Rear elements no larger than 60mm in diameter.
- Housed in a shutter model supported by the above lensboards.
- Focal length between 47mm and 135mm. (Longer and shorter focal lengths are possible via special configurations.)

The following is a non-exhaustive list of lenses compatible with the Stereo 12:

Lens	Manufacturer	Mount	Base Spacer	Filter Size	Shade Depth
Super Angulon 47mm f/5.6	Schneider	0	none	49	25
Apo-Digitar 47mm f/5.6 XL	Schneider	0	none	52	25
Pinhole 50mm (0.3mm)	Mercury	pinhole	none	n/a	25
Bronica 50mm f/2.8 MC (ETRS)	Bronica	0	14	n/a	25
Mamiya Sekor 55mm f/4.5 (TLR)	Mamiya	0	17	46	30
Apo-Digitar 60mm f/4	Schneider	0	4.6	40.5	35
Ilex 60mm f/16	Ilex	Ilex 00	6.4	n/a	35
Pinhole 65mm (0.35mm)	Mercury	pinhole	19	n/a	40
Mamiya Sekor 65mm f/3.5 (TLR)	Mamiya	0	12	49	40
Grandagon 65mm f/4.5	Rodenstock	0	8	58	40
Angulon 65mm f/6.8	Schneider	00	none	30.5	40
Super-Angulon 65mm f/8	Schneider	00	9	30	40
Fujinon SW 65mm f/8	Fuji	0	10	52	40
Graflex Optar W.A. 65mm f/6.8	Wollensak	Graflar 1	7	n/a	40
Super Topcor 65mm f/7	Topcon	0	9	40.5	40
HR Digiron-W 70mm f/5.6	Rodenstock	0	12?	58	40
Grandagon 75mm f/6.8	Rodenstock	0	16	58	45
Super Angulon 75mm f/8	Schneider	0	21	49	45
Fujinon SW 75mm f/8	Fuji	0	21	58	45
Horseman Professional 75mm f/5.6	Topcon	0	12	40.5	45
Mamiya Sekor 80mm f/2.8 (TLR)	Mamiya	0	12	46	45
Heligon 80mm f/2.8	Rodenstock	0	19	40.5	45
Apo-Digitar 80mm f/4	Schneider	0	15	40.5	45
Apo-Digitar 90mm f/4.5	Schneider	0	25	40.5	45
Angulon 90mm f/6.8	Schneider	0	28	40.5	45
Tessar 100mm f/3.5	Zeiss	0	30	49	50
Nikkor-W 100mm f/5.6	Nikon	0	40	40.5	50
Apo-Digitar 100mm f/5.6	Schneider	0	35	40.5	50
Sironar-N 100mm f/5.6	Rodenstock	0	39	40.5	50
Symmar-S 100mm f/5.6	Schneider	0	34	40.5	50
APO Symmar 100mm f/5.6	Schneider	0	34?	40.5	50
Trioptar 103mm f/4.5	Graflex	Century	30	32mm push-on	50
Mamiya Sekor 105mm f/3.5 (TLR)	Mamiya	0	34	46	50
APO-Symmar 120mm f/5.6	Schneider	0	FES 40 + 13		50
Mamiya Sekor 135mm f/3.5 (TLR)	Mamiya	0	34	46	50

Lens recommendations can be found at www.mercurystereo.com

Detailed instructions for mounting shutters to Mercury lensboards are found in our supplemental document, "Lens and Shutter Assembly" and our video, How to Assemble Your Mercury Stereo 12 Lensboard.

Base Spacers

Almost all lenses require a base spacer. Base spacers are named after their total thickness. For example, a Base 12 is a spacer 12mm thick. In general, the base spacers is *always* used for a given lens, and only the Focus Spacer is changed in order to alter focal zones. However, some lenses, as can be seen in the preceding chart, use a base spacer and *no focus spacer*. In some of these cases, different base spacers will produce a different focus zone. When this is the case, our separate spreadsheet, "Stereo Lens Info," lists multiple base spacers instead of focus spacers for different focus zones. Only very wide lenses fall into this category.

Front Extension Spacer (FES): This is a special category of base spacer that is essentially a camera extension. It mounts to your camera like any base spacer, but always does so via four (4) M4x8mm screws with no thumbscrew knobs. They may need to be tightened with an allen wrench (do not overtighten!). At the other end of the spacer is a new camera front, to which you can mount additional spacers. Typically you would mount a standard base spacer to the FES, then add a focus spacer as usual. All spacers after the FES mount directly to the FES rather than the camera front.

The FES enables much longer camera configurations than would otherwise be possible. This is useful for lenses with longer focal lengths (generally 120mm and greater) as well as macro photography.

Focus Spacers

Unlike base spacers, which are specific to a given lens (or several lenses), focus spacers are all the same. You only need to own one set of focus spacers to cover any number of lenses.

Focus spacers are labeled with a number from 1 to 14. This does not represent their absolute thickness, but only relative thickness: #1 is the thinnest, #14 the thickest. For a given lens, each focus spacer will produce a different focus zone (the range of distances at which objects are in focus). The approximate focus zone for each spacer and lens combination is given in the "Stereo Lens Info" spreadsheet.

For a given lens, only certain spacers will be relevant. Wide angle lenses may only have a few focus spacers to cover their entire practical focal range, while very long lenses (over 100mm) may require all 14.

However, we typically recommend only 3-4 spacers per lens, for commonly used focal zones. Excepting special purposes, you don't need a full focus spacer set.

Selecting a focus spacer: For a given lens, you will want to select a focus spacer that renders a

focal zone that covers what you are likely to shoot, at the f-stop you are likely to use. If you will be shooting far away objects, you may want to select the "hyperfocal" spacer for your given lens and f-stop. This is the spacer that has the closest focus zone that still reaches infinity.

Because faraway objects don't have much—or any—stereo depth, the optimal focal zone for most photographers is the one that covers roughly 6-12 ft. This is the distance that the human eyes are optimized to see depth at, and thus your photos will maximize the depth possible (the 3D effect) if you can contain your most important objects within this range. Of course, your focal zone may expand significantly past this range, giving you much more that is in focus besides. Wider lenses and larger f-stops will significantly expand your focal zone, and this is usually desirable for stereo photography.

Given these considerations, one or two focus spacers for a given lens will probably cover 95% of your needs. If your particular style of photography requires more spacers, you can obtain them from Mercury Works or 3D print your own using our files.

Focus Spacer Labels: Stereo 12 focus spacers are designed such that they have a flat surface near their base that perfectly fits a single row of text from our Stereo Lens Info spreadsheet. You will notice that there are some sheets in the spreadsheet that are formatted with a black background and a subset of information. These are designed for direct printing. If you then use a paper cutter (or a steady hand with scissors) to cut out individual rows for individual spacers, you can adhere those strips to spacers. Now, when you mount a spacer, you can see at a glance what your focal zones (depth of field) will be at several different f-stops, as well as the nominal focal point, the lens, the spacer #, and which colored bolts are used to mount the lensboard when using this spacer (a straight color indicates bolts without a washer of that color will work; a "W" indicates bolts of that color *with* a washer; two side-by-side options indicates that either will work).
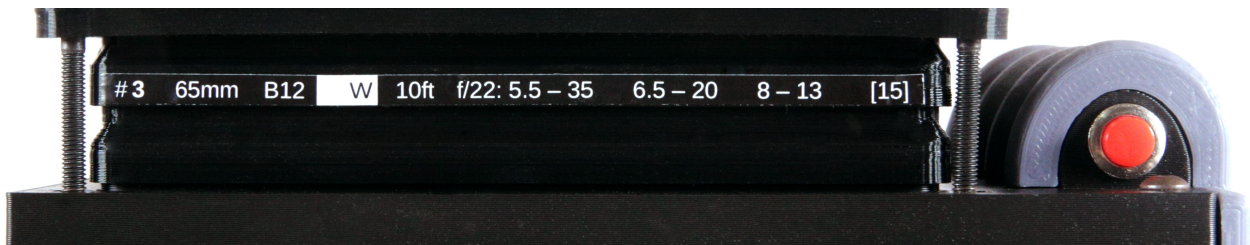

You can customize the information if you wish by altering the spreadsheet before printing.

S Focus Spacers: The "S" focus spacers are extremely thin spacers that fit in between the base spacer (or camera front) and the lensboard. They are only used for extremely wide lenses. There are four, labeled S1 (the thinnest), S2, S3, and S4 (the thickest, rarely used).

S spacers are marked with white dots. The number of dots present corresponds to the number of the spacer model. The one pictured above, for instance, is an S2.

Front Bolts: Changing spacers sometimes necessitates moving to longer or shorter bolts. In the Mercury Stereo system front bolts have thumbscrew heads that are color coded by bolt length. In the Stereo Lens Info spreadsheet, the proper bolts are listed for every Base/Focus spacer combo, in both actual bolt length and color. A "W" signifies that the given bolt must have a washer added to it. Mercury Stereo washers are plastic and of a uniform thickness. A set of four comes with every camera.
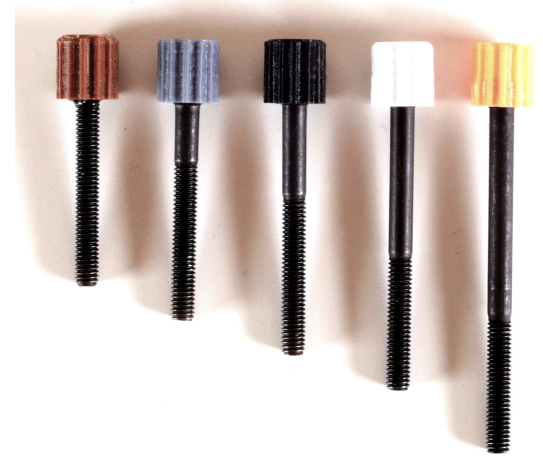
Front bolts are standard M4 size and available in their color-coded thumbscrew version from Mercury Works. You can also purchase generic ones online.

Film Backs

The Stereo 12 is the first modern stereo camera to feature interchangeable backs. This gives you many different options for film format and form factor.

Mercury 65/70mm Panoramic Back

This is the flagship back for the Stereo 12. We have to machine and rebuild a vintage Graflex RH50 back (not itself compatible with the Stereo 12), modify its frame counter, refurbish, and add many features to it, but the result is a back that can accept 70mm aerial and portrait film, 65mm motion picture film, and even 120 film (with some limitations). The availability of these backs is highly dependent on our ability to source the vintage parts.

This back shoots a nominal 6x12 image (actual: 56 x 113mm), the same as Linhof, Horseman, and Da Yi 6x12 120 backs. But instead of accepting only 120 spools, this back accepts 70mm cassettes. Those cassettes can be loaded with 70mm film as well as 65mm motion picture film (the film used for IMAX) using Mercury Works 65mm Cassette Spools (a set of which is included with this back).

You will need two metal 70mm cassettes, which are sold separately (available via Ebay, and sometimes available from Mercury Works).
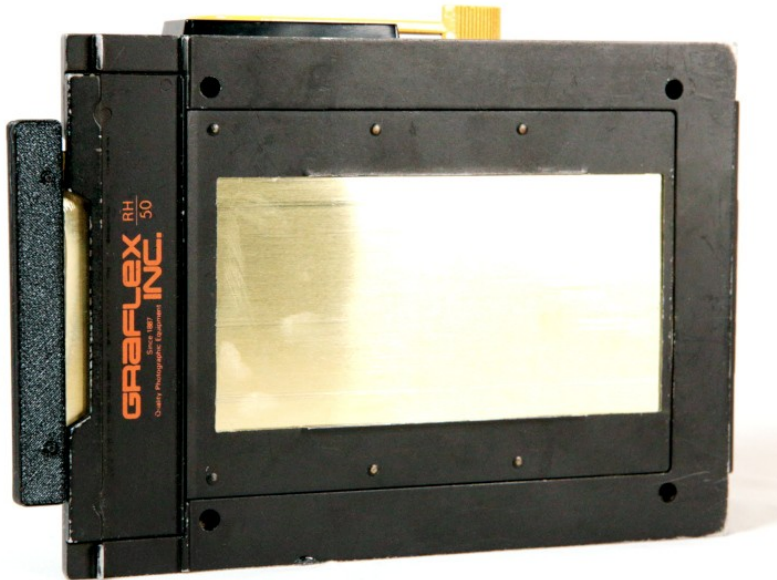
We add a complete loading diagram to the back to clearly indicate how to position the cassettes and how to load the film. For complete loading instructions, see www.shoot70mm.com

When loading 70mm film, you can get as many as 35 exposures (stereo pairs) per load.

When loading 65mm film, you can get as many as 32 exposures (stereo pairs) per load.

The long-roll cassette system used by this back is *variable load*, so you can choose how long each roll is, from just several exposures to the maximum listed above. Furthermore, you can cut your roll at any point, so you don't have to "finish a roll" in order to develop what you've shot. When you cut a roll, you can simply add a new takeup cassette and continue shooting with the rest of your unexposed roll.

Especially when shooting the 65mm motion picture film (IMAX) that Mercury Works makes available to photographers, this system confers enormous advantages over 120:

- Far less expensive film (½ the price of 120)!
- Most advanced film emulsions ever developed
- Amazing color, low grain, high exposure latitude
- Each cassette can hold over 5.5 times as many frames as 120
- Variable load cassettes (you choose how big each roll is)
- Mid-roll cutting (cut your roll any time for developing)
- Far better protection against light leaks, scratches, halation, and X-rays
- Much less film curl than 120 (better flatness)
- Can be developed in long roll format by M-Alchemy or at home
- Can be printed to medium format slides (just like IMAX 70mm exhibition)

M-Alchemy, the Mercury Works film lab, can process any 65mm and 70mm film, in any length up to the maximum. We can also print beautiful slides from your negatives using the motion picture industry's print film technology (as used in IMAX 70mm exhibition).

To develop at home, Mercury Works makes spirals available for both Paterson and Jobo. These can hold up to a 220 length of 65mm or 70mm film.


Shooting 65mm and 70mm Film

Once you've loaded your film and closed the back, test to see where in the advance lever stroke you feel tension. If it isn't right away (i.e., it is somewhere in the middle or toward the end of the stroke), go ahead and advance the lever to the end of the stroke.

Now advance the frame counter (via the black metal knurled knob) until it reaches the red arrow.

When you are ready to shoot, advance three full strokes until the counter is at "1". You are ready to expose!

After every shot, you need to advance the lever 1.5 strokes. The half stroke is properly aligned when the right edge of the advance lever lines up with the tip of the white triangle, as shown here:
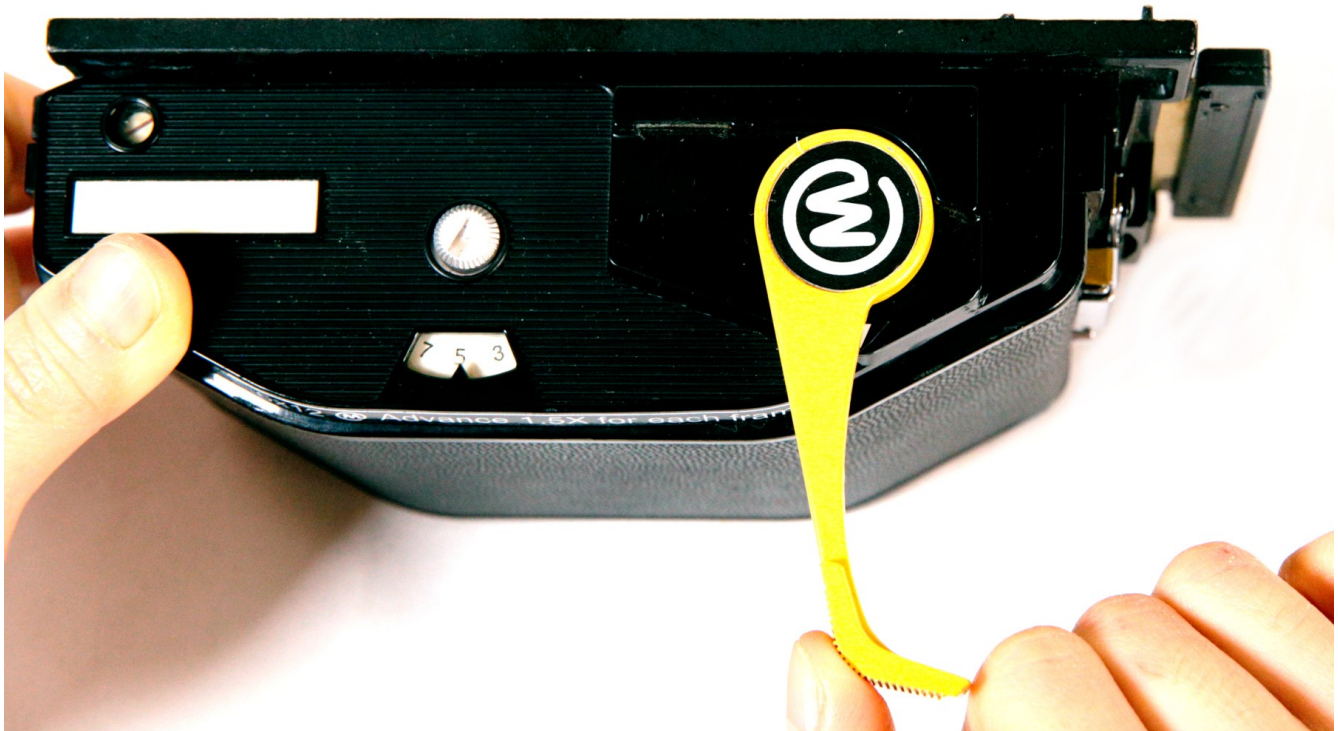
Note that the lever is only advancing when you feel tension. Sometimes your half stroke will happen before the full stroke (i.e., you'll only feel tension start at the halfway point of the stroke). The other 50% of the time you will have tension from the beginning of the stroke, in which case, your second stroke will be the 0.5, and you'll only advance it to the halfway point. A white indicator shows the

halfway point; just advance until the right edge of the lever is in line with this mark. (This is difficult to describe, but in practice is very simple. Just advance 1.5 times, counting as an advance only when feeling the film tension.)

Mid-Roll Cutting

To cut your film for developing before you finish your cassette, simply advance the film one extra frame (the usual 1.5 strokes), then remove the insert from the shell and use a pair of scissors to cut the film (near the takeup edge of the pressure plate). You can easily insert another cassette in the takeup position, spool your unexposed film onto it, and continue shooting. All of this can be done in subdued light.

If cutting for a 220 length of film, use the following guide:

> **If you added leader to the roll:** After exposure #11, advance to the next frame and cut in the middle of the pressure plate.

> **If you didn't add leader to the roll:** After exposure #9, advance to the next frame and cut in the middle of the pressure plate.

Shooting 120 film in the Mercury Panoramic Back

While this back is primarily designed for long-roll medium format (65mm or 70mm), it is also possible to shoot 120 film in it. It isn't as convenient as a dedicated 120 back, but it can be really handy if you primarily want to shoot 65mm and only occasionally want to shoot 120, or if you only want to bring one back with you on a trip and want a backup option in case you need to purchase film locally, etc. Be aware, however, that it is difficult to hold 120 film completely flat. Your film must be perfectly centered when loaded into the back, and even then it can slip a bit during the roll. The result could affect your photos if they are shot at a wide aperture and thus have narrow depth of field.

To shoot 120, you need the inexpensive "120 kit" for this back. It includes a drill bit (¼ inch, hex shank), a bit handle, and four plastic spacers.

To load a 120 spool, you need to first slightly enlarge the hole at both ends of the 120 film spool (as well as a 120 takeup spool). This can be done very easily, in less than a second, with a drill. Just drill out the existing hole, no deeper than the original hole. If you wish to do this in the field, with no drill

handy, you can insert the drill bit into the included bit handle and do this by hand. It takes a bit more finesse, but can be done without much trouble.

Once you've prepared your spools, insert them into the back, with a spacer placed around each of the spool holders (one ring on top, one ring on bottom). Snap the bottom of the back closed to secure your spools.
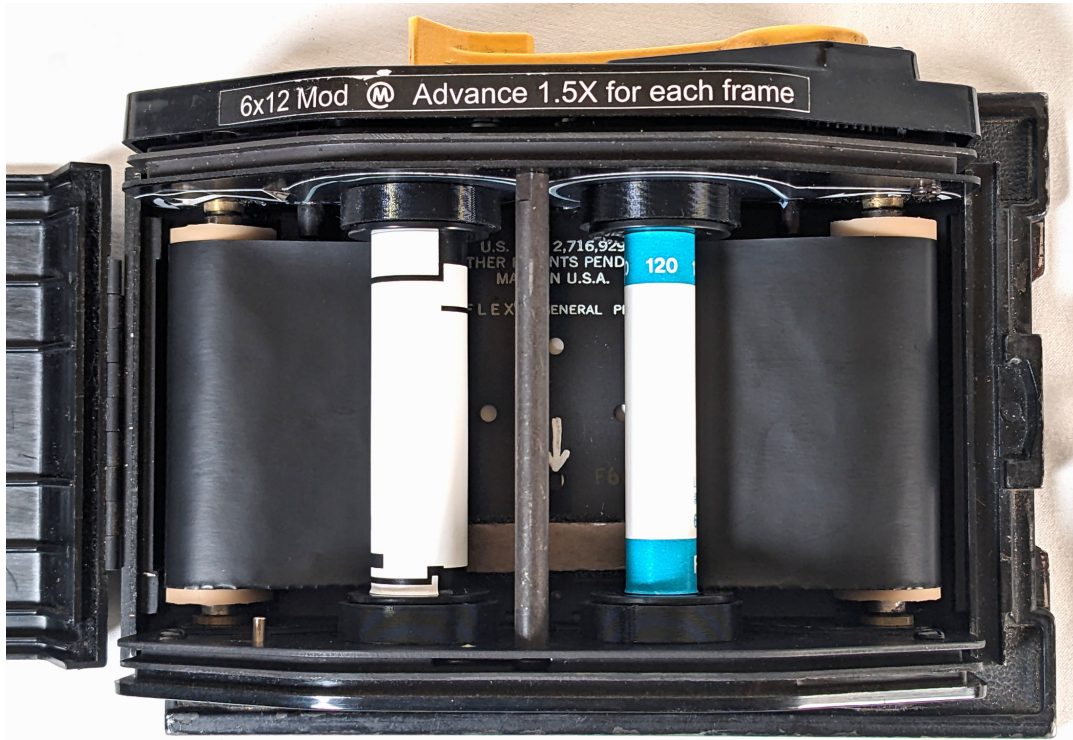
Now load the backing paper as usual: pull it around the front of the film insert, then back around the takeup spool. Use the back's advance lever to begin to wind the paper around the takeup spool.

As you advance, the "Start" line on the backing paper will begin to travel across the insert. It is difficult to see, but will periodically black out the holes in the pressure plate. You want to advance the backing paper until the *center* holes in the plate are blacked out.

When the backing paper is in this position, double check both sides of the insert to make sure that the backing paper is spooling across the pressure plate in a straight line, without being pulled up or down (i.e., that it is perfectly parallel to the two spools). Adjust up or down as needed. Then place the insert into the shell of the back and close the shell.

Next, you need to advance the lever 3.5 strokes. Note that the lever is only advancing when you feel tension on the film, and tension will only begin at some point over the full stroke of the

lever. Note that point and use it as your reference for 3.5 strokes.

Once you've achieved 3.5 strokes (approximately, since the 0.5 is difficult to get exactly), continue to advance the lever until the current stroke has been completed (the lever has advanced all the way to the right).

Now turn the frame counter knurled knob counter-clockwise until the frame counter resets. Advance it all the way to frame 1 (*not* the red start arrow!).

Now shoot as usual! You should get your full six exposures on the 120 roll, and the backing paper tail will then continue to roll on as usual.

Final Considerations

Like every removable back with a darkslide, particularly bright sunlight from the right angle can penetrate the light trap when the darkslide is removed, and even glint off the darkslide when it is pulled open but not fully removed. In those conditions, we recommend that you use a thin strip of black cloth gaffer's tape to tape up the darkslide slot.

You can watch our video demonstrating how to load 70mm cassettes here: https://youtu.be/9_D-mRHmWaQ

Mercury 65mm Cut Film Back

This is the least expensive back available for the Stereo 12, as well as the lightest and smallest. It is a modified 4x5 (large format) sheet film holder, with added mounting grooves and a film path designed for 65mm motion picture film.

Each holder holds only two stereo pair exposures: one on each side. However, even three of these holders are together smaller, lighter, and far less expensive than a 120 back, while holding as many exposures. Best of all, you get all of the advantages of 65mm motion picture film (see above).

The downside to these backs is that you must load them in darkness (a dark room or a changing bag). To load, use the Mercury 65mm Cut Film Guide. Just unroll a bit of film from the end of one of our bulk 65mm rolls and slide it, emulsion side down (i.e., the inside of the roll) into the groove of the Film Guide. Best to wear a cotton glove on one hand. With the film in place, hold it down with a finger, then cut the film with a pair of scissors placed against the oversized end of the Film Guide. Note that scissors won't cut perfectly flush with the edge of the Guide; the size of the guide takes this into account.

Optional but recommended: You can make a second cut at an angle, using the diagonal part of the Film Guide. This will snip a tiny bit off of one corner of your film. This gives you a future indicator of which side of your film is the emulsion side, following large format guidelines.

Next, load this cut strip of film directly into your Cut Film Holder by flipping it over (so emulsion side is up), then sliding it into the grooves in the holder. (Note that the darkslide must be at least partially open and the end of the holder hinged open.) Now close the holder's hinge and fully insert the darkslide.

Flip the holder over and repeat.

With some practice, this can be done in mere seconds.

Close up your bulk roll, turn on the light, and label your holder with pencil to indicate the type of film you've loaded.

You can watch our video version of these loading instructions here: https://youtu.be/yyqn09501r0

To Shoot: Just mount the back like any other to your Stereo 12. Pull the darkslide when you're ready and expose the side. It is then recommended that you flip your darkslide over (so the silver side is

facing out) and reinsert it in that position. When the black side of the darkslide is facing it out it indicates un-exposed film; silver indicates exposed film.

To shoot your second exposure, remove the holder, flip it to the other side, and re-attach to the camera.

To Develop: These strips of film can be loaded onto 65mm developing reels (safely, two per reel), tray developed, or sent to M-Alchemy for developing.

Basically, this method treats these advanced film strips as large format sheets, creating a panorama, or in this case, a stereo pair. The final strips can be contact printed to make beautiful IMAX-style slides.

These holders produce an image that is the full, maximum 120mm in width, to maximize horizontal space on your slides (less horizontal masking required).

Mercury Works also makes this style of back in a 70mm variant. It works the same, but accepts 70mm film instead of 65mm.

Cut Film Accessories:

To easily cut 65mm and 70mm strips of film to size in the dark (including adding corner notches that allow you to identify the emulsion side by feel if you later get mixed up), use our **Cut Film Guide** (available in two versions: one for 65mm film and one for 70mm film).

Emulsion Down
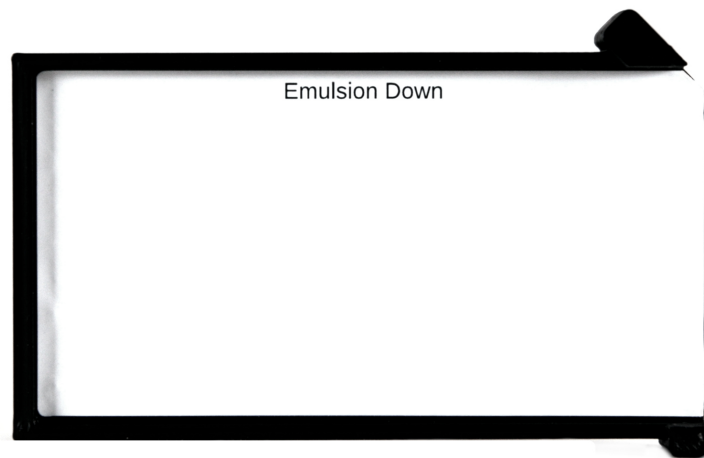
To store cut film strips for later use (if not loading directly into holders) or to safely ship for developing at M-Alchemy, use our **Cut Film Box**.

Horseman 120 6x12 Back

The Horseman 6x12 (also called the "6 EXP") is the best of the practical 120 backs. It loads and unloads like a dream, boasts excellent build quality, and uses a precise lever winding system that produces near-perfect frame spacing. Like our 65/70mm backs, there's no need to peer through a window or manually line up frame numbers (see below). The Horseman back is not cheap, though: it is only available used, and typically costs over $650 (and is thus more expensive than the Mercury 65/70mm Panoramic back). It is, however, *much* cheaper than the Techno Rollex (see below)!

This back produces a 56mm x 113mm usable image. It is not modifiable.

Like every removable back with a darkslide, particularly bright sunlight from the right angle can penetrate the light trap when the darkslide is removed, and even glint off the darkslide when it is pulled open but not fully removed. In those conditions, we recommend that you use a thin strip of black cloth gaffer's tape to tape up the darkslide slot.

If you are going to shoot a lot of 120 and want a back that is quick and easy to operate and will serve you reliably, this is the one we recommend.

Linhof Techno Rollex

This is the fanciest, and most expensive, 6x12 back ever manufactured for the Graflok 45 standard. It is the Rolls Royce of 120 backs for the Stereo 12.

Its chief advantage over the Horseman 120 back is that it features a full 120mm wide aperture, for reduced horizontal masking when mounting MF3D slides. Other advantages include an extremely smooth advancing mechanism thanks to an oversized roller and exceptional machining of the advance gearing, and amazing German build quality.

220: This back also has the capability of shooting with 220 film. Technically, the insert's backplate is meant to be changed to a specially-sized 220 plate, but in practice, this will still work with the standard 120 plate (theoretically your film could be up to 0.1mm out of spec in terms of flatness).

Disadvantages of the Techno Rollex back include (besides price) more weight than the Horseman, a bit more bulk than the Horseman, a slightly more complex three-part structure rather than the simpler two-part structure of the Horseman and the Da Yi backs, and the Linhof oddity of the film takeup spool being on the left instead of on the right (and the corresponding advance lever, which is operated from right to left).

Required Modification: The Techno Rollex includes one small part that is designed to mate specifically with Linhof Technica cameras, which must be removed to work with some other Graflok cameras, including the Stereo 12. This only takes a moment, is non-destructive, and doesn't affect the function of the back. The small ridge near the base of the darkslide, held to the back via two small screws, must be removed:

Keep it in a safe place! With it gone, it will be slightly more difficult to see exactly where to insert the darkslide. This can be remedied with the following optional part:

Mercury Works has created a replacement part for the original Linhof part that, when installed (simply by replacing two screws) renders the back compatible with all Graflok 45 cameras, including the Mercury Universal and Mercury Stereo:

We'll provide this kit to any owner of both the Stereo 12 and the Techno Rollex, for free with any order. Just ask us!

Da Yi 120 6x12 Back

The Da Yi back is a currently-manufactured item from China. It is solidly made and works well, but lacks some of the features of lever-action backs and has a few drawbacks. Instead of automatic frame spacing, this back has a window in the back, through which you must manually line up the numbers on the backing paper while turning the advance knob. This is significantly less convenient and elegant

than the backs listed above.
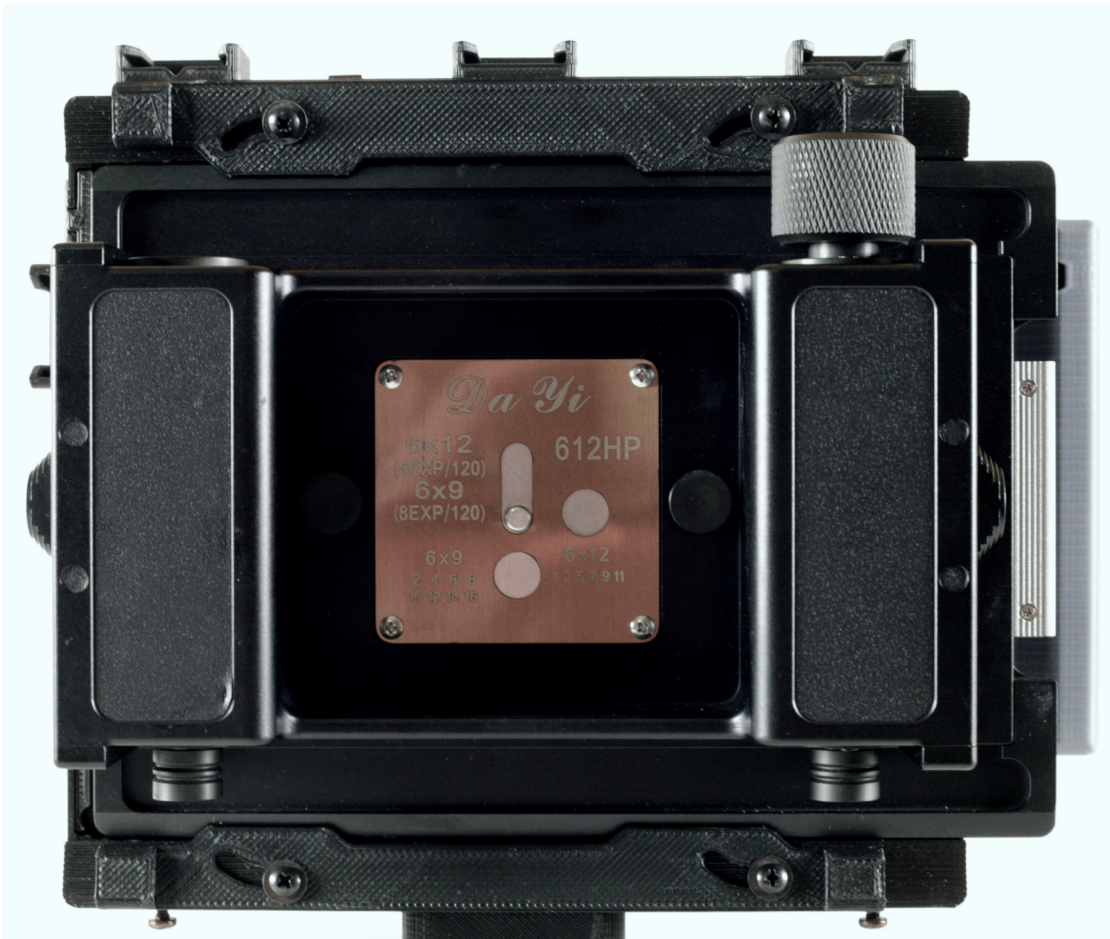
To work with the Stereo 12, you must remove this back's extra screws that hold optional masks in place. This feature, to shoot smaller formats, is just a distraction. Removal of the mask-mounting screws does not expose any internal part of the back to light.

Ignore the second backing paper window (or better yet, block it) and its superfluous information about smaller formats. When using this back, you must advance only to odd numbers on the backing paper: 1, 3, 5, 7, 9, and 11.

In its stock configuration this back produces a usable image size of 56mm x 114mm.

Modifying the Da Yi back

Mercury Works has designed a modification of this back to enlarge its image aperture. This requires completely disassembling the back, machining multiple metal parts, machining a new, longer darkslide, and precisely gluing and sanding multiple plastic parts. The result is a usable image area of 56mm x 120mm.
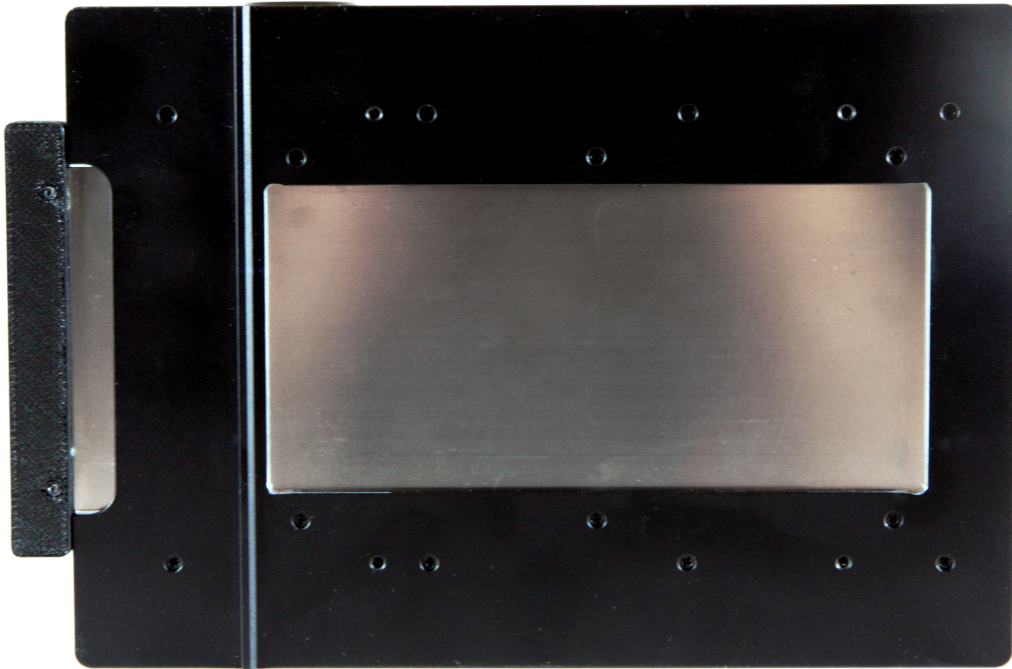
Our separate guide to this modification is available at www.mercurystereo.com. Mercury Works also offers, on a limited basis, a modification service to perform this modification on your back. Our version of the modification includes the installation of a film box clip to the back that also covers the unused advance window and text.

Challenges and Potential Problems with the Da Yi Back

Straight from the factory, this back can sometimes pinch thicker 120 film, leading to scratches or failure. Our modification guide describes a fix for this that can be performed while the back is disassembled.

This back can also suffer from light leaks. If you find that this is the case, adding black cloth gaffer's tape around the outside will fix the problem. Also, like every removable back with a darkslide, particularly bright sunlight from the right angle can penetrate the light trap when the darkslide is removed, and even glint off the darkslide when it is pulled open but not fully removed. In those conditions, we recommend that you use a thin strip of black cloth gaffer's tape to tape up the darkslide slot.

Loading and unloading this back can be a bit difficult because 120 spools fit very tightly. When unloading spools, we recommend that you use a thin, mini flathead screwdriver to pull or pry the spools out of the back. This problem is exacerbated when using Kodak, Ilford, and similar 120 film spools. Fuji's film spools are rounded on the ends and are significantly easier to insert and remove from this back.

Large Format Sheet Film Holders

Standard 4x5 sheet film holders are not Graflok 45 compatible: they don't have the proper ridges to lock onto Graflok sliders. They do, however, perfectly slot into the Mercury Stereo 12. Instead of using the sliders to lock the sheet film holder in place, you will need to string two rubber bands over the back of the camera to hold it tightly in place. We provide high-quality black synthetic bands for this purpose, but you could use standard (ugly) rubber bands as well. This takes only a second.

The bands connect from the groove in the front of the top left and top right cold shoes to the small black screws that protrude from the bottom of the camera on the left and right. Hold the Graflok sliders open while you string the bands, so they don't get pulled closed. After the first time you do it, you'll discover the best place to "route" them with respect to the sliders.

Once the bands are in place, just slide the sheet film holder into place under them. It will make a firm connection with the camera. Just pull the darkslide and expose as you would roll film. (You will notice that sheet film darkslides have a black and a white or silver side to their handles. This is so you can indicate to yourself whether the sheet on that side of the holder is unexposed or exposed. Choose a color to indicate exposed [probably white] and stick with it!)

Mercury Cut Film Holders: Mercury Works makes a modified version of combination wood/metal sheet film holders that have Graflok grooves cut into them. These can be mounted directly to the Stereo 12 (and Mercury Universal 4x5 cameras) like any other Graflok back, without the need for rubber bands. We make these in standard 4x5, in a special 65mm cut film version (see above), and in a 70mm cut film version.

Grafmatic

The Mercury Stereo 12 is also compatible with the remarkable Grafmatic back created by Graflex. It holds 6 sheets of 4x5 film, 65mm film, or 70mm film, and is a Graflok 45 back, so can mount without bands. It takes a bit of knowledge to know how to load it (watch our video), but using it is extremely easy and fairly miraculous: You can change from one sheet or strip to another without removing the back (unlike standard sheet film holders), with just a quick lever action (faster than advancing a 6x12 roll film back).

The main limitation of this back is that by default it includes a metal frame number mask wheel that eats into the usable image area on one side. This wheel needs to be removed for proper Stereo 12 use.

Mercury Works makes a modified version of the Grafmatic that removes the wheel and also adapts its septums for any combination of 65mm, 70mm, or 4x5.

This back has the same capacity as a 6x12 120 back, but holds the film much flatter (no rollfilm curl), is much lighter, is significantly less bulky, costs about 1/3 as much, accepts more film formats, and is faster to advance frames. Its chief disadvantage is that it must be loaded and unloaded in darkness.
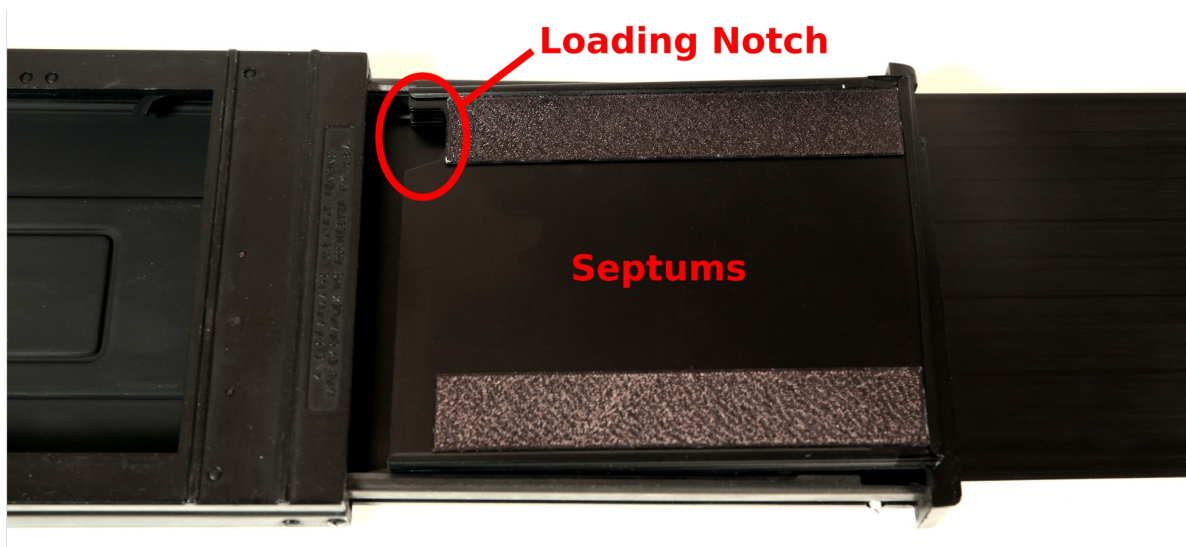
Loading

To load the Grafmatic, advance it until you reach "X". Then turn the frame counter to read "1". Turn the back onto its back (label side down) and open the advancing mechanism by holding the silver lever against the handle and pulling it all the way out. Now push the darkslide slightly inward. It will disengage, allowing you to pull it all the way out. The six septums will pop up so that their back ends are raised above the surface of the Grafmatic.

Now simply remove the septums. In the dark, load them with film. The standard, unmodified septum accepts 4x5 film just like a sheet film holder. Our modified septums accept a cut strip of 65mm film. Cut these to length and add the corner notch (to identify the emulsion side if you need to later) using our Cut Film Guide. Then just insert the strip, emulsion side up, into place. Our 70mm septums contain an extra notch at the bottom corner of the septum so that you can identify the difference between 65mm and 70mm septums in the dark, when you are using both.

70mm Notch

Once you've loaded all of the septums you wish (with any combination of 4x5, 65mm, and 70mm), stack them together to that they are ready to insert into the Grafmatic: the large hole in each should be in the upper left corner.

Loading Notch

Septums

Arrange the septums in whatever order you prefer, with "Frame 1" on top of the stack, "Frame 2" next, and the final frame at the bottom.

If you are loading fewer than 6 septums, *load empty septums in the stack so that the total number is always six!* While a back can sometimes operate with fewer than six septums, it can cause an uneven film plane, improper film plane distance, and jams.

Slide your complete stack back into the Grafmatic, hole-side first. Once they have slid all the way in, gently push them down against the spring and then slide the darkslide closed over them, holding them down in place.
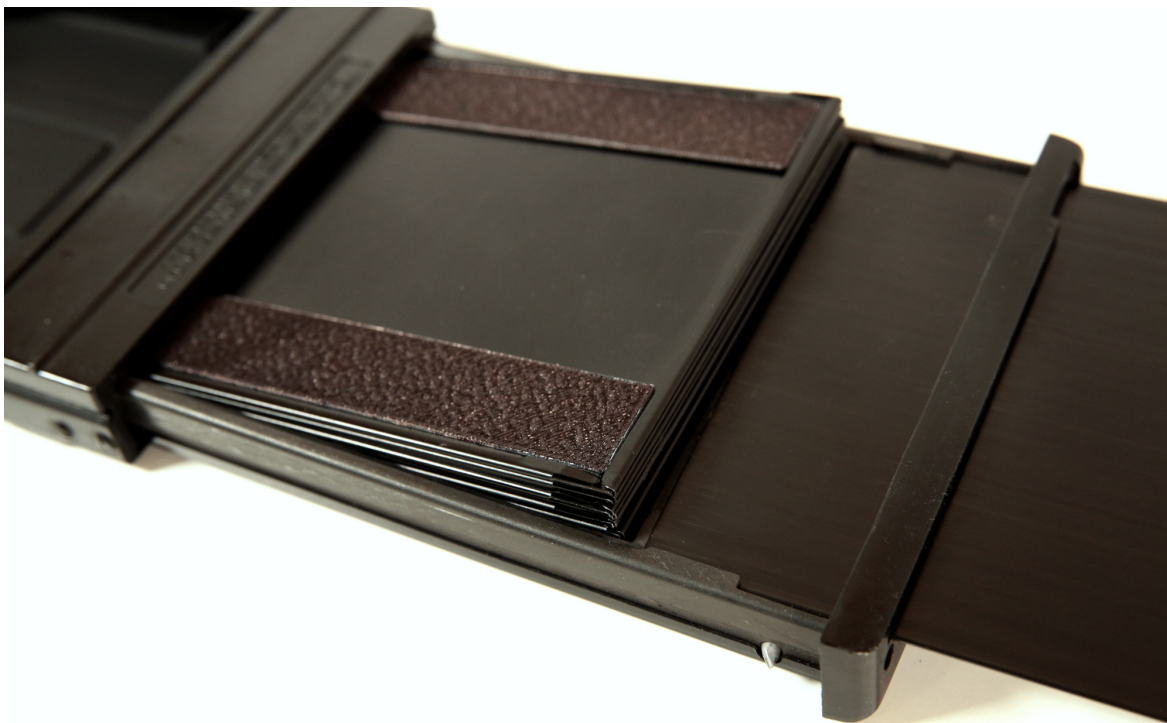
Close the darkslide completely, and then the full advance mechanism, until everything snaps back into its original size.

Back in the light, write out what you've loaded in each of the six positions on the white memo area of the back (it is large so you can specify each of the six shots, if they are different sizes, films, ISO ratings, etc.).

Notes for Shooting

1. To shoot the current numbered frame, pull the darkslide fully out and *then insert it completely again*. This doesn't operate like a normal darkslide. It must be *in* before you expose your shot, or your film plane will be incorrect and light can leak into the corners of other sheets.

2. When you perform this procedure (darkslide out and then in again), a red dot will appear on the lower right corner of the back. This indicates that film is uncovered—do not remove the back from the camera, remove lenses, etc. while a red dot is showing!

The one exception is shot #1. When you first load the back, a red dot will show, even though your darkslide is blocking the film and you can safely transport and remove your back. The red dot will remain when you actually work the darkslide, and you must do so in order to expose frame 1.

3. Once your film is uncovered (red dot showing), you cannot cover it again without advancing to the

next frame. It's okay to do this, leaving your shot unexposed. Just note it on the memo area of the back. You can always cycle back to that shot later.

4. Once you've exposed a frame, advance to the next by holding the silver "thumb lever" tightly against the darkslide handle and pull the mechanism out of the back all the way. Then push it back until it is fully closed. Your frame counter will advance to the next number and your next sheet of film will be advanced to the front. Remember that in order to expose it you must work the darkslide (exposing the red dot).

5. When you advance past frame 6, your frame counter will read "X". At this point the back will not advance any further until you manually turn the frame counter one more notch, to "1". From there you can continue to advance again.

6. It's okay to skip some frames and later cycle back to them to expose them.

We recommend that if you load film that requires different processing (different ISOs, different film stocks), that you make them different formats, so you can easily tell the difference in the dark. For instance, load some 65mm color strips, and 70mm BW strips. You can mix and match, and yet will be able to separate out the two formats in the dark, for separate processing.

Glass Plates and Tintypes

The Stereo 12 is compatible with both dry plate and wet plate processes!

Various vintage and new dry plate and wet plate holders are sold on Ebay and Etsy. As long as they are compatible with Graflok 4x5 mount cameras, they will work on the Stereo 12.

Dry plate backs usually have two sides, like sheet film holders. Use this for pre-prepared dry plate glass negatives and tintype positives.

Wet plate backs hold only one wet plate at a time. When using wet plate with the Stereo 12, be sure to clean all traces of any chemicals that spill into or touch the Stereo 12 body soon after use, as collodion will damage the camera over time.

Instant Film

The days of 4x5 instant film have largely passed, but the Stereo 12 is compatible with a couple of instant film backs:

Polaroid 545i: This back takes PN instant film. It is available used. The New55 project manufactured new BW and color versions of this film for some time, but is currently not. We'll see what the future holds.

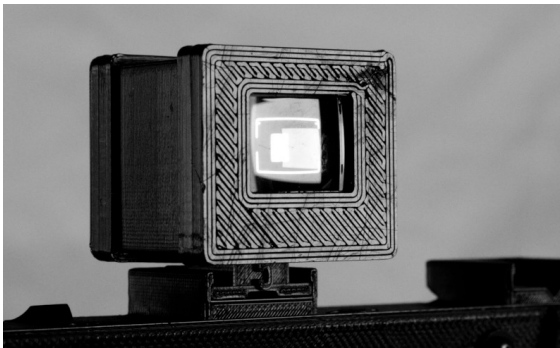**Polaroid 550 or Fuji PA-45:** These backs take Fuji's famous FP-100C45 peel-apart film, now

discontinued. It is still available, for a premium price, used. While a new version of Type 100 film is being made as <u>One Instant</u>, the larger 4x5 size required by the Stereo 12 has not yet been re-engineered.

Essential Accessories

Viewfinder: Required when shooting without ground glass. The camera can accept any accessory viewfinder with a cold shoe foot. The viewfinder must match the focal length of your lenses. The Mercury 5S viewfinder was specially developed for this camera. It is a simple, non-optical (it doesn't contain a lens) and has interchangeable front plates for 75/80mm, 90mm, or 100/105mm lenses.
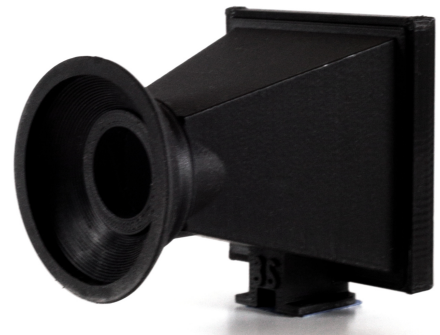
For 65mm lenses, Mercury makes an inexpensive optical viewfinder and a Deluxe optical viewfinder. The Deluxe version contains a brightline frame for 65mm and a larger view area for 55mm (but can also be used with 47mm lenses, though you'll have to keep in mind that a bit more will be captured than you will see through the viewfinder).

You can use any cold shoe accessory viewfinder with your camera, so you can shop vintage or 3rd party options if you like. Just note the 35mm equivalent FOV of your lens (given in the Full Lens Info document) and search for a viewfinder of that focal length.

Note that when using the Mercury 65/55mm viewfinder or 3rd party viewfinders, they will be formatted for a slightly rectangular frame, when the proper frame for the Stereo 12 should be square. Use the viewfinder's edges as a rough average and keep in mind that the frame will be slightly taller and slightly less wide than you see. Or, in other words, your actual frame size is an average of your vertical view and your horizontal view. In practice, this is not difficult to judge.

One of the best viewfinders ever made, especially for medium format lenses, is the Mamiya Press 65mm viewfinder that was bundled with the M-Press 65mm lens. Unfortunately, these are difficult to find independently, and will be significantly more expensive than Mercury options. The viewfinder has three chief advantages: it is very large and comfortable to use, it includes parallax correction for close-up subjects, and it can be easily masked to a 6x6 frame by adding opaque window film, cardboard, or gaffer's tape strips on the right and left sides of the front glass of the finder. Just mask down to the existing indicators. Note that thusly configured, this finder will crop a bit tighter than your actual image. The finder also isn't usable for any other focal lengths, as it contains no brightlines or excess image area like the Mercury Deluxe 65/55mm finder. Finally, the Mamiya 65mm finder has a non-standard cold shoe foot that will need to be filed/cut down or replaced before it will mount on non-Press cameras. Mercury Works makes a replacement foot for this finder. To replace the stock foot, just remove the two flathead screws on the original, lift away the foot, replace it with the Mercury version, and attach it using the original two screws.

Final Note: Only the black version of the Mamiya 65mm viewfinder is suitable for Mercury Stereo use. The older gray/beige version is offset instead of centered, and will not produce an accurate image.

Camera Strap: This camera is designed to accept camera straps with quick release connectors. These have thin but strong cords that you push through the curved holes in the top of the camera as shown, then feed the plastic connector through the loop you've made and pull tight. Many types are available via online

marketplaces. Here's <u>one recommended strap</u>.

Spanner Wrench: This versatile and inexpensive tool is used to setup your lensboard for the first time.

Lens Caps: If the lenses you chose to use with your camera don't have individual lens caps (true for Mamiya TLR lenses in particular), you'll need to order some generic lens caps for them. 65mm TLR lenses use 48mm caps, while all other Mamiya TLR lenses use 46mm caps. Consult the Full Lens Info document for filter size (and thus lens cap size) for all tested lenses.

Highly Recommended Accessories

Side Handle: If you plan to shoot handheld for any length of time, we highly recommend a removeable side handle. This greatly improves the ergonomics of the Stereo 12, which has been engineered to accept some handles that conform to the Smallrig standard. Some handles have too short of mounting screws and can be modified. Some interfere slightly with the side cold shoe can can also be modified. Here are two that work without modification and are highly recommended:

- Highest quality, larger size, faster mounting/unmounting screws: Smallrig Universal Aluminum Side Handle Grip, <u>HSS2425</u>

- Best Value, smaller size, great for travel: Neewer Aluminum Side Handle Grip, <u>VS105</u>
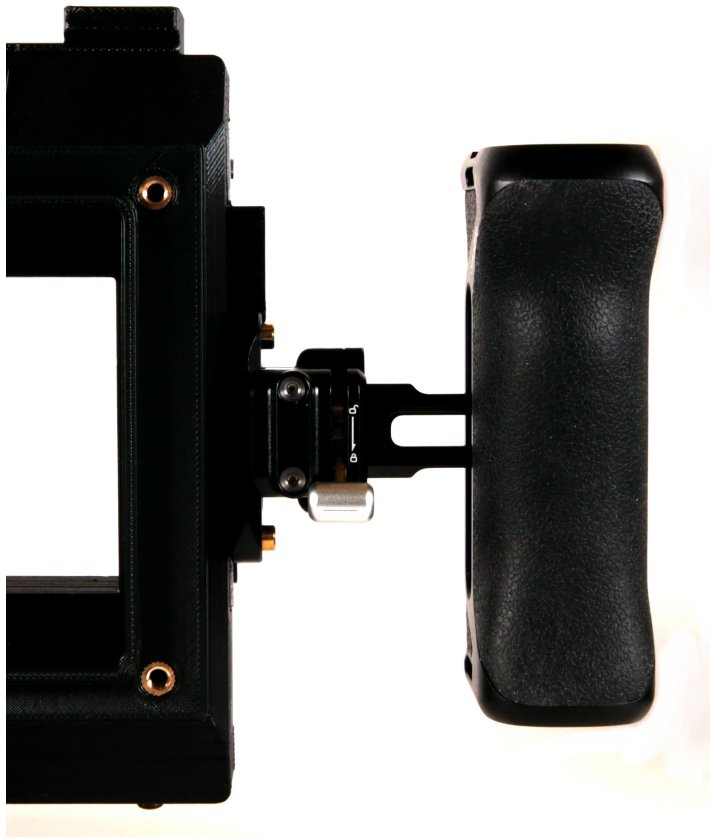
Perhaps the fanciest side handle is a "Nato Quick Release" version of the Smallrig Universal handle mentioned above. It is a bit larger, bulkier, and heavier than the standard options (especially the Neewer), but it is a great option for photographers who want to frequently pop on and pop off a side handle. To make use of this handle, however, you'll need three items:

- SmallRig Snap-On NATO Side Handle, 1/4"-20 Thread Hole- 4017

- SmallRig Mini NATO Rail, Anti-Off Quick Release NATO Rail, Thickness 6mm, Length 48mm for NATO Handle, Camera Cage – 2172

- Mercury Stereo 12 NATO adapter kit. This consists of a thin spacer that goes under your Mini NATO Rail and a replacement side cold shoe that conforms to the rail. If ordered at the same time as your camera, Mercury Works will install this for you. Otherwise, you will need a Torx #6 driver to remove the side cold shoe's screws. Use the same screws on the new cold shoe.

Ground Glass back: For calibration/checking of your lenses and for shooting on a tripod, a ground glass is essential for precision stereoscopic work. Mercury Works offers three versions for this camera: the **Basic** back, which provides ground glass viewing but can't mount any accessories, the **Deluxe** back (which can accept a range of mountable accessories via adjustable mounting rails, and also includes a light-blocking ridge on the camera side to block light and help lock it more firmly in place on your camera), and the **Deluxe Ultrabright** back (which functions like the Deluxe but makes use of a high-end optical plastic with etched grid and integrated fresnel lens to increase its brightness from the standard ground glass). Accessories for the Deluxe versions include a protective cap, a hood, and a magnifying viewer.
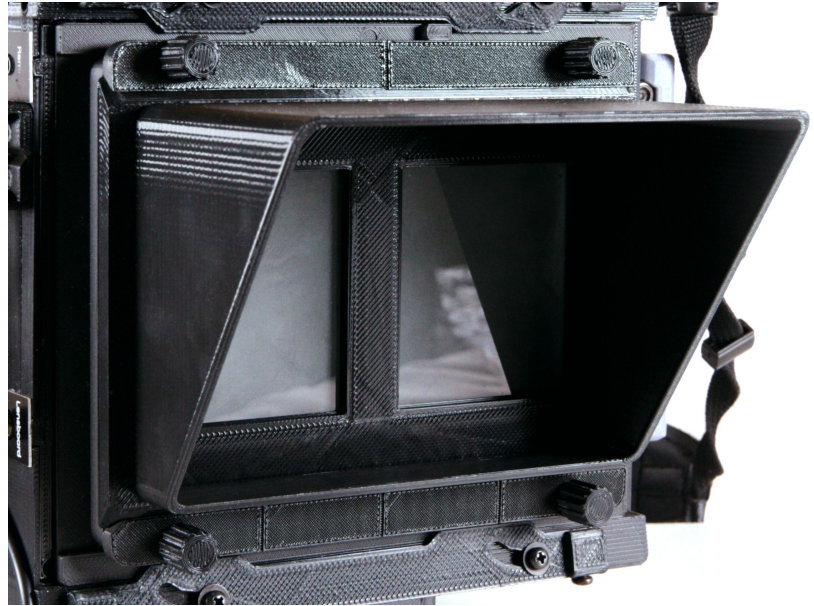
Accessories for the Deluxe ground glass backs include a **sun-blocking hood** (pictured above), a **protective cap** for use during transportation and storage, and a **Sliding Magnifier** that blocks sun from your image, can shift to either the left or right images, and magnifies your image to enable detailed inspection of focus.
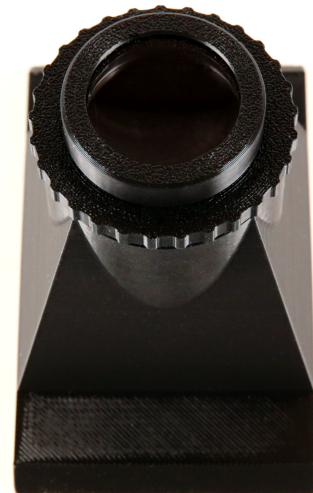
QR Clamp: If your tripod doesn't already have an Arca Swiss style QR base, we highly recommend getting one. The Stereo 12 has a built in QR plate meant to mount to this type of base. This is the most secure method of mounting your camera. You can choose any generic base of the "Arca Swiss QR" type. These can be found in many online marketplaces.
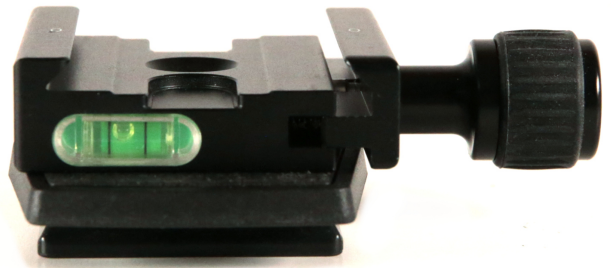
Light Meter: You can use an app (recommended: Light Meter Pro on iOS or Light Meter on Android) on your phone if you can't afford a light meter, but we always recommend a standalone photography light meter. The Sekonic Flashmate is the classic choice for a small, compact, excellent meter. They can often be found used. Larger, more professional Sekonic models are even better.

Remote Trigger: If shooting on a tripod, you'll want a remote trigger. Any basic wired trigger with a 2.5mm connector ("compatible with Canon Rebel") will work. Mercury Works makes a **deluxe** version specifically designed for this camera with a short cable and a cold shoe mount so it remains conveniently mounted on top of the camera until you are ready to shoot.

Mini Screwdriver Set: Useful in general, you may wish to keep the Philips screwdriver from a set like this in your camera bag at all times if you choose to use the included screws to secure the battery compartment plate.

Filter Step-Up Rings: If you plan to shoot with multiple lenses, we highly recommend that you standardize your lens filters by stepping all of your lenses up to the same filter size. We recommend 52mm. Most of our Recommended lenses are natively 52mm or smaller, and those that are larger (up to 58mm) are designed to cover large format and can be stepped *down* to 52mm without cropping/vignetting the image. 52mm is a very common and economic filter size. It is also the default recommended size for our Lens Shade system (see below).

Lens Shades: Lens shades can be more important for stereo photography than mono because lens flares will disproportionately affect the two different views, producing a discordant visual effect for the viewer. The Mercury Stereo Lens Shade system can be used with all lenses in our Recommended list. See Advanced Options for an explanation of the system. While our Shade system offers more extensive

shading than screw-on shades and provides full access to lens filters without the necessity of removing the shade (and doesn't require a second size of lens caps), you can also use screw-on filters, at least for longer lenses.

Lensboard Shell: Use this to protect your lensboard during storage and travel. The Lensboard Shell can be be used on-camera or as a complete form of protection for a detached lensboard. It consists of a front shell that protects all of the sensitive electronics and connections on your lensboard, with cutouts for your lenses, so you can still access their lenscaps, etc. We make two models: one for all size 0 lensboards (left, below), and one for all size 00 lensboards (right, below). The 00 front shell is compatible with standard base and 57mm base lensboards.
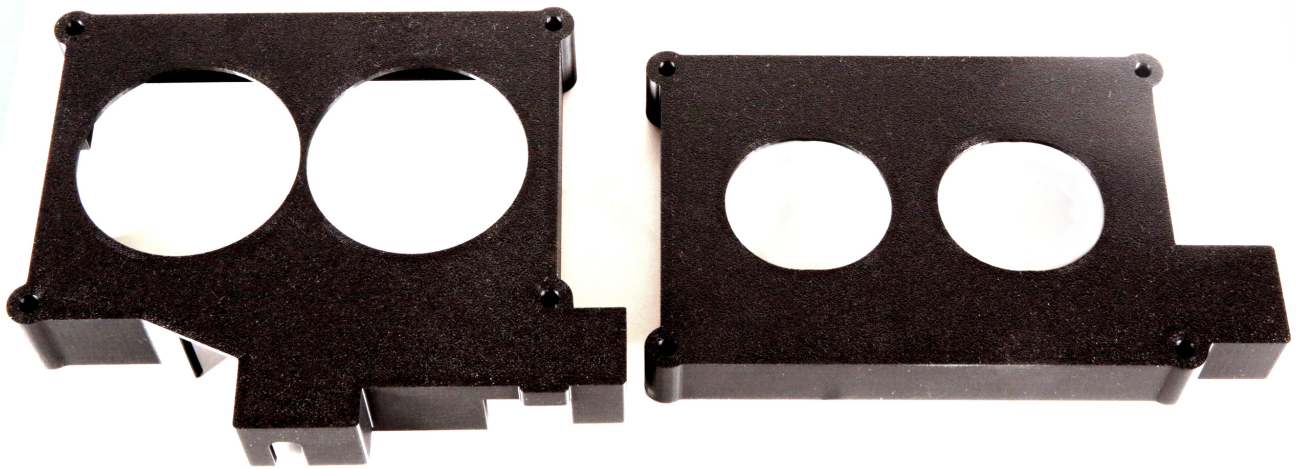
When used on-camera to protect a lensboard that is currently mounted, you use only the front shell. You need two front bolts that are approximately 25mm longer than the bolts you are currently using. In practical terms, if you are using gray bolts, you'll likely need orange. If you're using black bolts, you'll likely need red. (For the list of all bolts, with their lengths and colors, see the "Full Lens Info" spreadsheet downloadable from www.mercurystereo.com, which contains a "Bolts" sheet devoted to this info.

When used to protect a detached lensboard, the Front Shell is paired with a Rear Shell that fully encloses the back side of your lensboard, including lens elements. We make Rear Shells in a variety of different depths to accommodate different lenses. Each Rear Shell is imprinted with its depth (in millimeters) on the inside for reference. See the main info sheet in the "Full Lens Info" spreadsheet (downloadable from www.mercurystereo.com) for the minimum depth required for each lens. All of our Rear Shells are compatible with all of our Front Shells.

A Rear Shell is screwed together with a Front Shell with at least two standard front bolts (in opposite corners). The Copal 0 Front Shell requires **black** bolts to couple with any Rear Shell. The Compur 00 Front Shell requires **gray** bolts to couple with any Rear Shell.

Use of the Stereo 12 Shell system is *very highly recommended* for travel, backpacking, etc.

Graflok 45 Rear Protective Cap: This is a simple rear cover for your Stereo 12. It locks in place like any Graflok back, but is simply a protective cover. Use this when transporting or storing your camera without a back attached. It keeps the interior of your camera, as well as your lenses, protecting from dust, debris, and impacts. This cap contains a groove on the inside surface that you can optionally glue a ridge to if you want an even more secure fit: the ridge will lock into the right-side slot on on your camera. Note that this protective cap is compatible not just with the Stereo 12, but also with all large format cameras that accept Graflok 45 style backs. This includes the Mercury Stereo Pano body and the Mercury Universal 4x5.
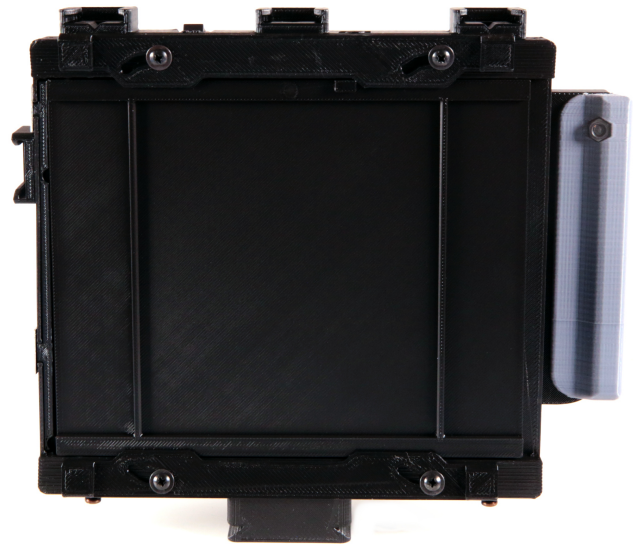
Advanced Accessories

Range Finder: The Stereo 12 uses zone focusing, but if you are bad at estimating distances or want a more precise device, a vintage accessory range finder can be used. For more information and a comprehensive set of options with reviews, see the Mercury Range Finder Roundup at www.mercurycamera.com

Lens Element Mount: This accepts the viewing lens mounts from Mamiya TLR lensboards, which otherwise aren't used with Mercury cameras. This allows you to safely store a complete set of exra lens elements that can be screwed into your Mercury Stereo lensboard when you wish to use them. This includes a press-on back cap to protect the rear elements. You should use lenscaps to protect the front elements. You can also use a discarded Mamiya TLR lensboard, along with two of its viewer lens element spacers, to hold an extra set of lens elements, albeit without any rear protection.

Ground Glass Loupe: If you don't have a Mercury Deluxe Ground Glass back and its accompanying Magnifier, or you want higher levels of spot magnification (especially for testing/calibration of lenses), we recommend a high quality metal 6X or 8X ground glass loupe. These can be found on various online marketplaces. We do not recommend any cheap plastic versions.

Of course, some of the best upgrades for your camera system are extra lenses and extra film backs. See Part II of this Guide for details of options.

PART II: HOW TO SHOOT A STEREO PHOTO WITH YOUR CAMERA

1. Work out your shot. Frame up using the viewfinder or (advanced) ground glass back if shooting on a tripod. To use ground glass, replace your film back with a ground glass back, mount the camera on a tripod, and put your lenses into "aperture preview" mode.

2. Make sure that your subject(s) falls within your focal range. Focal range is determined by the particular "focus spacer" you have on your camera. Swapping out the focus spacer for a different one will shift your focus zone, or the range of distances that are sharply in focus. There are 14 possible focus spacers, but in practice each lens only requires around 3 spacers to cover all ordinary focal ranges. Focus spacers with lower numbers set your focus zone further away, while spacers with larger number move your focus range closer. Each focus spacer lists its number on the left and right sides. A comprehensive table of all spacers and their focus ranges at different f-stops can be found in the Mercury "Lens Focal Info" spreadsheet, available for download at www.mercurystereo.com.

That spreadsheet can be printed to create labels for each lens-spacer combo that lists focal ranges at three different f-stops (circled below). From left to right: the range if your lens is set to f/22, the range if your lens is set to f/16, and f/8. This information can be customized before you print if you wish.
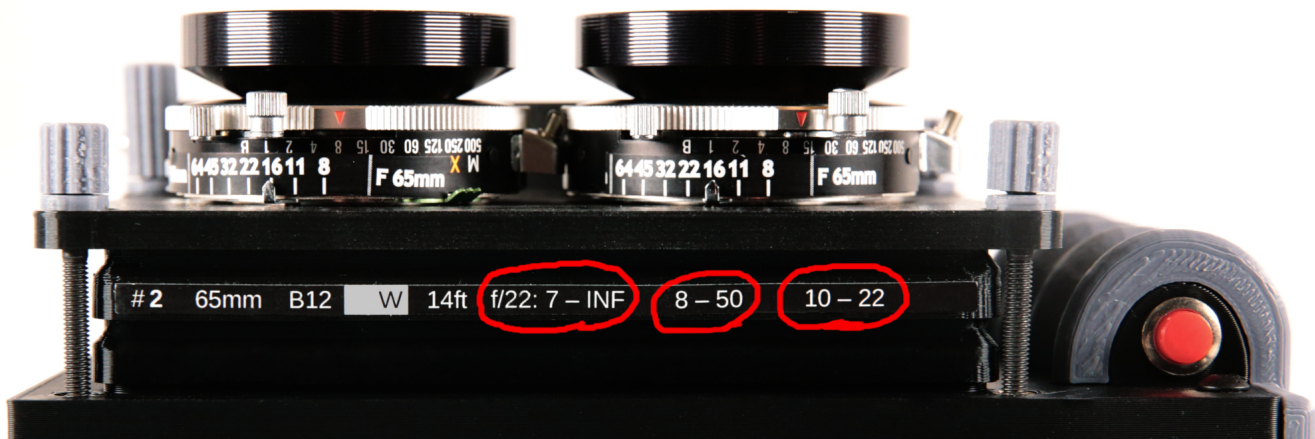
Does your focal range look reasonable? If your subject falls closer or farther away, you can change to a different front spacer. Just fully loosen the four thumbscrews on the front of the camera, lift away your lensboard, usually keeping it connected via wire to the camera body. You'll notice two spacers below the lensboard: the one next to the camera body is the BASE spacer. Leave it there. The second, the one with the focal range numbers, is your focal spacer. Remove it and replace it with a different one. As the numerical value (#) of each spacer increases, the camera will focus closer.

Once you've replaced the spacer (make sure it snapped all the way in place, evenly), place the lensboard back on top and screw down the thumbscrews. Sometimes you will need to remove or add washers to your thumbscrew for different spacers, or change to screws with different colored heads. Each spacer's label has a colored box that indicates which bolt to use, and if it also requires a washer

("W").

3. Take a light reading. While a real light meter is the best way to do this, but if you don't have one you can use any light meter app. Recommendations: Light Meter for Android, or Light Meter PRO for iOS. Input the ISO of your loaded film. Take a light reading with your phone.

For stereo photography, because the goal is usually to maximize your depth of field, you generally want to choose the largest f-stop number you can, to maximize what is in focus (which increases the stereo depth in the image). However, you have to keep a reasonable shutter speed. If hand-holding the camera, you need to have a 30 shutter speed or faster (larger number). If on a tripod, you can slow down your shutter speed all the way to 1 second.

4. Set your chosen f-stop and shutter speed settings on *both* shutters:

Simply turn the aperture and shutter speed rings on both shutters until your desired settings have been set identically for both. (If your aperture scale has multiple colored lines, line up with the color that matches your lens.)

5. Prep the camera to shoot.

(a) If on a tripod and you want to use a remote trigger, plug it in now to the jack on the left side of the camera, near the top, labeled "Remote."

(b) Turn the camera on via the switch on top:
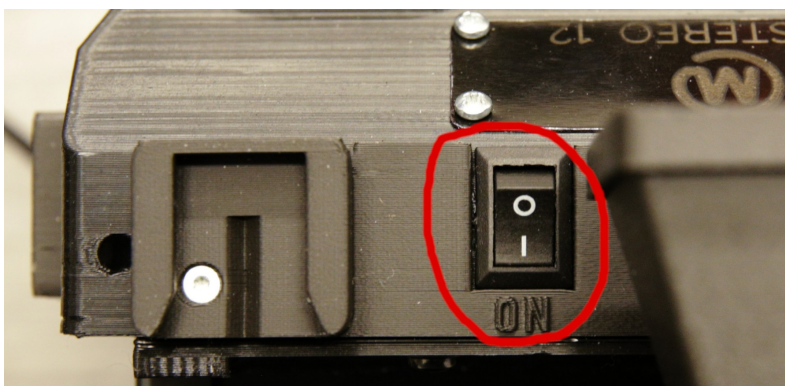
(c) Remove your lens caps. It's easy to forget to do this when not using a ground glass back, since you are using a viewfinder and not looking through the lenses themselves when you are previewing!

(d) Cock both of your shutters by moving the silver levers (circled below) to the left until they click in place. If you're using lenses other than Mamiya TLR, your cocking levers will look different and may, in some cases, move in opposite directions on the two different shutters.
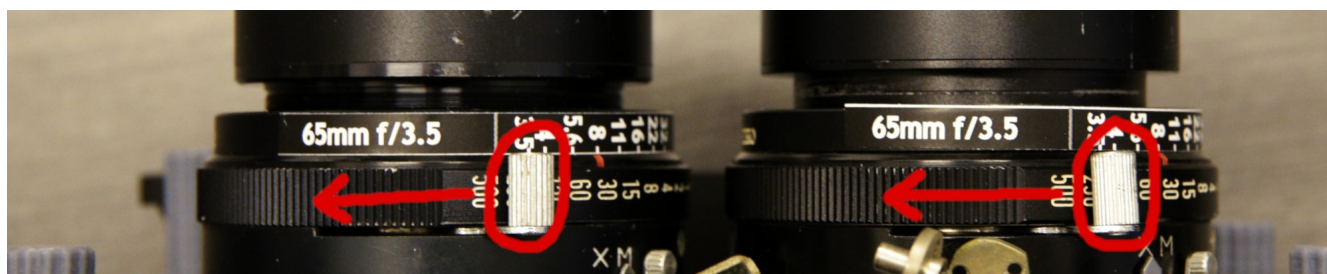
(d) Final step, when you are ready to shoot: slide the darkslide out of your film back, pulling it to the right until you see the line drawn on it. Stop there.
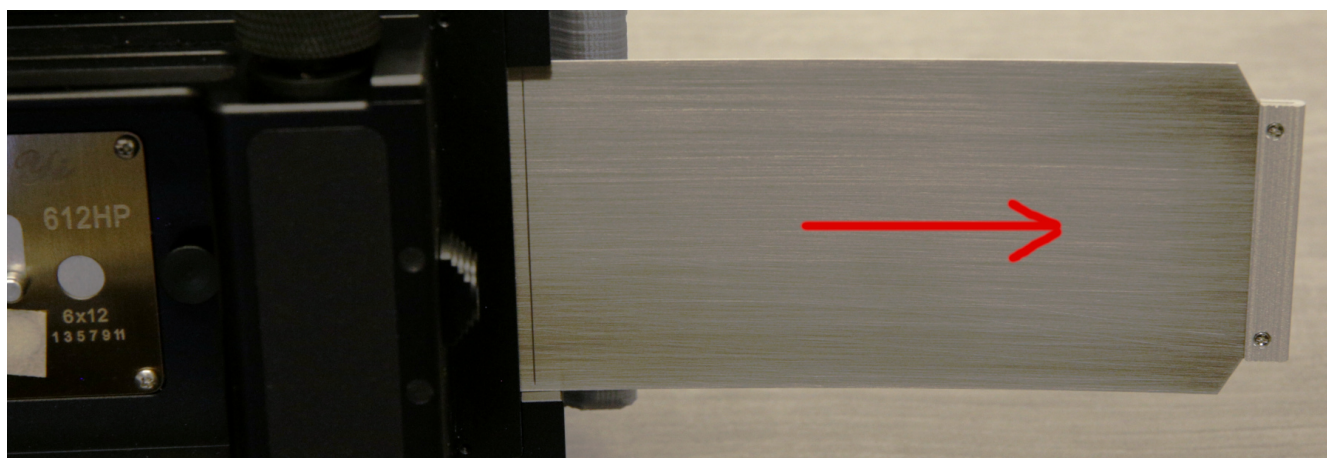
6. Trigger the camera. Press the red trigger button on the camera grip or the button on your remote

trigger, if you have one plugged in. The shutters should fire. You can check, afterwards, to see if both cocking levers are back to their uncocked position. If they are, all went well!

7. Close your darkslide and advance the film. It is important to do this immediately after exposing a shot! If you don't successfully train yourself to ignore everything else and immediately advance the film, you *will* inevitably make mistakes (advance twice and lose film or not advance and double expose).

If you are using a lever-operated rollfilm back, advance to the next frame. If you are using a windowed 120 back, wind the knob until the next odd number on the backing paper shows through the window, and close the window. If you are using a cut film holder, make sure that your darkslide handle has been re-inserted with the silver side facing outward, then flip the holder around and re-attach it to the camera. If you are using a Grafmatic back, advance the mechanism so that the next frame number is showing on the frame counter.

Next...

Your camera is now ready to take another exposure. If you're done for awhile, be sure to replace your lenscaps and turn the camera off to save your batteries.

Changing Batteries

If you ever need to change batteries, they are accessible once you take your film back off the camera. Remove the two screws holding the battery cover in place.

The Mercury takes two 9V batteries. We recommend using name brand Alkaline batteries. Lithium batteries last much longer, but have less power and can lead to inadequate triggering. Do not use rechargeable batteries—they don't have enough amperage, and their internal circuitry will likely shut them down due to the Stereo 12's unique circuitry.

How long your batteries will last depends on their age since produced, quality, ambient temperature and humidity, and whether you forget to turn off your camera when not using it, but you will generally get about 80 exposures from one set of batteries.

PART III: ADVANCED OPTIONS

Shooting with Ground Glass

If you are shooting in a controlled or slowly changing environment, the greatest precision is afforded by shooting on a tripod with ground glass. Large format photographers know the joy that this style of shooting brings.

Aperture Preview

Instead of a film back, start with a ground glass back mounted. If you are using the Copal or Generic 0 lensboard, place the two shutters in preview mode. Copal shutters have a triangular preview lever that is slid to one side to engage preview mode, whether the shutter is cocked or not. The Seiko LF shutter also has a preview lever, but the shutter must be cocked to engage it.

Mamiya TLR shutters don't have preview modes, so our corresponding lensboards contain special preview screws. To activate them, make sure the Mercury preview thumbscrews are threaded into the front of the lensboard (they can be screwed into the back side of the lensboard when not used). Set each shutter to the "B" shutter speed. Then, for each shutter, press the actuator piston, where it connects to the shutter release lever, away from the shutter. This will actuate the shutter, but keep pressing the piston, holding it in the actuated position, and thread the corresponding preview thumbscrew in until it meets with the first hint of resistance. Let go of the piston. The screw should hold it in place. Do this for both shutters.

Compur 0 shutters have a preview nub that has to be moved along the body of the shutter. One shutter, however, will have its nub somewhat obscured by the other shutter. You can either use some thin tool to rotate the nub or use a preview actuator screw for that shutter, just as with Mamiya TLR shutters.

Compur 00 shutters are especially tiny and do not possess aperture preview modes, and our lensboards for them, in the spirit of an extremely compact unit, do not possess preview locks either. While we don't recommend these lenses for ground glass use, you can certainly still use them by setting the shutters to "B" and then holding the solenoid piston(s) open after tripping the shutter.

For all shutters: change your aperture to the largest (that is, the smallest f-stop number) available.

You should now have an image from each lens showing in your ground glass. Of course, slow lenses will produce much dimmer image than fast lenses, brighter subjects will be easier to see than dark ones, and you must adequately block light from *behind* the camera from shining on the ground glass. You can use a darkcloth to block out the light, or hold a magnifier loupe designed for ground glass to the surface of the glass, or, if you have a Deluxe Mercury Ground Glass back, you can insert our hood or our magnifying viewer into the rails on the back. Both of these will help block out the exterior light and help you focus on the image being produced by your lenses.

Composing on Ground Glass

Ground glass will help you visualize the exact image you will photograph, including focus range (depth of field) and composition. But unlike flat photography, ground glass gives you additional information for stereography. Namely: divergence.

The two "views" displayed on your ground glass are of the same scene, but from two slightly different perspectives. The differences between these side-by-side images are directly translatable into the 3D effect of the final photo, when viewed through any stereo viewer. That is, through the ground glass you're seeing not a stereo image in 3D, but rather a dissected stereo image: one where you can see how much each object in the frame diverges from the other view. A high degree of divergence will produce

an image "close" in 3D space, while a low degree of divergence will place that object at a distant plane, behind the high-divergence one, and so on. You will quickly learn to associate ground glass divergence with stereo depth. Ground glass is thus a very powerful tool for composing in Z-space. You can instantly see the depth effects of moving the camera closer or farther away, repositioning subjects within the scene, and changing lenses. Since these are all tools that are important to stereography, it helps to be able to fully preview them.

Also notice that the edges of your frame are not the same for the two views. Each view will have different edges. In the final 3D image, only objects visible in both views will be rendered with great clarity. Anything visible only to one eye will hover at the periphery of your vision but have no real 3D presence. Ground glass thus allows your to far more precisely adjust your composition so that your left and right edges fall in good places, without cropping anything important.

Note: When viewing with ground glass, you are seeing what the film sees, not what the viewer will see later. Your images will be upside down (that how your film or sensor records images in all cameras) and reversed left-to-right. In addition, your stereo views are in the wrong order: the one on the left is actually meant for your right eye, and vice versa. But none of this matters once you get used to it. The features described above give you an *analytical* version of your photo, providing detailed information to the knowing photograph, not a *synthetic* version meant for viewers' enjoyment.

Exposing Your Shot

Once you've adjusted all relevant parameters of your image, lock your tripod and replace the ground glass back with a film back, loaded with your choice of film.

Attach a remote trigger unless shooting with a high shutter speed, so you don't have to touch the camera when you expose your shot.

Don't forget to take your lenses out of preview mode and set your actual desired shutter speed and aperture. Then take your shot.

When you view a scene through a viewfinder, you only see an average of two different perspectives. This works when shooting rough and dirty, handheld, but for precise stereographic control, ground glass opens up an entirely new world of stereo photographic control.

Deluxe Ground Glass Back Accessories

Unlike the basic Mercury Stereo ground glass, our Deluxe Ground Glass Back possesses two accessory rails that can be tightened or loosened with four thumbscrews. Accessories mount by sliding on either end of the back, under the accessory rails. Accessories include the following:

Ground Glass Shade: This shade blocks light from the top and sides to help you view your image on your ground glass, even when the camera is in the sun.

Protective Cap: This simple cap protects your ground glass from impacts, scratches, and dirt when it is not being used. It is a very good idea to slide it in place when the ground glass back is being transported.

Ground Glass Magnifier: This magnifying viewer slides onto the accessory rails and into either the left or right position, displaying one lens view at a time. By blocking stray light, it allows you to view your image without a handheld loupe, even in direct sunlight, in sufficient detail to ascertain critical focus, framing, and stereoscopic divergence at different depth planes. It can even be slid to the right or left edge of the ground glass back, allowing it to be fully removed from view without taking it off the back. The eyepiece can be rotated to focus for particular viewers' eyes.
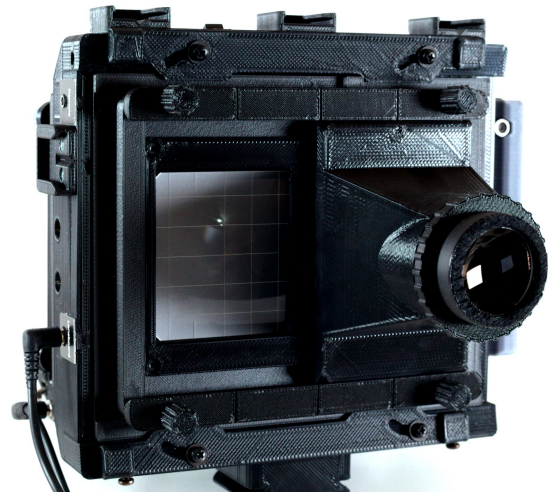
Mercury Stereo Lens Shade System

This a fully modular system that consists of two parts: A Shade Base and a Shade. The Shade Base is rated by filter size: either the native filter size of the lenses you wish to use or the size of your step-up ring if using one (as we recommend). We recommend that you standardize your stereo lenses (even if only using one lens set) to 52mm. This is our default Shade Base size, but others are available as well, such as 46mm and 49mm. We also make a special 52mm Shade Base with a stereo base of 57mm instead of our standard 62.5mm, for users of our Compur 00 57mm Base lensboard.
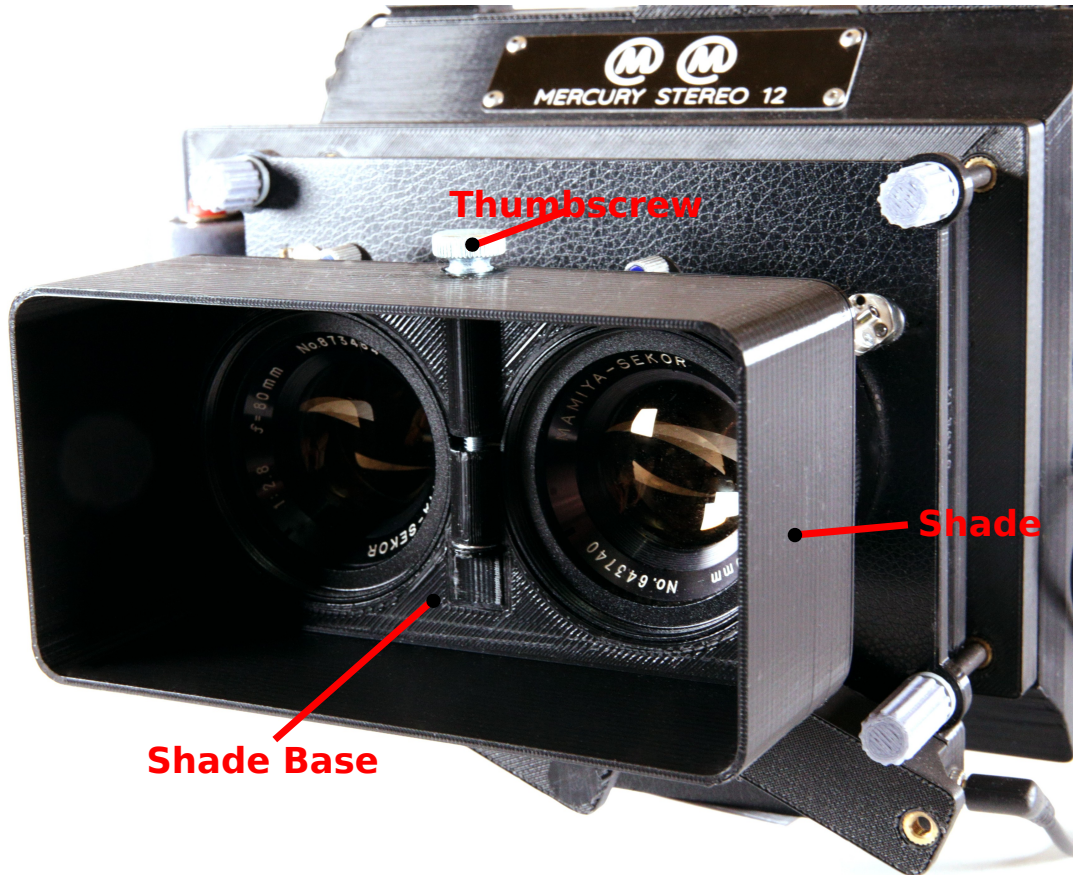
To attach the Shade Base to your lenses, just press it on the front of your step-up adapter or lens until the front of both adapters are flush with the inside surface of the Shade Base.

Shades come in 10mm increments from 25mm to 50mm. All shades "snap" in place over the Shade Base. Because all our Shade Base variants share the same outer size (only the lens/filter diameter is different), the basic set of Shades fit on all Shade Bases universally.

To lock a Shade in place and tighten the Shade Base to your lens pair, insert the thumbscrew in the hold in the top and turn it until the Shade Base is holding fairly tightly to your step-up rings / lenses. There's no need to over-tighten; the Shade Base is designed to slip back and loose in case of extreme impact, rather than shattering (though it will still help protect your lenses in this scenario).

This table shows the maximum recommended Shade depth for different lens focal lengths. Note that you can always use a shorter shade if you want your camera to be more compact or you want even easier access to your lens filters/caps.

Lens Focal Length	Maximum Recommended Shade Size
47mm	25
55mm	30
60mm	35
65mm	40
75mm	45
80mm	45
90mm	45
100mm +	50

Shooting Hyperstereo and Close-Up Stereo

The Mercury Stereo 12 is designed to emulate the human eyes, and records roughly the amount of depth perspective that we have (though this changes somewhat based on the focal length of the lens you use).

There are times, however, when you may wish to shoot subjects that require an expansion or a contraction of the "stereo base." Because we must view these images with our standard human interpupillary distance (IPD), the difference in the spacing of the lenses during photographic explore and the distance of the eyes for viewing allows very close subjects to be processed by our nervous system as resolvable in depth (when they wouldn't be in real life), or very far objects that look flat to us in real life to gain dynamic tension in depth with each other. This is done in the first case by reducing the stereo base, or distance between the two lenses, giving an extremely close object the stereo depth of something somewhat farther away, which we can process, and very far objects an exaggerated stereo base, to make them intelligible in depth.

How can you do this if the distance between lenses on the camera doesn't change?

You can accomplish this with the Mercury Hyperstereo Mount. This metal, sliding mount goes in-between your tripod and the foot of the Mercury camera, all using the same QR system already built-in to the camera.

To use it, set up your shot (tripod only) then *only cock the left shutter* at first. If you are shooting a distant subject and need to increase the stereo depth, loosen the large knob that protrudes toward you and physically slide the top plate (including the entire camera) to the left if you want to increase the stereo base and to the right if you want to decrease it. Measure how far you've shifted by aligning the left edge of the bottom plate with the scale on the top plate. Each line represents 1mm. The maximum you should ever shift is to the 0 point. If contracting, this would fully cancel the stereo effect and your left and right lenses would shoot the same thing (a flat image). If expanding, this will roughly quadruple your stereo base.

Note that our default printable spreadsheet for spacer labels includes, as an optional data point, a suggestion for how much to shift, assuming that you *closest* subject is near (and certainly not closer than) the close focus distance of your depth of field at f/22. Include this in your spacer labels if you wish to shoot with the Hyperstereo Mount and find this useful.

When you've shifted the amount you want, tighten the big knob and trigger the camera. (Remember that only the left lens will fire.) Then shift to the right, to the same number you used when shifting to the left (this time measure from the *right* edge of the base plate), cock just the right shutter, and trigger the camera again. Now advance your film. You've shot a hyperstereo photo!

Extreme Hyperstereo

If you want to shoot something *really* far from the camera, such as a distant mountain range, you will need much more hyperstereo shifting than is possible with the Hyperstereo Mount. To do this you will have to either rig something ridiculous or physically walk the camera to the left and then the right. Of course, doing this will introduce all sort of potential alignment problems, but it's worth experimenting with!

Extreme Close-ups

If you want to shoot a subject *really* close to the camera, you can experiment to work out the amount of negative shift that results in a good photo, but you will likely need to drastically increase your front

spacing to achieve actual close-up focus. You can stack multiple spacers with extra-long bolts or makeshift methods of attachment. Custom spacers can also be made. Ask us if you want to go this route! To determine the amount of spacing you need for a given focal distance, experiment while viewing with a ground glass back until you have a number.

Part IV: Viewing in 3D: Digital

Compositing Digital 3D Images

Once you have shot a stereo pair, you will need to edit and composite it into a 3D format before you can view it in full 3D.

Pre-Editing

You can edit your individual images like you would any other in a photo editing program such as Gimp, Photoshop, Lightroom, or Capture One. Just remember these tips:

- Do not crop any smaller than the borders of the image during this step. All cropping should be done only in Stereo Photo Maker (see below).
- Any changes you make to exposure, color balance, etc., should be made to the other image in your stereo pair as well.
- Dust busting is a good idea, as dust, hairs, or specs that appear on one image but not the other are very prominent when viewing in 3D.

When pre-editing, you can open both images, scale them the same, and place them side by side on your monitor in order to preview their stereo qualities using a screen viewer (see section below).

Compositing in Stereo Photo Maker

Once you have edited your individual images to fix any imperfections and set your color, contrast, etc., import them both into Stereo Photo Maker. This is a free program, found at https://stereo.jpn.org/eng/stphmkr/

1. Open Dual Images. Choose both.

2. Check to see if left and right are correct. Use a screen viewer (best, see below) or switch into Analglyph mode and use a pair of analytic glasses to see if the foreground objects look closer than the background objects. If this is reversed, click the "Swap Images" button and check again.

3. Most of the time, you can auto correct alignment and stereo window placement by clicking on the Auto Align button.

4. If you need to move the depth of the entire photo so that an objet isn't causing a window violation (crossing a window and remaining visible to an eye that, spatially, shouldn't be able to see it), or have an object in the foreground that you want to proceed to "pop out" on the viewer's side of the window, you can change the overall placement in depth of the photo using the left and right arrow keys on the keyboard. Right arrow moves the images further apart and causes the overall stereo view to recede further behind the window. Left arrow moves the images closer together and causes everything to move closer to the viewer.

5. If colors or exposure are inconsistent between the two images, use Image → Auto Correct Color to fix. Select the Left or Right side as your reference, and SPM will attempt to make the other images match.

6. When you're happy with everything press "S" or select "Save" to save your stereo pair in side by side (SBS) format. This is the most ubiquitous format, but other formats are also available.

If you want to print (or make a PDF of) a stereo card for a card viewer, select "Print Stereo Card" from the File menu. Note that you must have at least one printer driver installed on your computer for this option to function properly.

If you want to add borders, select View → Image With Borders and then save that.

Screen Viewing

Once you have a side-by-side (SBS) format image, you can load it directly onto devices for viewing.

The most basic form of stereo viewing is to use a Screen Viewer. This device is simply held up to your eyes while viewing a side-by-side stereo image on any screen (computer monitor, mobile device, projection, TV, or large prints). They are adjustable for different sized image/screens and produce a very high-quality image when viewing high-resolution screens. The best screen viewer we've found is the NVP3D Stereoscope, found here: https://nvp3d.ch/en/shop

Another good screen viewer is the Pocket 3Dvu, which isn't quite as generous in its adjustments or compatible screen sizes, but is less expensive and available here.

Free Viewing

Free viewing involves teaching your eyes to relax certain muscles and focus in certain ways that allow you to fuse two side-by-side images into a single 3D image. For many people it is very easy to learn; for others it never clicks.

There are two methods, each for a different SBS format: Parallel viewing and Cross-Eyed Viewing. Parallel viewing allows you to fuse standard SBS images; Cross-Eyed viewing requires a reversed SBS image, with the right eye on the left side of the pair, and the left eye on the right side of the pair!

A very useful background primer and method for teaching yourself how to free view in a few minutes are given on this page: https://stereoscopy.blog/2022/03/11/learning-to-free-view-see-stereoscopic-images-with-the-naked-eye/

Note that even if you *can* free view, using a viewer of some kind can be far more comfortable for your nervous system, and produce a more cinematic experience by blocking out non-image material.

Formatting Digital Images for a Mercury Parlorscope

Mercury Works makes two different lines of medium format viewers: a 60mm Immersive Parlorscope and a 75mm Gallery Parlorscope. Both are high-end viewers that use the best available lenses and extremely ergonomic designs for a premium viewing experience of both medium format slides and digital stereo images.

If you own, or will exhibit on, a Mercury Parlorscope, we highly recommend that you format your SBS digital images (see next section for analog slides) to optimize them for the particular phone model that you're using inside the Parlorscope.

The following is a step-by-step guide for two different families of Sony 4k phones.

Xperia 1 series: 3840 x 1644

1. Resize image to 2900 pixels wide (keeping the current aspect ratio).

2. If image height is now smaller than 1524, move to Step 3.

If image height is now between 1525 and 1800, resize to a height of 1524 (keeping the current aspect ratio).

If the image was significantly vertical in orientation and thus has a larger height than 1800 or so, the two views will need to be separated (the left image shifted left and the right image shifted right) for proper viewing. Undo the horizontal resize (step 1). Working with the original resolution, multiply the current height by 13 and divide by 7. Resize your canvas' width to that number (while unchaining your vertical canvas size, so that it does not change). Center your image in the new canvas in the dialog box for resizing the canvas, and choose black as your background color. Select your left view, then cut and paste it to a new layer. Divide the width of your canvas roughly into 4 quadrants (i.e., imagine a line down the center, and then a line down the center of each half). Move the left view so that it is centered on the first line (centered on the left half of the canvas) and your right view so that it is centered on the right half of your canvas. (You can also move the right view so that it is an equal distance from the right edge of the canvas as the left view now is.) Now resize your entire image to a height of 1524 while keeping the aspect ratio locked.

3. Resize your canvas, using a black background, to exactly 3840 pixels wide by 1644 pixels in height. Choose the option to center your image in the new canvas size. Save as a JPG for viewing.

Xperia Z5 Premium or XZ Premium:

Final resolution: 3840 x 2160

1. Resize image to 1830 pixels high (keeping the current aspect ratio).

2. If image width is now between 3500 and 3840, move to Step 3.

If image width is now larger than 3840, resize to a width of 3840 (keeping the current aspect ratio).

If the image was significantly vertical in orientation and thus has a width less than 3500 or so, the two views will need to be separated (the left image shifted left and the right image shifted right) for proper viewing. Resize your canvas' width to 3840 (while unlocking your aspect ratio, so that your vertical canvas size does not change). Center your image in the new canvas in the dialog box for resizing the canvas, and choose black as your background color. Select first your left view and later your right view, cutting them and pasting them to new layers. Divide the width of your canvas roughly into 4 quadrants (i.e., imagine a line down the center, and then a line down the center of each half). Move the left view so that it is centered on the first line (centered on the left half of the canvas) and your right view so that it is centered on the right half of your canvas.

3. Resize your canvas, using a black background, to exactly 3840 pixels wide by 2160 pixels in height. Choose the option to center your image in the new canvas size. Save as a JPG for viewing.

Viewing Digital Images on your Mercury Parlorscope

Your Mercury Parlorscope can accept medium format slides or Sony 4K phones for digital viewing (if configured to do so; some versions of the Parlarscope omit digital viewing as a feature).

The Immersive (60mm) Parlorscope is compatible with the following phones:

> Sony Xperia Z5 Premium
> Sony Xperia XZ Premium
> Sony Xperia 1 series

The 75mm Parlorscope is compatible only with Sony Xperia 1 series phones.

Each phone has a particular "phone tray" manufactured by Mercury Works, specific to the phone model and the Parlorscope model. Contact us for additional trays.

All phone trays enable the phone to be inserted into the side of the parlorscope. When the tray has been inserted all the way, and the right side is flush with the contour of the parlorscope, the phone is in the correct position. When full inserted, you can still plug devices (such as a charging cable or the included slideshow keyboard) into the USB port on the phone, via the hole in the phone tray.

Instructions for individual phones are provided below.

Xperia Z5 Premium:

This model uses a USB Micro port. It will charge with any USB Micro cable plugged into a USB power source. However, in order to use the Mercury slideshow keyboard, you must authorize the keyboard as a device. You must do this every time the phone is rebooted.

1. Plug in the keyboard, with phone in tray. (The keyboard is connected, via a USB-C cable, to a USB Micro OTG adapter.)

2. From the pull-down quick menu on the phone, select the gear icon: Settings.

3. Device Connection → USB Connectivity → Detect USB Device

4. You won't get any indication it worked, but it did. Go back to the Home screen and proceed from there.

You must also change your Display settings as follows (luckily, these settings are persistent, and you don't need to repeat this after rebooting the phone):

Adaptive Brightness: Off

Set brightness to maximum

Change screen sleep time to 30 minutes

To view stereo images, you must use the Album app. You can add this to your home screen, but by default it is in the "Apps" folder. When you open Album, it will display all photos on your device by default, in reverse chronological order. To load only a curated set of images, tap the "…" menu button within the Album app, and select "Folder". Then select the folder you want to load, and only that folder's contents will be displayed.

Tap a photo to enlarge it to full screen size. Make sure there are no overlays on top of it, and insert the phone tray fully into the viewer. If the orientation of the photos is wrong, tilt the phone until it fills the screen properly.

While viewing, use the two keys on the slideshow keyboard to advance forward or backward among the images in the folder.

Important Note: On this phone, each image takes about 6 seconds to load in full resolution. Before then you will see a pixelated, low-resolution version of the image.

Xperia XZ Premium:

This model uses a USB-C port. It will charge with any USB cable plugged into a USB power source.

To connect the Mercury 2-key keyboard, you need a USB C (phone) to USB A (female) OTG cable, then a USB A to USB C cable to connect the keyboard itself. You can use the included OTG cable, or a splitter OTG cable that provides you with one USB A input and one USB C female input for charging. This optional cable allows you to connect the 2-key keyboard at the same time as a USB C charging cable to power your phone simultaneously. We recommend the MOSWAG USB C OTG Adapter Splitter.

Otherwise, the XZ Premium is used just like the Z5 Premium.

Parlorscope Optical Adjustments

There are two styles of Mercury Parlorscope, each with different adjustments. Our Immersive Parlorscope and our Budget Parlorscope have three adjustment dials:

The left and right focus dials independently adjust the focus for each eye. The IPD adjustment adjusts the spacing between the two lenses to match your eyes. When in doubt, the IPD should be adjusted so that the lenses are at the center point.

The Mercury 75mm viewer has physically larger lenses that do not have, and do not require, IPD adjustment. This viewer accommodates a wide range of IPD values. Accordingly, it possesses only focus adjustments:

Due to the large, heavy lenses in this viewer, the focus adjustment must be kept quite firm. Accordingly, it requires a fair amount of pressure to adjust focus. Do so by sliding the left and right sliders forward or backward.

If you find that adjustment is too difficult, or that the adjustment is slipping, you can tighten or loosen the screws in the middle of the sliders.

Part V: Viewing in 3D: Slides

Shooting Slides

There are several ways to shoot transparencies on the Mercury Stereo system:

1. Shoot 120 slide film. Kodak's E100, Fuji's Veliva 50, Velvia 100 (not available in US), and Provia 100 are all excellent slide films. They tend to be expensive, and must be processed E-6 (Mercury Works Lab processes this, as do some other labs). They are also slow (50 or 100 ISO) and have a very narrow dynamic range (about 6 stops). This makes small differences in exposure critical. Shooting slide film is only recommended in bright sunlight or other extremely controlled lighting conditions.

Note that expired slide film is also available in 70mm, and new slide film available in 4x5 and 135, all of which can be shot on the Mercury.

2. Shoot Motion Picture Film and use M-Chrome service at Mercury Works Labs to create transparencies from your favorite negatives. Kodak Vision 3 65mm films, sold for still photographers by Mercury Works, make excellent slides when processed ECN-2 (rather than C-41) and then printed to transparency using the M-Chrome process. When you order slides from Mercury Works, you can choose to customize your exposure and color balance, giving you far more control over the look of your slides. We can do color or BW slides. We can also make slides from C-41 processed film and BW film, with less predictable contrast and less accurate color.

Significant advantages of this process include:

- A wider range of film stocks. Four Vision 3 film stocks exist, each with special characteristics, including speed, color balance, level of grain, etc.
- Higher ISOs. You can shoot at ISO 50 or up to 1600 (with push developing) to cover a much wider array of subjects and shooting conditions.
- The film is significantly cheaper than slide film.
- Much greater exposure latitude to capture more details in highlights and shadows. This I much more forgiving than slide film for incorrect exposure as well.
- Ability to make *multiple copies* of your favorite negatives!
- Ability to change the color balance and brightness (exposure) of your slides, including making multiple versions.

3. Shoot glass negatives and contact print to glass (or film) transparencies.

This special process yields amazing results. Contact Mercury Works for more information. We can do the processing and positives for you.

Mounting MF3D Slides in Standard Cardboard Mounts

Standard 80x132mm cardboard slide mounts are available from Mercury Works, as well as other vendors and individuals online. The following is a guide to mounting your transparencies (slides or M0Chrome prints) in these mounts. With a bit of practice, it becomes fast, easy, and fun!

1. Choose a mount. If you shot your image with a 112mm back (Horseman 6x12, unmodified Da Yi 6x12, Mercury 70mm, Mercury 135 Pano), you will usually use a 45mm wide window. Slide mounts of this width can be purchased directly from Mercury Works. If you shot with a 120mm modded Day Yi back, or a 4x5 sheet film holder, you can use between a 45mm and 50mm wide window; choose according to where you'd like to mask.

Then choose the height of your stereo window. This depends entirely on aesthetics: how much you wish to mask out (too much sky, too much foreground, etc.).

2. Cut out your chips. These are your individual left and right images. First lay out your stereo pair as developed on a light table, oriented so that you can read the text printed on the film. If there is no text, place your film emulsion side down, and such that your images are look right-side-up and not filled left-to-right.

Now trim the left edge of the leftmost image and the right edge of the rightmost image.

Cut your film down the center, separating the two chips.

Move the rightmost chip to the left side and the leftmost chip to the right side (swap or "transpose" them).

3. Prep your slide mount. First, crease it on the provided crease line, folding it *away* from the indented/embossed line. Then, make sure that the side with the larger squares and no rounded corners is sitting down on your light table, with the other side sticking up vertically.

Next, add double-sided mounting tabs to the base of your slide mount. I recommend adding six per mount: one centered on top of each window, one centered on the bottom of each window, one on the left of the leftmost window, and one on the right of the rightmost window.

In order to get some of these to fit, you will need to cut them in half, lengthwise, and stick half on each side. You can do this for all of them to conserve tabs if you wish.

[example photo coming soon]

4. Position one of your chips. At this point your should put on cotton gloves. I recommend this procedure:

(a) Choose either the top of bottom of the slide to be your reference edge. The other one will get partially masked (how much depends on which slide mount you're using). For instance, if your photo is a portrait and you like the headroom, choose the top as your reference edge. If your subject is near

the ground and the top of your image is a lot of sky, choose the bottom as your reference edge, etc.

(b) When mounting the right chip, use the left edge as your second reference edge. When mounting the left chip, use the right edge as your second reference. In other words, the edge near the center of the slide mount is your automatic reference.

(c) Now that you have two reference edges, line up the corner where they meet on your slide with the corresponding corner of the slide mount's window. Use your reference edges to match the edges of the window, allowing your slide to be completely straight (no rotation/slant).

(d) Holding down the slide at two different points to keep it steady, use a finger on your other hand to push the slide down over all of the adhesive tabs, affixing it (somewhat) in place.

(e) Do the same to the other chip. You now have a preliminary slide position.

5. Measure your near and far homologs. These are two points that are visible and identical in both chips. One should be at or close to the nearest point in the foreground, and one should be as far away as possible (near or at infinity).

Your near homologs should be *at least* 62mm apart. Your far homologs should be *no more than* 65mm apart. If both of these are true, and your images are properly vertically aligned, without rotation/slant, you have a slide that's ready to be comfortably viewed!

If your preliminary mount doesn't satisfy these conditions, you'll need to reposition both of your chips. Let's say that your near homologs only measured 60mm apart. Unless you want the object you're measuring to pop in front of the stereo window (i.e., come "out of the slide" at your viewer), you'll need to move your right chip 1mm to the right, and your left chip 1mm to the left. You can do this easily. Of course, sometimes it works just fine to have an object come out of the slide, especially if it doesn't touch any of the borders of the image.

6. Use a map viewer, prismatic viewing glasses, or an Owl viewer to view your slide. Make sure that it is easy and comfortable to view, and looks good to you.

7. Once your slide is "legal" with regard to its near and far homologs, or you are aware of what is violating the law and are happy with the effect, you can glue your slide.

We recommend using [Neutral pH (archival) PVA glue](). Apply in an "H" pattern. Make sure that you apply plenty of glue to the upper "memo" portion of the slide mount (above your chips). Then draw a line of glue down the center septum of the mount, and across the bottom, left edge to right edge. Try not to get glue directly on your chips. Also note that if your chips come too close to one or more of the edges of the mount, you'll need to further trim your chips to prevent them protruding from the mount, and to keep a "lane" clear for glue.

[example photo coming soon]

7. Place your slide on top of a pre-folded piece of wax paper, fold the slide closed, fold into the piece of wax paper, and insert into a book. Immediately place several other heavy books or other objects on top of it. Let dry for at least several hours (overnight to be extremely careful).

8. Test your slide out in a Mercury Parlorscope or other MF3D viewer and bask in its glory!

Viewing MF3D Slides in Mercury Parlorscopes

All Mercury Parlorscopes are designed to view physical slides. This is accomplished by inserting a "slide carrier" into the top slot of the viewer. All Parlorscopes accept the same universal set of carriers. The only difference is that Parlorscopes that use available light ("Steal the Light" versions) should have the white translucent frame removed from their slide carriers to brighten the image. Parlorscopes with build-in lighting sources should be used *with* the white translucent frame in place. This serves to further diffuse the light and to contain any dust and debris deposited into the carrier as a result of swapping slides.

As dust and debris build up inside the slide carrier, it can be cleaned with a lens-cleaning cloth or (recommended) an anti-static cloth.

Mercury Works makes a number of slide carriers, for different types of slides:

- 80x132mm cardboard slides: the standard MF3D slide mount. These mounts are available from Mercury Works and other companies and individuals online.

- 3D World plastic slides: this defunct format utilizes snap-together plastic mounts

- Thin Glass Slides: up to 1.5mm thick, up to 131mm wide)

- Thick Glass Slides: 2-3mm thick, up to 131mm wide)

- Realist: The standard mount for 135 format slides

All slide carriers work in all of our Parlorscopes.

In our Dual Format Parlorscopes, which work for both slides and digital viewing via 4K phones, you will need to first insert a Phone Plug Tray into the phone slot on the side of the viewer. This blocks light from the side and provides the proper path for the slide carrier to insert from the top of the viewer.

The standard cardboard slide carrier, once inserted, does not need to be removed in order to change slides. Simply grasp the top of the slide mount and pull it out, and drop another slide in. You may, however, remove or partially remove the slide carrier if a slide becomes stuck or it makes it easier for you to grasp. All other slide carriers require you to remove the carrier to change slides. Each slide carrier has to tabs or "ears" that stick above the body of the Parlorscope to make this an easy, instantaneous process.

For Parlorscope optical adjustments, see Part IV of this Guide, above.

Part VI: Working On, Expanding, and Caring For Your Camera

Lens Compatibility

Mercury Works publishes a list of recommended lenses for your Stereo 12 at www.mercurystereo.com, but the camera is compatible with many more lenses that either fall outside of our recommended guidelines or simply haven't been tested by us. You can use any compatible lens with a bit of testing. Here are the requirements for a lens to be compatible with the Stereo 12:

1. It fits into a shutter model officially supported by the camera (see next section) or a shutter no larger than our supported shutters.

2. Neither its front element nor its rear element is larger in diameter than 60mm. In practice, this generally means a 58mm filter thread.

3. It flange focal distance is at least 52mm. That's at the extreme end and will come with a number of restrictions on use; 60mm or more is recommended for more focal and mounting flexibility. The shutter it is mounted in can also impact this number. Flange focal distance can be found in the official datasheets of major lens manufacturers, or measured carefully; it's the distance between the back of the shutter (the surface that rests against the front of the lensboard) and the film plane when the lens is focused at infinity.

4. An image circle of at least 60mm. This is the bare minimum, and won't fully cover your frame at infinity. But because ordinary stereo photos are taken at hyperfocal distances or (more commonly) much closer distances, a 60mm image circle will cover your frame for focal distances 10ft and closer. A 75mm image circle will fully cover infinity focus at hyperfocal distances, and a 79mm image circle will cover at all focal distances (not necessary except for specialty hyperstereo shooting).

For optimal stereo results we recommend that the focal length of your lenses be no longer than 105mm. However, this is not a strict requirement. You can use longer focal lengths for unique results, hyperstereo photography, and mono photography.

Shutter Compatibility

While Mercury makes lensboards for most common shutters (see table below), there are many vintage shutters that we haven't tested with the Stereo 12 but which would work just fine. A shutter will generally be compatible if it isn't larger in diameter (including controls and ports) than 60mm, but sometimes even longer levers are okay as long as they can be oriented away from the center of the lensboard.

Only set-and-release shutters are compatible with electronic actuation. Also, some shutters may be physically compatible with the Stereo 12 but you won't be able to orient their actuation levers in a way that makes them electronically triggerable. In either of these cases, the shutters can still be used without electronic actuation. We make a double-cable release adapter for these lenses, and they can be manually triggered via a simultaneous plunger press in that configuration. Note, however, that the shutters won't be in perfect sync, and thus this isn't a viable setup for rapidly moving subjects.

Let us know if you have a pair of shutters that you believe to be compatible but aren't recommended. We can create a lensboard for you. We just need to know the diameter of the rear threads and the diameter of the retaining ring/flange.

Supported Shutters

Shutter	Triggering	Necessary Modifications	Difficulty	Notes
Copal 0	Electronic Manual	Drill hole in lever	Easy	
Mamiya TLR, black	Electronic Manual	Drill hole in lever, cut/file aperture ring if using with different lens(es)	Fairly Easy	From Mamiya C TLR system
Mamiya TLR, chrome	Electronic Manual	Drill hole in lever, file/cut aperture ring	Moderate	
Seiko 0	Electronic Manual	Drill hole in lever, flip aperture ring and file/cut it, slightly file flash port.	Moderate	Found on Fujinon LF lenses
Seiko SLV	Electronic Manual	Swap aperture lever indicator or file down (1 shutter only)	Fairly Easy	Found on Topcon/Horseman lenses
Compur 0	Electronic Manual	Drill hole in lever, file and flip aperture ring if "Graflex" version	Moderate	
Compur 00	Electronic Manual	None	Very Easy	Easiest shutter to mount!
Copal 0 Press	Manual	None	Very Easy	
Century	Manual	None	Very Easy	Trioptar 103mm lens
Pinhole	Electronic Manual	None	Very Easy	No shutter needed; lensboard has built in manual lift shutter.

Stereo 12 Electronic Lensboards

Lensboard	Notes
Copal 0	Not compatible with "Press" model shutter (use Manual lensboard for that)
Mamiya TLR	Includes aperture preview mechanism

Generic 0	Compatible with Compur 0, Fujinon large format, and Seiko SLV
Compur 00 standard base	
Compur 00 57mm base	Lenses closer together for larger slides
Pinhole Deluxe	Includes switchable pinholes for 50mm and 70mm focal lengths. Regular electronic actuation or digitally timed with optional Trigger Controller.

Manual Lensboards

Lensboard	Notes
0 Manual	Compatible with Copal 0, Copal 0 Press, Compur 0, Seiko/Fujinon large format size 0 shutters (not Seiko SLV)
Mamiya Manual	Includes aperture preview mechanism and remote cable release port.
00 Manual	For Compur 00 lenses
00 Manual 57mm base	For Compur 00; lenses closer together for larger slides
Wista Twin	Requires Wista Twin lensboard (vintage) with removed septum. Requires either BASE 43 spacer or (recommended) Front Extension Spacer 40 + Base 8.
Century	Compatible with Century shutter holding Trioptar or Graftar 103mm lens
Pinhole 50mm Manual	Mounts to camera with no front spacers.
Pinhole 70mm Manual	Mounts to camera with either a Base 43 or (recommended) a Front Extension Spacer 40 + a Base 8.

Setting Up Your Lensboard

See separate document, *"Lens and Shutter Assembly"*

Transporting Your Camera

To protect the surface finish of your camera, we recommend using a folding, velcro-secured, padded gear cover.

The most delicate aspect of the Stereo 12 system is its electronic lensboard. When traveling with the camera in a backpack of suitcase we highly recommend protecting your lensboard with a Mercury Lensboard Shell (see Advanced Accessories section of this Guide for details).

Troubleshooting

Symptom: Electronic Lensboard Won't Trigger

Possible Problems:

- No batteries or drained batteries.
- Blown fuse. Check fuse when back is removed and replace with 20mm 1.5amp slow blow fuse if necessary)
- Lensboard not properly plugged in. Check to make sure that cable is fully plugged in to both lensboard and camera port. Especially the first few times, this plug may meet resistance and feel like it is plugged all the way in, when it isn't. Only when the metal part of the plug has nearly fully disappeared into the port is it all the way plugged in.

Symptom: Electronic Lensboard triggers but one or both of my shutters does not

Possible Problems:

- Batteries are weak or old. Check that they are within their usable dates and not drained. Test with fresh batteries.
- Solenoid connecting wire is not properly tensioned. The wire must be wrapped tightly around both the shutter release lever and the solenoid piston, and the length must be such that when the piston is released the shutter lever can return fully to its rest position (if it doesn't, lengthen the wire between the two), and the shutter trigger can be tripped within the piston's range of motion (if it can't, shorten the wire between the two).
- Shutter has become loose in its mount and is turning slightly when you put pressure on it to cock it. This small rotation of the shutter and mis-tension the wire connection. To fix, reposition the shutter and tighten down the retaining ring on the back of the lensboard. Then consider adding some hot glue to the back of the retaining ring (not touching the shutter's threads) as explained in the lens and shutter assembly guide and online video.
- The shutter is not tripping as smoothly as it should. It may require a CLA from a skilled shutter repairer.

Symptom: Electronic actuator (solenoid) detached from lensboard

Possible Problems:

- We always recommend that you protect your lensboards with our Lensboard Shells, as the most vulnerable components are their actuators. An impact or great deal of pressure against them can in some cases snap them off the lensboard. If this happens, you can glue them back together. We recommend using rubber cement or E6000: glues with some flex. Hard glues are far more likely to fail under the conditions that pertain to shooting this camera. Hold the actuator in place with blue painter's tape or other tape until the glue cures. In an emergency, tape alone can be used to hold the actuator firmly in place.

www.mercurystereo.com