



**STI**

***Stellar Technologies International***

CVF<sup>®</sup> Series II Critical Visual Focusers



# Instruction Manual

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## Introduction

### **Total Flexibility**

Thank you for purchasing a CVF Series II focuser.

The CVF Series II is totally modular in nature and is designed to enable you to easily customize focusing for a specific purpose. Different cameras may be used with the CVF by simply adding different CVF bayonet camera mounts for them.

Several different focusing screens are available and are all interchangeable without the need to recalibrate.

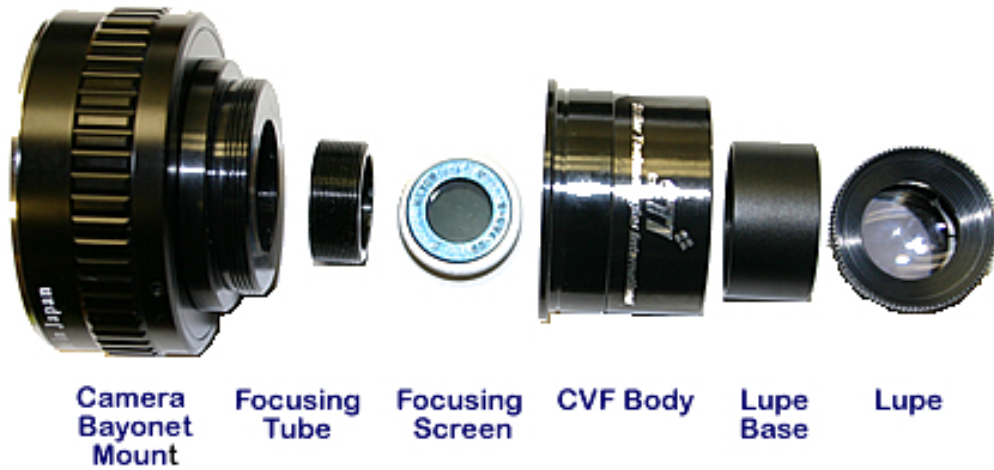
In addition, several different power lupes may be used for different applications.

Focusing screens, lupes, and camera mounts may be used in any combination preferred by the user and are changeable on the fly in the field.



# CVF Series II Components

*Note: Actual components may differ slightly from those shown below*



Please take the time to familiarize yourself with the various components of the CVF and their function before use. Should you have any questions at all, please feel free to call or email us at any time.

# Available Component Options



## 35mm Mounts

Canon EOS  
Nikon  
Olympus  
Minolta  
Pentax-K  
Canon FA  
Minolta Maxxum

## Focusing Screens

Cross-hair  
Hybrid Knife-Edge  
300 LPI Ronchi

## Lupes

10x  
22x

*Other CVF components not listed above may be available. Please inquire.*

## The Modular Camera Mount



35mm

The modular camera mount has a bayonet identical to your camera's. To attach the CVF to your t-ring, position the red dot on the bayonet with the red dot or mark on your t-ring. To remove the CVF from the t-ring, push the tab on its bayonet backwards (not in) and then turn the bayonet assembly until loosened.

A complete modular camera mount assembly is composed of the camera mount, helical focusing tube, and the focusing screen. The helical focusing tube holds the focusing screen assembly is threaded on the outside to permit adjustment by clockwise or counter-clockwise rotation within the internally threaded bayonet housing. This permits ultra-fine adjustment to exactly match the film plane or backfocus of your specific camera. The focusing assembly has already been calibrated for the type of camera which you specified when ordering and should not need adjustment. Please refer to your calibration certificate for the exact measurements of your unit.

The camera modular mount can be easily removed from the body by carefully turning the mount counterclockwise, and replaced doing the opposite. Please be sure the fine threads of the M42 mount are engaged properly with the threads of the body to avoid cross-threading. A rubber o-ring between the threads and the body of the camera mount is present to prevent over-tightening. Force should never be applied when replacing the mount.

### **Focusing Screen**

Note that the focusing screen itself is mounted within a snap bushing surrounded by an aluminum ring. The glass screen itself is held inside the snap bushing by a metal compression ring. Focusing screen assemblies should never be taken apart by the user.

Focusing screen assemblies are removable from the focusing tube and several different types of screen assemblies are available. As shipped, the 'Cross-hair' assembly has

been installed and calibrated to the factory specification for film-plane distance or backfocus of your camera. The calibration position is indicated on the helical focusing tube by a small spot of paint.

**Precautions**

When reattaching the camera Modular Mount to the CVF Series body, please take some precautions. Do not over-tighten the assembly. The bayonet assembly should easily screw into place. Force should never be necessary. If you encounter resistance, back off counter-clockwise and try again until you feel the proper start of the thread.

Please take your time with the above procedure to avoid stripping the fine threading on the bayonet mount and/or the CVF Series body.

## The CVF Body



The CVF Series body assembly is also a modular design. It will accommodate any of the CVF modular camera mounts available and any of the magnifying lupes. The primary function of the CVF body is to align the camera mount axis to the axis of the magnifying lupe and provide a drawtube for the lupe to be able to focus properly on the focusing screen.

To attach a modular camera mount, the CVF body has standard universal M42x1mm threads. To attach a modular camera mount, screw the mount's threads into the female threads in the CVF body. Turn gently clockwise until snug. Do not over-tighten. A rubber o-ring is fitted to the rear of the camera mount to prevent inadvertent over-tightening. Do not remove it.

To remove a modular camera mount, simply unscrew the mount counter-clockwise. Removal of a modular mount does not affect the calibration of the unit.

If you own two different 35mm camera brands, you do not need two CVF Series focusers. You simply purchase an additional CVF camera modular mount to match the second camera. It will screw in to the same CVF body and the same lupes and screens may be used. In addition, no recalibration is necessary when switching between mounts. Backfocus calibration is integral to the modular mount and is *not* affected by its position within the CVF body. This use of a modular focusing body adds tremendous flexibility, benefits, and conveniences for the photographer who uses several different cameras for different applications.

Additional lupe magnifications are available and are interchangeable with the basic 22x lupe which came with your unit. To change lupes, simply unloosen the thumbscrew and replace one lupe with another.

**Important:** When switching between different camera modular mounts or changing focusing screens, first loosen and remove the lupe eyepiece. Failure to do so can result in damage to the lupe, to the focusing screen, or both when the bayonet mount is screwed in again. ***No part of a lupe should ever contact the focusing screen surface.*** Since different modular camera mounts have different backfocus

distances, the lupe eyepiece position will be different for each. Different magnification lopes also have different working distances, - some very close to the screen and others much farther away. To be on the safe side, always attach the modular camera mount to the CVF body first, and then insert and position the lupe.

**Note to Series IV ‘Stiletto’ Users:** All 35mm bayonet mounts and screens designed for use with the Series IV ‘Stiletto’ focuser may also be used with the CVF. However, not all focusing screens designed for the CVF are compatible with the Series IV ‘Stiletto’ focuser since different focusing principles are involved. In addition, mounts for CCD cameras are not available for the CVF at this time. Not all Series IV CCD mounts will function properly with the CVF due to their very short backfocus distances.

## Lupe Adjustment

One of the keys to pinpoint focusing with the CVF Series II is assuring that the lupe is focused properly on the focusing screen.

The basic function of a focusing screen - regardless of type - is to provide a means for the eye to compare the image to be photographed with an area that is already in proper focus. In the case of the CVF focusing screens, the area in proper focus may be a cross-hair pattern, a knife-edge, a ronchi screen, ground glass, or other design. In any case, it is extremely important that the pattern be perfectly focused for your own eye. This is accomplished by positioning of the lupe itself within the CVF body.

To focus a lupe, first unloosen the thumbscrew holding it so that it can be repositioned. Then, aim the CVF assembly at a bright light source while looking through the lupe. As the lupe is moved inwards or outwards, you will notice the pattern etched on the focusing screen becomes sharper. When the pattern appears sharpest, simply lock down the thumbscrew to hold the lupe base assembly in place inside of the CVF body. If necessary, the lupe may be adjusted for finer focus by simply turning the lupe eyepiece within the lupe base. The lupe base is finely threaded to permit small adjustments.

In short, coarse lupe adjustment is obtained by sliding the lupe back and forth, and fine adjustment is made by turning the lupe clockwise or counterclockwise within the lupe base.



# Lupe Magnification



A second key in precision focusing is to choose the proper magnification for the type of object or setting being photographed.

The CVF Series II excels in photographing daytime nature objects at close range, solar photography, and planetary/deep-sky photography. Thus, it can cover subjects only a few feet away to objects at infinity, while at the same time accommodating objects filling a large field of view and objects which have a very narrow one. To properly focus on a particular object, therefore, requires the use of a lupe with a magnification that provides the desired field of view.

In general, for solar photography a low magnification lupe or no lupe at all is desirable since the field of view is relatively huge. This should only be done after pre-focusing as well as possible through the camera itself. For use without a lupe, the camera mount may be detached from the CVF body and the user may look directly through the focusing screen. For nature photography low, or high powered lupes may be used depending on the field of view. For lunar photography, a high powered lupe is desirable. And for deep-sky focusing, the high powered lupe is most effective. A low power 10x lupe and high power 22x lupe come standard with the CVF Series II.

# Focusing Screen Selection



The third key to success in focusing is to choose the correct type of focusing screen to match the application.

Several different focusing screens are available for use with the CVF Series II, and each was designed with a specific purpose in mind. All patterned screens have identical glass thicknesses to guarantee interchangeability,

and are etched with evaporated black chromium to guarantee high contrast, extreme precision marking, and a long high performance life.

**Cross-hair Screen:** The basic cross-hair screen may be used in any application, but is especially useful in still or nature photography where a fair amount of contrast is available from the object itself.

**Hybrid Knife-edge Screen:** The hybrid screen is similar to a traditional camera focusing screen with a clear spot in the center. This screen works well for nature and general daytime photography where critical focusing is required. The black chromium knife-edge surface may be used extremely effectively for both solar photography and for deep-sky photography. The clear center area provides a large area of contrast for solar focusing, and the precision knife-edge is unsurpassed for focusing on pinpoint light sources. The 150 LPI ronchi grid allows you easily to approximate critical focus. For solar photography, pre-focusing with the camera is recommended. The black surface surrounding the knife-edge is at the exact film plane of your camera and is an excellent point of reference with which to compare the actual solar image.

**Black Chromium 300 LPI Ronchi Screen:** High resolution ronchi screens are best suited for focusing on deep-sky objects and may only be used at night when a pinpoint source of light is available. For easy focusing at night, the mount should be detached from the CVF body and used by itself. Place your eye as close to the screen as possible as if it were an eyepiece. Used in this manner, the number of bars on the ronchi screen will appear to become thicker and fewer in number as you approach the focal plane. When the bars are minimized or have disappeared completely, remove the mount and replace it with your camera. For best contrast of the ronchi bars, focus on the brightest star visible, and then retrain your scope to the object you actually want to shoot.

Regardless of these guidelines, any focusing screen may be used in any application where desired by the user. CVF users are encouraged to experiment with the different types of focusing screens in combination with the several different magnifying luges available.

## Maintenance

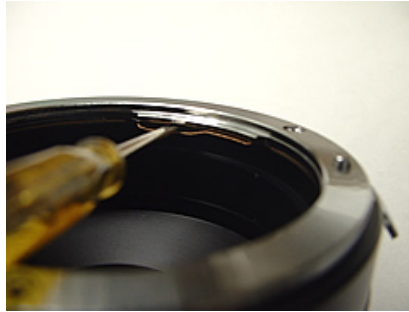
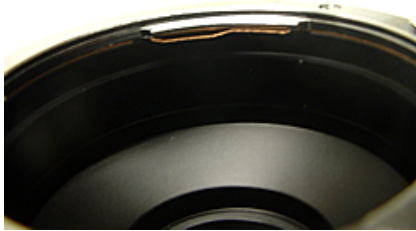
The CVF Series body is manufactured of 6061 aluminum with a durable finish. The surface should be cleaned when necessary with mild liquid detergent and water only. Use of chemicals or abrasives for cleaning should always be avoided.

Eyepiece luges in the CVF are 5-element designs. Like all optics of this type, surfaces are delicate and prone to scratching if extreme caution is not taken. Compressed air dusting sprays specifically designed for optical cleaning are strongly recommended. Should the optical surface require heavier cleaning, take the same care and precautions as you would in cleaning your main telescope optics.

The focusing screen is the most delicate and critical part of the instrument. Never touch its surface since any oil from your skin will easily show up under magnification. It is recommended that the focusing screen be cleaned with alcohol and lint-free optical tissue or lint-free cotton swabs. For removal of small particles, an aerosol air duster spray with no chemical additives should be used.

The modular mounts used in the CVF Series also require adjustment over time.

On some models, the t-ring is held against the face of the bayonet by three copper tangs. With normal use, over time these tangs may slightly bend causing the t-ring to fit too loosely against the front of the chrome bayonet plate. The solution is to carefully bend these tangs downward back into their original position. A small jeweler's screwdriver or needle-nose pliers may be carefully wedged between the chrome ring and the copper tangs to reposition them. Make small adjustments a little at a time since you do not want the t-ring to fit overly tight. On other models aluminum tangs may be used instead and may be repositioned in the very same way.



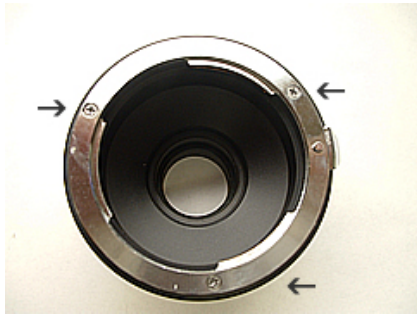
In addition, three very small flathead screws secure the bayonet to the cone assembly. Their positions are indicated below. Over time the screws may loosen causing the front of the bayonet to turn. This makes it difficult to remove the Series IV from the t-ring. The solution is to retighten these from time to time with a



jeweler's screwdriver.

The chrome bayonet front plate is also held to the mount by three small Philips head screws. Again, these should be retightened when necessary.

**Important:** The calibration of your unit is measured from the front of the bayonet mounting plate to the surface of the focusing screen. It is important to maintain the original positioning of the front plate of the bayonet during the maintenance procedures outlined above.

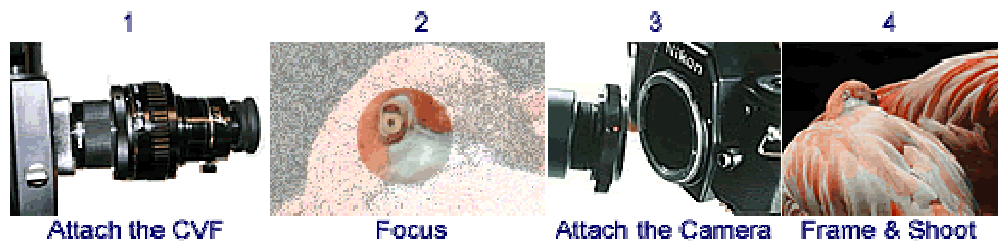


## The Focusing Procedure

Focusing with the CVF Series II is somewhat different than what most people are used to. Instead of seeing the entire field of view which will be captured by your camera, you will see only a portion of it. This portion will be magnified in accordance with the lupe selected. To effectively focus on an object, first frame the image in your camera viewfinder. Then, attach the CVF which will magnify the central portion of the image.

To determine correct focus, notice the image fade into focus on the ground glass portion of the focusing screen. Once this appears to be close to focus, concentrate on the clear 'Spotlight' area of the ground glass. When this appears as sharp as possible, you have reached the focal point. 'Rocking' between out of focus images on either side of focus is normally used to find this point. It is at this point that you simply remove the CVF and replace with your camera. Your camera will be in perfect focus. You verify this by looking through your camera viewfinder which should show a pinpoint image, or on your computer screen if you are using a DSLR in conjunction with the computer. For other focusing screens, the procedure is similar except the focused screen pattern is compared to the image.

***Important Note: Turn off the camera's auto-focus feature and use manual settings. If the auto-focus feature is left on, it will override the focal point derived from the CVF.***



Always set up your equipment for terrestrial or astrophotography as you would normally. Keep in mind that the CVF focuser is interchangeable with your camera and the very same adapters and attachments should be used for both units.

## Installing a New Focusing Screen



Focusing screens are mounted inside of a plastic bushing with an aluminum ring that snaps onto the end of the focusing tube assembly. To remove the screen, gently pry the aluminum ring up from the end of the focusing tube. A small jeweler's screwdriver may be wedged between the aluminum ring and the top of the focusing tube, if necessary, to separate the focusing screen assembly. The screen assembly itself is wedged in the focusing tube by two plastic 'wings' which apply pressure laterally on the inside of the focusing tube. Alternatively, focusing screen assemblies may be removed by inserting an instrument through the front of the bayonet mount and gently pushing on the plastic portion of the assembly until the screen assembly is loosened.

Regardless of the approach chosen, please take care at all times to avoid touching the surface of the screen itself since it can be easily dirtied and/or scratched.

Now, install the new screen by gently pushing its plastic bushing straight into the focusing tube by applying uniform pressure to the top of the plastic bushing (not the aluminum ring). Make sure that the aluminum ring sits uniformly on the edge of the helical tube and that the head of the plastic bushing is flush with the surface of the aluminum ring. Taking care in this step will preserve the calibration of the CVF Series II regardless of the screen chosen.

### *35mm Modular Mount*



## Focusing Screen Calibration

The CVF Series focusing assembly is composed of a glass focusing screen held within a helical focusing tube. The focusing tube position can be changed by rotating it within the threaded mount and changes the backfocus distance and position of the focusing screen.



The helical focusing tube holds the focusing screen in the proper position. The position of this tube is factory preset and calibrated to match the backfocus distance of your camera. This backfocus distance is measured from the chrome front plate of the bayonet mount to the surface of the focusing screen on the inside. A small amount of medium-strength Loctite 263 holds the helical focusing tube in place. If desired, this seal may be intentionally broken for adjustment. Before doing so, remove the focusing screen from the tube to avoid inadvertent damage. Then, grip the outside of the focusing tube and turn with gentle force. Heat and small hand tools may be used to loosen the Loctite, if necessary.

If you wish to change the position of the focusing screen for cameras which have been customized or out of spec, follow these instructions:

1. First, remove the glass focusing screen. Grip the aluminum ring housing it and remove it from the helical focusing tube.
2. Second, loosen the black helical focusing tube itself. The focusing tube is held in place with medium-strength Loctite 243 threadlocker. It may be loosened by carefully gripping the outside with a small pliers. If necessary, heat can be carefully applied to the focusing tube to loosen the threadlocker first.

## Calibration Certificate

A certificate is provided with each CVF unit as your guarantee of correct calibration.

1	44.000
2	43.991
3	43.995
4	44.022
5	44.010
6	44.002
N	6
MAX	44.022
MIN	43.991
R	0.031
X	→ 44.003
S	0.010

The example shown here is for a Canon EOS. The nominal backfocus distance supplied by Canon is 44.00mm. A 'nominal' distance can be interpreted as being the target distance the manufacturer strives for. It is measured from the front of the bayonet mount plate to where the chip or film is in the camera. In reality, it is difficult for a manufacturer to machine a camera to exactly this distance due to the tolerances of the machinery used to make the camera components. This distance may typically vary up to 1%.

Likewise, during calibration it is difficult to precisely calibrate a single distance to the exact nominal backfocus distance. After calibration, a series of six or seven measurements of the CVF are taken. The certificate shows these actual measurements, as well as the maximum and minimum readings, the average reading (bar x), and the standard deviation. In the example, the average reading is 44.003mm. In practice, a reading of 44.0 plus or minus .01

would be more than acceptable. Please note that these differences are not in the placement of the focusing screen itself, rather than in the measurement technique. CVF units should be sent back periodically for recalibration.

PART NO.	CANON EOS
DATE	1/21/05
NAME	Steve

## Section

# 7

## Attaching the CVF

The CVF Series II attaches to your telescope or microscope exactly as your camera does. It uses the very same t-ring. Although appearing to be a good idea, separate t-rings should not be used for the CVF since slight differences in machining between different t-rings can affect the backfocus distance. Always use the same accessories on the CVF as you do on your camera.

Those wishing to use a diagonal with the CVF may easily do so. The photos below shows ways to attach the focuser and the camera. Instead of attaching the t-ring to a t-adapter, it may be attached to a 1.25" or 2" camera adapter which slides into the diagonal's drawtube like an eyepiece. Since the backfocus distance of most diagonals is very close to the t-adapter which it is substituting, the focusing range is preserved.



These items may be found in our [Accessories](#) section.

## Warranty

I truly appreciate your purchasing a CVF Series II focuser , and hope that it measures up to your highest expectations. The CVF Series II is warranted against defects in manufacturing for a period of one year from the date of purchase. Not included in the warranty are damages caused by misuse, accident, or damage to focusing screens.

Should repair ever be necessary, your CVF Series II may be returned to STI for servicing. Only the cost of necessary parts and shipping are your responsibility. Our turnaround period on repairs is normally one day.

STI provides for a 30-day Clear-Sky period during which you may return your unit at any time for a full refund, less shipping. Our intent is to provide you with an instrument that will solve your focusing problem and be used, and not wind up in your accessory junk drawer. After this period, a restocking fee may apply.

If you ever have any questions at all about using the CVF Series II, or about astrophotography or photography in general, please feel free to write or give me a call at any time.

Thank you again for purchasing a CVF Series II focuser, and I look forward to hearing from you and seeing some great photos!

Clear Skies!



Richard



**STI**

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