

LensAlign® User Guide



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The LensAlign User Guide consists of this document as well as the LensAlign Video Tutorials and Quick Start Guides that are available at www.LensAlign.com

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We have tried our best to be accurate in all pictures and descriptions. All questions regarding LensAlign and/or this user guide are welcomed at our support/discussion forum at www.LensAlign.com.

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1 What is LensAlign?

LensAlign is a precision calibration tool that allows you to measure, and in many cases, adjust the focus performance of your camera when specific lenses are used. It consists of a precision target-alignment system to assure that the LensAlign focus target is positioned precisely parallel to the image plane, combined with an adjustable, sloped precision calibrated Depth of Field (DOF) display ruler that allows the user to objectively determine the true focus that any given body/lens combination establishes using its internal focus mechanisms. That is the job of LensAlign...to determine if the point that the camera is focusing on is the point that is actually in focus in the captured image. LensAlign provides the information you need to assure optimum focusing performance in an easy, reliable, accurate and repeatable manner without the requirement of technical knowledge.

What are focusing errors and how do they affect your pictures?

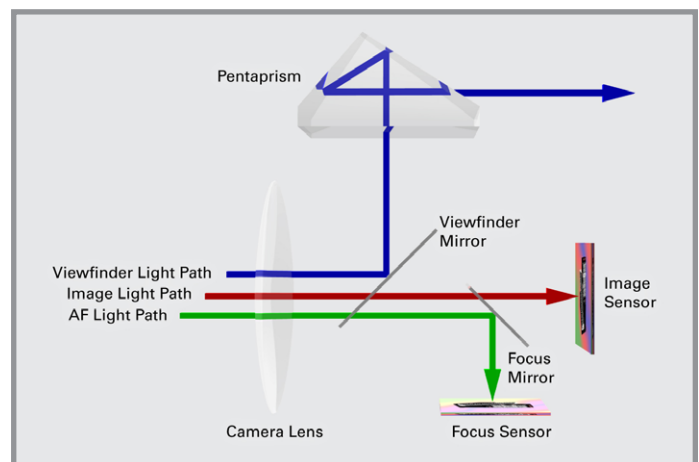
Focusing errors are essentially discrepancies between the sharpest point of focus determined by the camera's focus system and the actual point of focus the lens delivers at the image plane. Such discrepancies may be caused by characteristics or calibration points of the camera's autofocus system, optical characteristics or electronic interfaces of the lens itself, misalignment of the focusing screen, reflex mirror, or image plane (that is, the image sensor or the film plane), or even other factors.

By far the most significant and widespread focusing errors are front-focusing and back focusing. For front focusing errors, the actual sharpest focusing point obtained by using the camera's autofocus (AF) system or by focusing the lens manually is closer than (in front of) the intended focus point. This can be proven by examining the recorded image. For back focusing errors, the sharpest focusing point of the lens at the sensor or film is farther away (in back of) the point obtained by using the camera's AF system or by focusing manually. In either case, your camera may not be able to deliver critically sharp, detailed images of whatever appears at your intended point of focus, and may instead render crisp images of things that are closer or farther away. Example: You focus on the subject's eye and the mouth or ear is sharper than the eye in the recorded image.

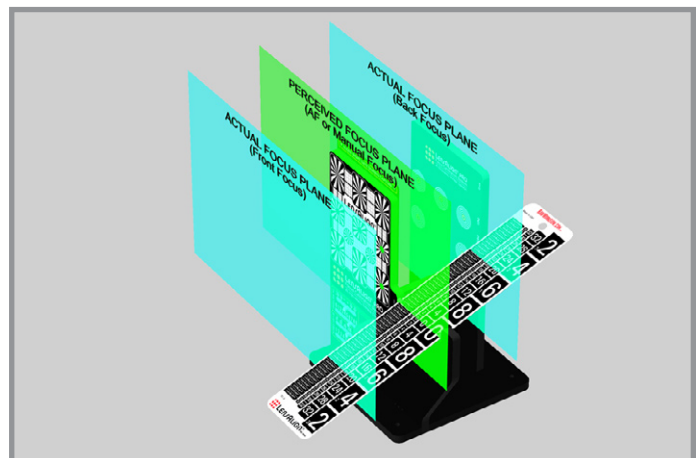
Precise focusing becomes especially critical when shooting with long focal-length lenses, at wide apertures, and at close distances because depth of field is very limited (shallow) in all these cases and out-of-focus areas of your subject will appear noticeably blurry and out of focus. Knowing whether your camera's AF or manual focusing system is focusing precisely, in which direction any errors occur, and just how far off it is critical information. The objective, quantified data obtained



LensAlign PRO, LensAlign LITE and LensAlign PRO PLUS



Focusing errors can be caused by discrepancies between the Image Light Path, the Auto Focus Light Path and the Viewfinder Light Path



Focus error causing the actual focus point to be back or front focused from the perceived "in focus" point

with LensAlign will allow you to correct or minimize these errors by recalibrating your camera's Auto Focus System for specific lenses using the AF adjustment (AFA) capability that's built into most current advanced DSLRs. In severe cases of focus error, the LensAlign tests will provide reason and documentation such that you would contact the factory or service center to have your equipment checked and potentially recalibrated.

Autofocus errors involving the central AF zone, other AF zones, or multi-zone AF systems can all be detected and measured using LensAlign, and this information can be very useful even if your camera lacks focus micro-adjustment capability. Manual focus errors caused by mirror or viewfinder screen misalignment, eye problems, and the limitations of micro-prism and split-image and superimposed-image rangefinder systems can all be identified and quantified. Having the facts will, in many cases, enable you to minimize such errors by making manual focus adjustments, to select smaller apertures to increase depth of field, or to avoid certain lens/camera/distance combinations entirely. Finally, by presenting conclusive out of spec results to the lens and/or camera manufacturer you may be able to arrange for a factory lens or camera calibration, potentially within the warranty.

2 LensAlign PRO “Out of the Box”

Before setting up and aligning your LensAlign Pro we strongly suggest you take inventory to make sure that all the necessary components were included in the package and that they are in proper working order.

The items shipped with LensAlign Pro include:

- A) Certified Base that includes a standard tripod socket insert and two parallel sighting and focusing targets
- B) Shipping Spacer placed in between the sighting and focusing targets and held in place by a rubber band to ensure that the targets remain parallel, and aren't damaged in shipping.
- C) Sight Gate that can be opened for aligning the unit with your camera and closed when shooting test pictures of the focus targets.
- D) Sight Gate Magnet with adhesive backing that holds the Site Gate in place but allows it to be opened and closed.
- E) DOF (depth-of-field) Display Ruler.

To assemble your LensAlign Pro:

1. Remove the protective paper backing from the rear of the Sight Gate Magnet, exposing its adhesive surface, and affix it to the rear of the Sight Gate as shown. Be sure to position the Sight Gate Magnet in the rectangular box below the notice “Reverse Side Faces Camera” and with the LensAlign logo at the top of the box.



LensAlign PRO Inventory



Orientation of Sight Gate Magnet

2. The Sight Gate adheres magnetically to the rear of the front Focus Target Plate as shown in the adjacent photo.
3. Mount the DOF Display Ruler on the Certified Base by placing the small notches on its left- and right-hand side over the mounting pins to the right of the Focus Target array and swing it backwards until its left-hand edge is held in place at position 3 on the vertical numerical scale to the right of the Rear Sighting Plate.

3 LensAlign Shooting Parameters and Alignment

The best way to think about preparing for a LensAlign “shoot” is to think about setting up for a normal soft lit portrait session. The difference is that you will first select the lens, and determine the proper testing distance, rather than having the desired portrait “look” determine your choice of lens and distances. The analogy is not 100%, but most our guidelines will adhere to normal portrait or product photography.

With LensAlign we need to take more of a clinical or laboratory approach to precisely determine the performance of the focus system of your camera/lens combination. Therefore, we need to eliminate all other variables, and optimize our shooting parameters to isolate the focus system performance.

Distance

Note: The LensAlign Distance Tool calculates the optimum camera to LensAlign distance based on the camera sensor frame size, lens focal length and the lens aperture. It can be found on our website at www.lensalign.com/ldt.

The standard test procedure for measuring the focusing accuracy of any lens using the LensAlign system is to position the focus target at a distance from the camera equal to 25X the focal of the test lens. This can be simply thought of as 8 feet per 100mm of lens focal length (so test a 100mm lens at 8 feet, a 75 mm lens at 6 feet and a 50 mm lens at 4 feet).. Measure the approximate distance from the camera body to the front of the LensAlign focus target. It is not critical that this distance be precise. Within a few inches is fine at close distances, and within 1 foot is fine for distances beyond 15 feet.

Tip: To tailor the test parameters to your particular shooting style, you can use LensAlign to test the focusing accuracy of your camera and lens combination at the focal lengths, and distances you typically use.

For example, a portrait photographer might want to test and calibrate the focusing accuracy of a medium telephoto lens/camera combo for relatively closer distances than recommended (3-6 feet), and birder or sports or wildlife photographer might want to test and potentially correct at distances longer than recommended (50-100 feet). This



Finished Assembly with Sight Gate and DOF Ruler Mounted

will provide the most accurate performance data and correction for those specific shooting situations, but may not be best for the generalized shooting corrects as suggested by the recommended test distances.

Mounting LensAlign and the Test Camera

Once you have determined the settings you wish to use as the basis for testing and calibrating your test lens, mount the camera/lens combination to be tested on a sturdy tripod, with ball head or separate pan and tilt controls. The LensAlign unit can be placed on a tabletop or other firm, sturdy support, but mounting it on a second tripod makes it easier and quicker to position the LensAlign, during alignment. The tripod onto which you mount LensAlign need not be a high end tripod. In the lab we use \$20 video tripods obtainable from the web or your local photo dealer. In fact cheap video pan and tilt tripods are ideal for mounting LensAlign.

Lighting LensAlign

You can illuminate the LensAlign DOF Ruler using any diffuse light source that yields relatively even lighting without producing hot spots or shadows on the Ruler when you observe them in your DSLR's viewfinder or in Live View. Continuous light sources such as window light, flood lamps, and household lamps are OK, but spotlights or other point light sources are not recommended. In most cases your camera's built in flash or an auxiliary shoe-mount flash will yield satisfactory results. Using flash diffusers or bounce flash (off a white wall or ceiling) may help if the lighting in your test shots is too directional.

We in fact have 2 lighting areas when shooting LensAlign. The LensAlign focus target is one, and the LensAlign DOF display ruler is the other. They can be lit with the same lighting source, or 2 different ones depending on your situation, and the equipment available. The criteria for lighting the focus target is enough light with high contrast and no glare, so that the AF system can grab a good and indisputable focus lock each time the AF is activated (Note that the LensAlign focus target surface has been specially designed for this purpose).

The illumination of the DOF Display Ruler is also critical because this is your window into the performance of the AF system once it locks. The result we want there is soft light, no shadows or specular areas of reflection to produce as high a contrast image as possible. This is best achieved with a large soft light source.

Tip: By using 2 light sources, one for the focus target (continuous light) and flash for the DOF Display Ruler, we have independent control over each allowing us to optimize the image output of the ruler (our only concern in the test image), and also allowing us to control the conditions under which the AF is being tested.



LensAlign and test camera mounted on individual tripods

Camera ISO

We recommend using a relatively low ISO setting such as ISO 100 or ISO 200. But since our goal is to eliminate all variables, it is better to shoot at a higher ISO if it is required to achieve a high enough shutter speed to eliminate all traces of camera shake.

Camera White Balance

White Balance is not critical as long as it is close. Auto-WB is fine, or set it to the closest setting that matches the illumination of the ruler.

Raw vs JPEG

While this is a rare exception, we believe that there is no advantage to shooting RAW for LensAlign test shots, and in fact recommend Large Fine (highest size and quality) JPEG in all cases. RAW will simply slow the process down. Only warning is to remember to return the camera to the RAW setting when you are done.

In Camera Picture Style (JPEG Setting)

Because we are trying to eliminate all variables in our LensAlign testing, in fact color is one of those variables. It can distract and confuse the reading of the LensAlign DOF Display Ruler. Also in some cases, lenses will exhibit extreme Chromatic Distortion when shot wide open as in using LensAlign, and this also can distract and confuse the Focus evaluation. We recommend using the monochrome setting of your camera. Additionally, increasing the contrast setting 2 notches above normal is also helpful.

Camera Exposure

The exposure should be as bright as it can be without blowing out the Whites of the Display Ruler. This is best accomplished, by observing the “blinkies” (highlight warning) of test exposures, and adjusting the exposure until the blinkies on the ruler section of the image just disappear. There should be no concern if other parts of the image are blown out. We want the ruler to be optimally exposed as brightly as it can be.

We recommend that you shoot in manual mode so that each LensAlign test image has the exact same exposure.

Background Color

There are 2 reasons to shoot against a black or at least dark background. If the LensAlign is close to the background, a light colored background can cause light to

be reflected off of the ruler surface back to the camera, causing a flare or lack of contrast. Also it is easiest to evaluate the LensAlign test photos if the background is Black or dark and non-distracting.

Camera Auto-Focus and Drive

- AF = Single Capture Point
- AF = Center Focus Point Selected
- AF = Single Shot mode (as opposed to continuous or servo)
- Drive = Single Shot

4 Camera to LensAlign Alignment

Note: The main area where LensAlign LITE and PRO differ is in their method of alignment to the camera. Please consult the proper section of this user guide for your version of LensAlign. Once aligned the operation is identical.

Note: It is not necessary to level either the camera or the LensAlign unit because the proprietary alignment procedure assures that the image plane of the camera will be precisely parallel with the test target array.

LensAlign PRO

Shooting parameters during alignment

As set for testing with these exceptions...

- F8
- JPEG (set to a color mode)
- Light and expose so that you can observe the front and rear sighting holes

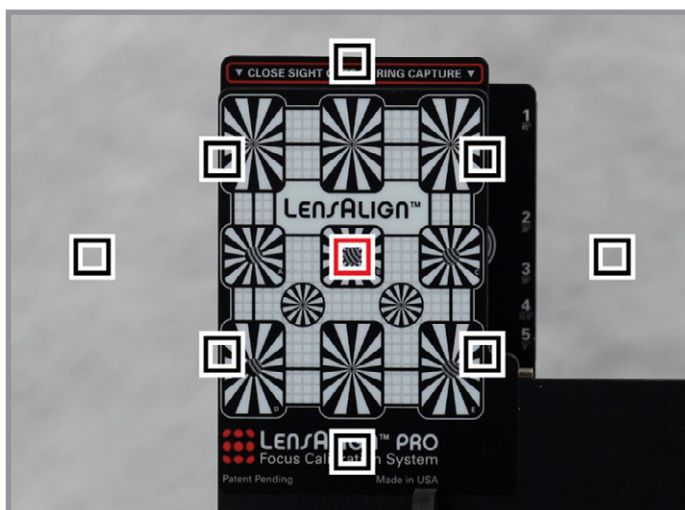
While looking through the test camera's viewfinder, adjust the camera's position so the central LensAlign Focus Pattern (the "star" labeled B and highlighted in red in the illustration) is visually aligned with the camera's central autofocus zone. The central zone is usually defined by brackets or a small square in the middle of the viewfinder image.

Back-Sighting

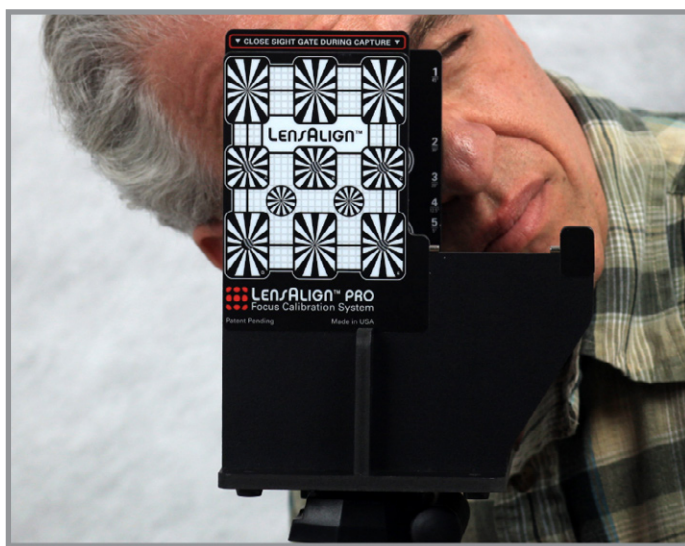
Remove the DOF Ruler and set the Sight Gate in the Up (open) position. This will allow you to look directly through the Central Sighting Hole on the Rear Sighting Plate and look back towards the camera. Now position yourself behind the LensAlign and place your eye directly behind the central hole of the Rear Sighting Plate. While viewing through both the Rear and Front Sighting Holes, adjust the LensAlign so that the lens of the test camera appears in the very center of the sighting hole. This should bring



Test setup showing test camera and LensAlign on tripods in preparation for alignment



Initial Pre-alignment view



Back-Sighting LensAlign

the camera's alignment very close to the proper position. Now all that is left is to fine tune the alignment.

Tip: Shine a narrow-beam flashlight on the camera lens to facilitate Back-Sighting alignment.

Note: In the example shown, Back-Sighting has achieved about a 90% perfect alignment. If you look closely at the illustration showing a magnified Live View on the LCD you can see that while the red “bulls-eye” on the Rear Sighting Plate can be seen at the center of the hole in the central target of the Front Sighting Plate, it is not perfectly centered—concentric circles around the red dot are visible. Only when perfect centering is achieved will the Focus Target of LensAlign and the camera’s imaging plane be precisely parallel as required for accurate focus evaluation.

Tip: When perfect alignment has been achieved only the central B sighting dot will appear centered. The sighting dots on the outer targets will appear off-center.

Front-Sighting

While looking through the viewfinder, determine the approximate state of alignment by observing whether or not the rear sighting hole (showing up as a white or black dot depending on lighting) is centered within the front sighting hole. Since the position of your eye with respect to the viewfinder eyepiece can alter the results, it is essential that for final evaluation you use Live View in magnified mode, or take a picture and zoom way in.

If the rear and front sighting holes are not concentric you must move the camera slightly to bring it into alignment, always positioning the camera such that the central focus point of the camera is always centered on the central focus target of LensAlign. If the rear sighting dot is to the left, then move the camera right, and if the rear sighting dot is low, you must bring the camera higher. Another method of fine tuning the alignment of the camera to LensAlign is to re-do the back sighting procedure with more care. Once experienced, many photographers can set the LensAlign Alignment by using Back-Focus alone.

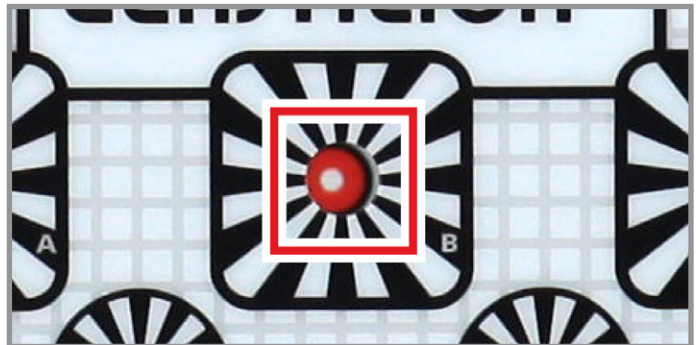
Tip: Position a light above the LensAlign or use a narrow beam flashlight to illuminate the Back Focus Target to facilitate Front-Sighting. This helps with both the Live View and test shot methods of alignment.

Note: After you have successfully aligned your camera with the LensAlign unit, we suggest that you verify perfect alignment by shooting and examining a few additional test images. Do not change the position of the test camera or LensAlign while doing so. Sighting must also be checked and possibly repeated if the camera or LensAlign has been accidentally moved.

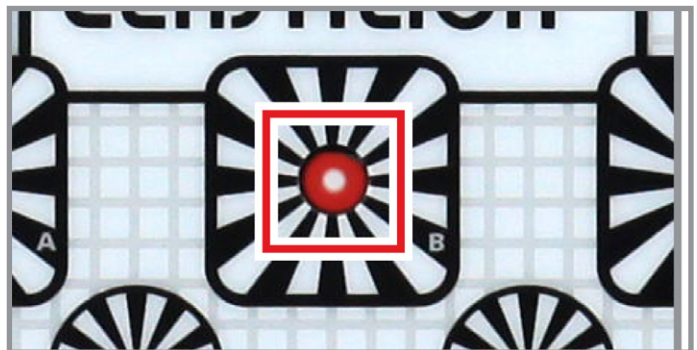
LensAlign LITE



View of test camera from rear of LensAlign during rear sighting



90% perfect alignment after back-sighting



100% perfect alignment achieved after front-sighting



Rear of test camera with LCD display in Live View mode showing focus target in perfect alignment

LensAlign LITE is aligned by mounting the LensAlign Sighting mirror onto the front of the focus target and adjusting the camera position so that the camera “sees” its own reflection centered in the mirror. The LensAlign LITE may also be moved or adjusted to facilitate proper alignment.

Shooting parameters during alignment

As set for testing with these exceptions...

- F8
- JPEG (set to a color mode)
- The LensAlign lighting is not critical.

The camera should be “lit” such that the reflection of the lens is clearly visible in the LensAlign Sighting mirror.

While looking through the test camera’s viewfinder, adjust the camera’s position so the central LensAlign Focus Pattern is visually aligned with the camera’s central autofocus zone. The central zone is usually defined by brackets or a small square in the middle of the viewfinder image.

1. Position the camera such that the reflection of the camera/lens combination is visible in the sighting mirror. This is accomplished by racking the focus of the lens such that you go back and forth between the LensAlign and the reflection of the camera as you position the camera.
2. Once the camera is visible in reflection, you can fine tune the position of the camera such that the center of the lens is shown centered in the center of the mirror.

Go back and forth between focusing on the mirror and on the camera’s reflection to assist in your adjusting the camera. Use the figures as a guide to what you should be seeing.



Step 1: Initial Pre-alignment view



Step 2: Camera focused on the LensAlign mirror

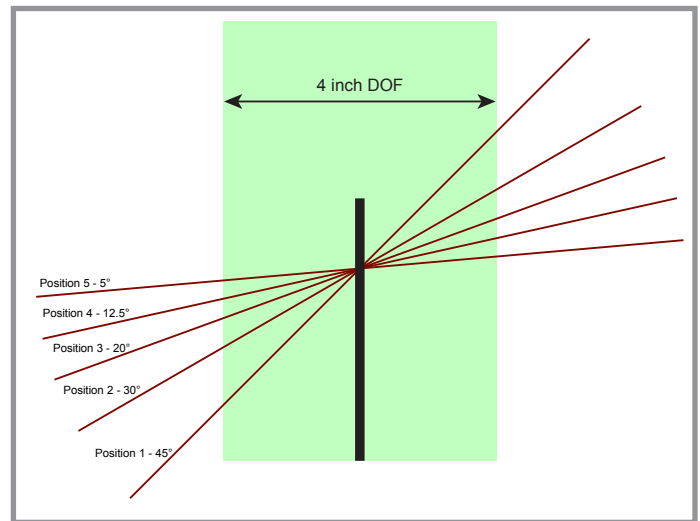


Step 2: Camera focused on the camera's reflection

5 Mounting the DOF Ruler and Setting the Ruler Angle

Carefully mount and adjust the DOF Ruler's angle to position #3 for general focus testing or to one of the other calibrated positions you prefer for a specific purpose. Internal magnets hold the DPF Ruler in the proper position at all marked settings.

Note: Positioning the Standard DOF Ruler or the Long Ruler, at a steeper angle (closer to horizontal) with respect to the Focus Target array will result in a narrower depth-of-field zone in your test images for any given focal length/aperture combination, while placing it at a shallower angle (closer to vertical) will result in a wider depth of field zone being recorded on the captured image. Therefore setting the ruler at the #1 (topmost) mark on the vertical ruler position index will provide greater resolution (more numbers visible on the ruler scale) while setting it at #5 will pinpoint the optimum focus point while resolving fewer numbers on the ruler scale. The middle setting (#3) offers a good compromise in defining both the optimum focus point and depth-of-field range, which is why we recommend it for general shooting.



How ruler angle affects measurement resolution

6 Shooting the Test Pictures (Autofocus test)

Final Preparation

- Sight Gate Down (PRO)
- Sighting Mirror removed (LITE)
- Enumerator properly adjusted (PRO)

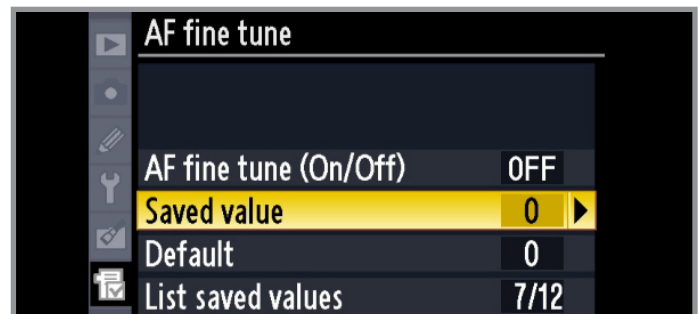
IMPORTANT! If your camera has AF Adjustment capability, make sure that it is OFF or set to 0. This is done through the menu system of your camera.

Capturing test images of the LensAlign Depth Of Field Ruler using your camera's autofocus (AF) system to focus on the central focus target enables you to assess the performance of the camera's AF system with specific lenses by providing visual data that defines the precise point of focus for each lens, and determines whether the exact focus point falls within the depth of field of the lens at maximum aperture (numerically lowest f/stop).

Note: The focusing system will not be influenced by presence of the LensAlign ruler in the frame so long as it falls outside of the camera's active AF zones. That's why it is essential to set your camera autofocus system to the Central AF setting that activates only the central AF zone and NOT to multi-zone AF or some other setting.



How ruler angle affects measurement resolution



Turn off AF Adjustment before shooting baseline test pictures (Nikon)



Turn off AF Adjustment before shooting baseline test pictures (Canon)

Capturing the baseline images

First take a few “baseline” images to establish the native performance of the AF camera/lens system under test.

1. Verify that the camera and LensAlign are securely mounted and properly aligned, and all of the previously mentioned shooting parameters set as described.
2. Defocus the lens either by moving the manual focus ring (make sure it engages the focus mechanism), or by putting your hand in front of the lens and forcing the lens to de-focus.
3. Take the first “baseline” shot...press the shutter release partway down, wait for the focus confirmation beep or light, and press the shutter release in fully to shoot the first frame.
4. Now take 2-5 additional shots without de-focusing first but ensuring that the AF engages for each shot.

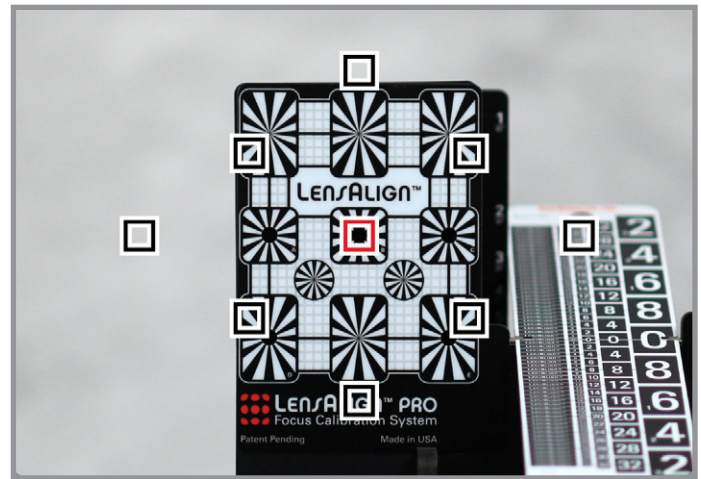
Now evaluate the base line images to determine the native performance of the system. It is generally not possible to make this evaluation using the rear LCD of the camera; the images must be viewed at 100% on a computer monitor. This can be done by downloading the files to a computer from the memory card, or by shooting in “tethered” mode in which case the images will already be on the computer.

7 Evaluating Baseline Images

If the autofocus system of the camera has focused the test lens perfectly (that is the deviation between AF-determined optimum focus point and the actual proven focus point is zero) the “zero line” in the center of the ruler will be the sharpest “line” on the ruler. If any numeral other than zero is the sharpest, this indicates that the AF system has not focused the lens at the optimum focus point. Your determination of the sharpest numeral and your ability to read the scale on the image of the ruler will indicate, whether, by how much, and in what direction the optimum focus point set by the camera/lens combination deviates from the actual optimum focus point.

Based on the DOF and particular characteristics of a given lens, there might not be a careful delineation between one line of numbers and another. In this common scenario, one can determine the exact point of focus by observing as to which line of numbers falls within the center of the DOF area as shown in the figures.

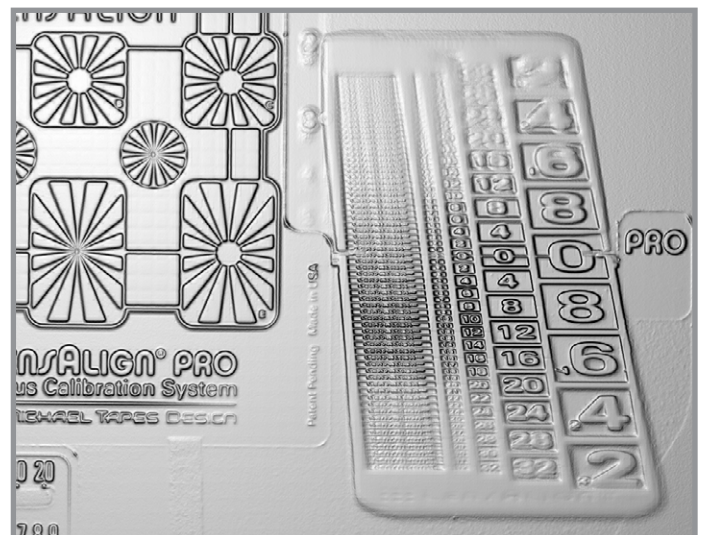
Note: Because we are shooting wide open, the lens performance is at its poorest, in terms of sharpness but remember; we are only judging relative sharpness. Overall the test image may not be tack sharp. We are determining the sharpest area to determine the exact point of focus capture. How sharp it is has nothing to do with the AF system. If the lens is sufficiently unsharp at its widest aperture as to make the determination difficult, one



Sight gate in down position, ready to capture test images



Baseline image showing front focusing



Emboss filter enhanced baseline image showing front focusing

can repeat the test stopping down 1 or 2 stops to achieve more overall sharpness in the test shot. This will come at the expense of a larger DOF, so it is a trade off as to which will prove to be best.

If the True AF point on the ruler is located below the zero point on the ruler image, the AF system has front focused the lens—that is, it has focused on a plane closer than the optimum point of focus. If a number above the zero point on the ruler is the sharpest, the AF system has back focused the lens—that is, focused it on a plane behind the optimum point of focus. In almost all cases, the depth of field provided by the lens at its set aperture and object (image-plane-to-subject) distance extends some distance in front of and behind the point of optimum focus and this is indicated by the range of numbers that is legible on the image of the ruler.

Tip: Some LensAlign users find it easier to judge the relative sharpness of the display ruler by using the Emboss Filter in Photoshop or a similar function in another image processing software system.

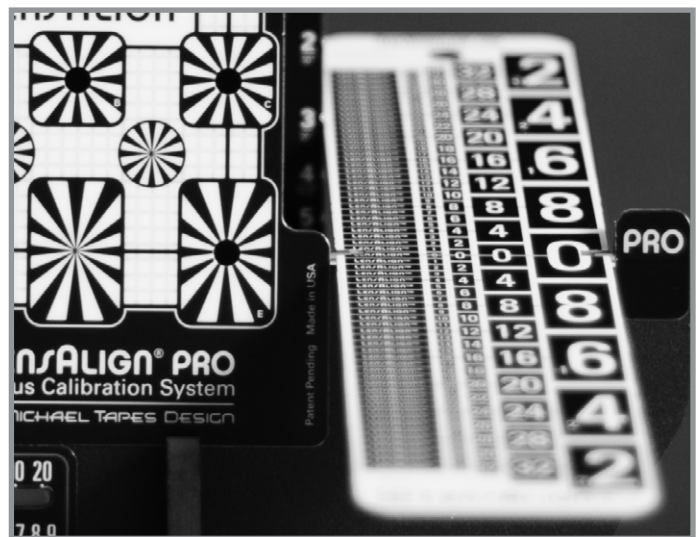
Positive baseline image result

If the baseline images reveal that the “zero line” on the ruler is in fact the center of the DOF, then this means that there is no back or front focus and that, in fact, the AF system is able to position the lens properly as it should. The plane of focus in the captured image has been correctly set by the AF system. This is great news. LensAlign has confirmed the performance of your AF system with this lens/body combination. If you are so inclined, so may want to test at progressively smaller apertures to make sure that the lens does not have any aperture shift issues when used on this body. Just depends how deep you want to go.

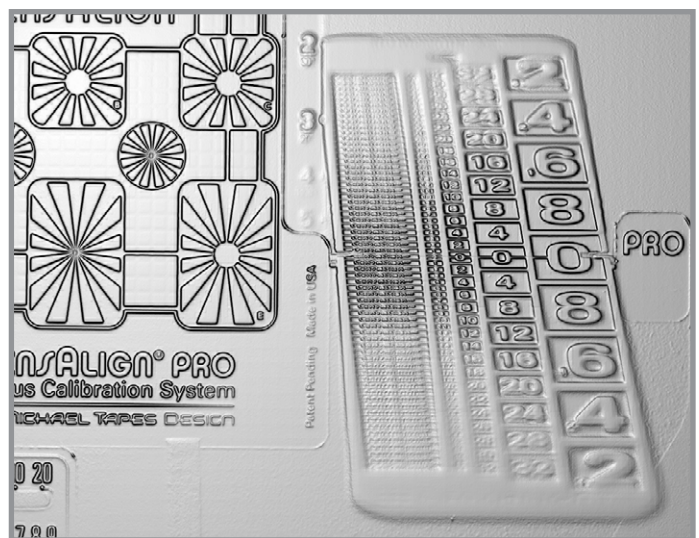
Negative baseline image result

If the baseline images reveal that back or front focus is present, there are essentially two courses of action.

- 1) Use the LensAlign test images as documentation to be provided to the camera factory or service center so that a correction can be made. But be aware that if the “0 line” itself is sharp although not centered, the camera maker may consider this within factory specifications and not make any changes. Even if the 0 line is on the edge of the DOF, this may be considered as normal operation of the AF system. However, in many cases, utilizing the camera’s AFA system (see below), can improve this “in spec” but undesirable AF performance.
- 2) Use the Camera’s AFA (AF Adjustment) system to correct the error. This is described in the following section.



Baseline image showing perfect focus



Emboss filter enhanced baseline image showing perfect focus

8 In Camera Auto-Focus Adjustment (AFA)

One of the primary benefits of LensAlign is that it generates quantified data on autofocus performance that can be used to adjust or calibrate the autofocus parameters of advanced DSLRs fitted with specific lenses to provide markedly improved AF accuracy. This is only possible with late model upper-tier and professional DSLR models that incorporate this feature. However, the AFA systems in (for example) the latest Nikon and Canon models in this class will recognize almost any CPU based lens when it is mounted on the camera and automatically set any AFA parameters you have saved.

Each camera maker has its own name for its AFA system. Here are some...

- Canon: AF Micro-Adjustment
- Nikon: AF Fine Tune
- Sony: AF Micro-Adj

To make life easier we will simply refer to AFA (AF Adjustment) when we are discussing the camera's internal AF adjustment system.

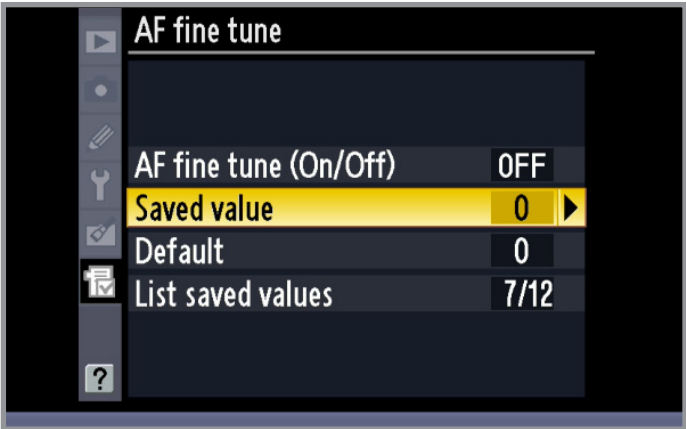
As of this Sept 29, 2009 the following cameras are known to have AFA:

- **Canon**
1DsMkIII, 1DMkIII, 5DMkII, 7D, 50D
- **Nikon**
D3x, D3, D300, D300s, D700
- **Sony**
A900, A850
- **Olympus**
E-30, E-620
- **Pentax**
K20D, K7D

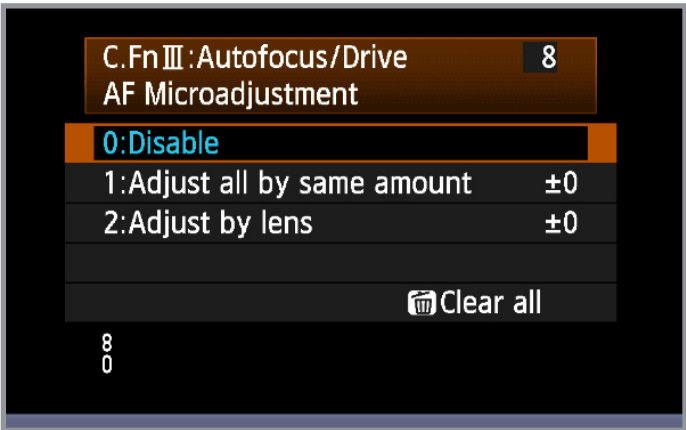
Please check www.lensalign.com for a current list of cameras with AFA.

Using LensAlign to set the Camera Auto-Focus Adjustment

Now that you have established a back or front focus offset for a given body/lens combination you can use the AFA system within the camera to store this information as part of the calibration data that the AF system uses for this lens. First we have to establish the proper value to input into the camera AFA system.



In Camera Auto-Focus Adjustment menu page (Nikon)



In Camera Auto-Focus Adjustment menu page (Canon)

The AFA system generally allows a -20 to +20 value to be registered with each of 12-30 different lenses depending on the camera make and model. The minus values will pull the focus forward to compensate for back focus and the plus values will push the focus back to compensate for front focus. To establish the proper value we take a series of photos in the general direction and then further optimize.

Let's take an example of a LensAlign test result that shows the front focus like in the figure. Since it is a front focus, we will have to apply a plus AFA value to compensate. The procedure is exactly like the one used for the base line image test shots.

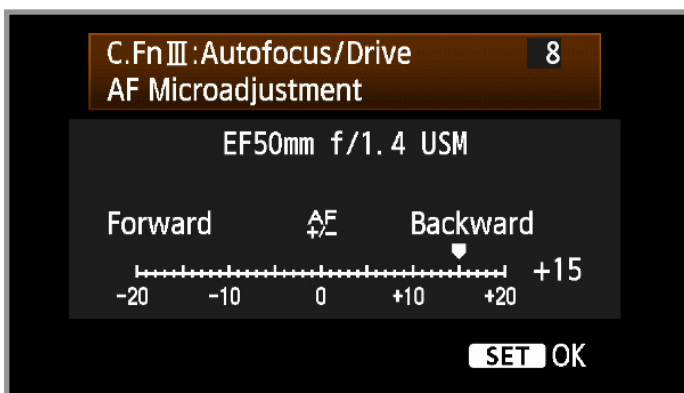
1. Ensure that the camera and LensAlign are securely mounted and properly aligned (test shot verified), and all the previously mentioned parameters set as described.
2. Set the AFA Adjustment to +5 in the camera menu system. (see camera manual for details)
3. Note the +5 adjustment on the Enumerator (PRO) or a post-it note (LITE)
4. Defocus the lens either by moving the manual focus ring (make sure it engages the focus mechanism), or by putting your hand in front of the lens and forcing the lens to de-focus.
5. Take the first "trial" shot...press the shutter release partway down, wait for the focus confirmation beep or light, and press the shutter release in fully to shoot the first frame.
6. Now take 2 additional shots without de-focusing first but ensuring that the AF engages for each shot.
7. Repeat until shots have been taken for +5, +10, +15, +20 and a new set at 0 AFA

Note: Once you have use LensAlign a few times you will get a feel for the proper adjustment range and may not have to test as many values.

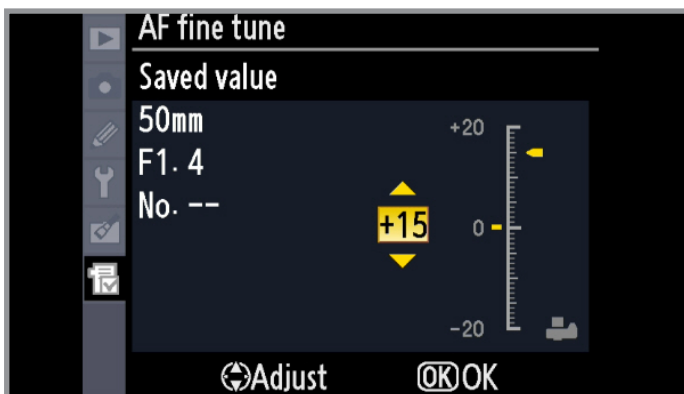
Now examine these "trial" shots on your computer at 100% and establish which AFA value has the proper calibration such that the 0 line of the DOF display ruler is now centered within the DOF. If the proper value appears to fall between 2 of the AFA settings, then an additional round of test images should be taken to find the proper value using the same method.



Test image showing front focusing



Adjusting the in-camera AFA (Canon)



Adjusting the in-camera AFA (Nikon)



Test image showing corrected focus (AFA = +15)

9 LensAlign LRK

The Long Ruler Kit is designed to complement the standard 9.5-inch ruler and focus target included with LensAlign PRO to allow precise focus and depth-of-field measurements for lenses that have a more extended depth-of-field range than the standard ruler can accommodate. This includes wide-angle lenses, and telephoto lenses. The Long Ruler Kit also allows you to assess focusing performance at distances much greater than the standard test distance of 25X the focal length of the lens, thus providing data that may accord more closely with the conditions of actual use.

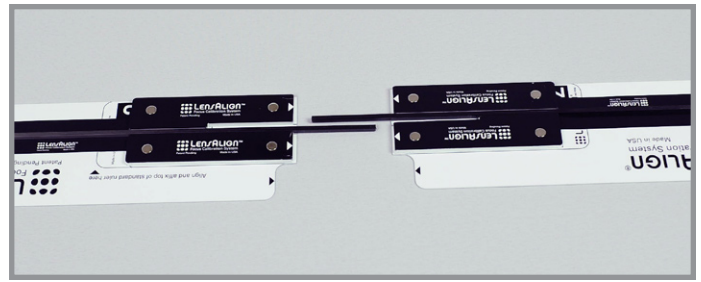
The Long Ruler Kit consists of a lightweight vinyl ruler, reinforced with carbon fiber rods for added stiffness that measures 47 inches in length and 3 inches in width, along with a Large Focus Target that mounts in place magnetically over the targets on the Sighting Plate. The two-piece Long Ruler mounts easily over the Standard ruler and it is used in exactly the same manner as the standard ruler. The Large Focus Target is designed to match the size of the camera's central autofocus (AF) frame when shooting at long distances or with wide-angle lenses, thus assuring accurate measurements of focusing performance.

Note: The LRK comes as part of the LensAlign PRO Plus, or can be purchased later for use with any LensAlign PRO system.

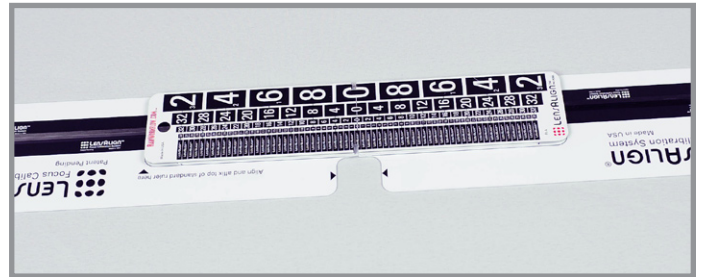
Setup Instructions

The Long Ruler Kit ships in a shipping/storage tube containing two Long Ruler halves and a shipping/storage envelope that protects the Large Target. Make sure all these items are present and in good condition before proceeding.

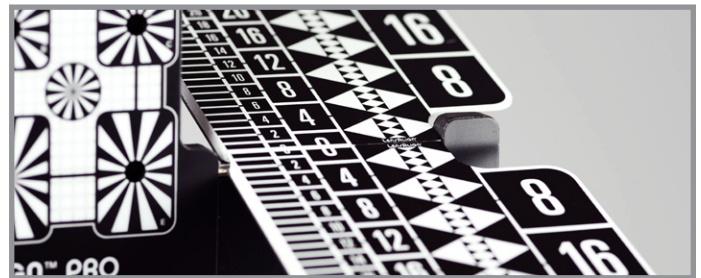
1. Remove the two Long Ruler halves from the shipping tube and save the tube that protects the carbon fiber stiffening rods for storage. Now place the ruler halves end to end with the carbon rods overlapping as shown, and join the ruler halves by inserting each carbon rod into its opposing slot.
2. The metal 9-1/2 inch Standard Ruler that came with your LensAlign PRO adheres magnetically to the spacers on the back of the Long Ruler. Align and mount the 9-1/2 inch ruler, centering it on the back of the Long Ruler as pictured. Note: The unpainted side of the 9-1/2 inch ruler should be contacting the magnets. Turn the assembled Long Ruler over and remove the protective plastic film (if present) from the front (calibrated) surface.
3. Mount the Long Ruler assembly on the ruler pivots of the LensAlign body in the same manner as the Standard Ruler.
4. Remove the Large Focus Target from its storage



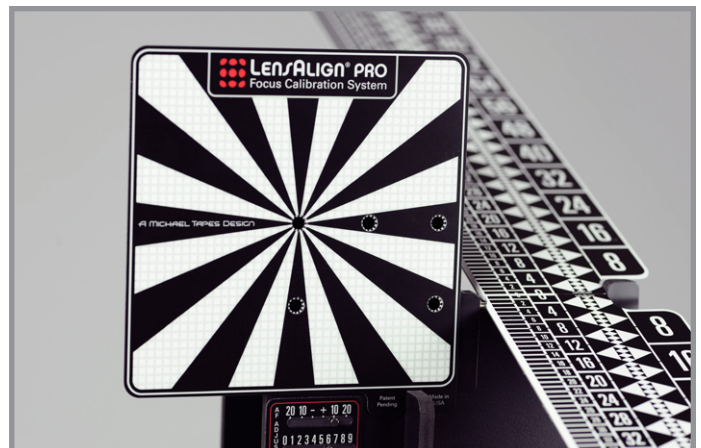
Setup Step 1



Setup Step 2



Setup Step 3

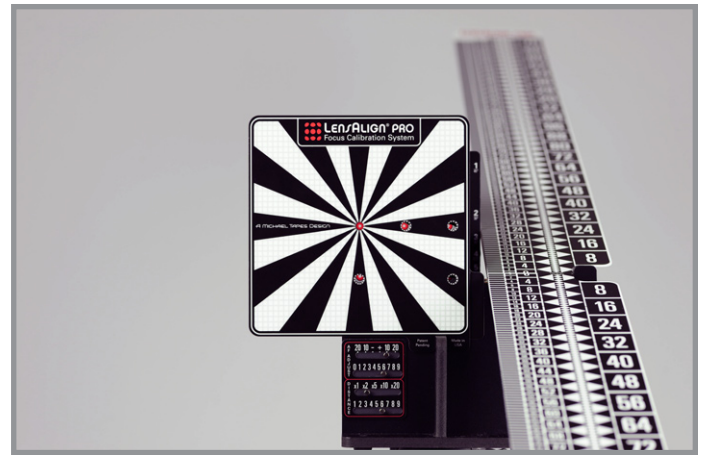


Setup Step 4

envelope and mount it directly over the Front Sighting Plate so that its notched slot fits over the vertical tab located below the Focus Target array, and the five sighting holes on the Large Focus Target are precisely aligned with the holes on the Front Sighting Plate.

5. When properly installed on a LensAlign PRO and sighted, the Long Ruler Kit appears like the one in the photo. As noted, the sighting and shooting procedures when using LensAlign Pro with the Long Ruler Kit are virtually the same as those previously described when using it with the Standard Ruler. The only difference is that the Long Ruler Kit extends the object distance and focal length range for which focus and depth-of field measurements and calibrations are possible.

Note: A slight sag at the ends of the Long Ruler will have no significant effect on the evaluation and accuracy of focus calibration measurements or data, and will only affect the extreme ends of the depth of field range in any case.



Setup Step 5

10 Using the Enumerator

LensAlign PRO is shipped with the Enumerator, a panel that attaches easily to the front of the LensAlign to provide a simple way of recording important shooting data in each test frame. The AF Adjustment and Distance data can quickly be set on the Enumerator to supplement the information recorded in the camera's EXIF (meta data) information within the image file.

Installing the Enumerator

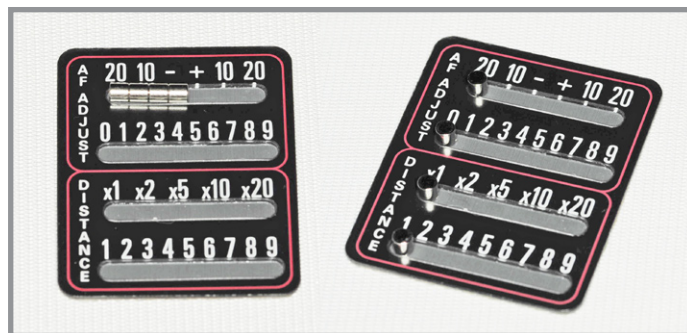
First remove and separate the four magnetic markers from the Enumerator panel and place them in the horizontal slots on the face of the Enumerator.

If the Enumerator has not been factory mounted on your LensAlign PRO, remove the adhesive backing and mount the Enumerator just below the Focus Target, placing it flush with the left-hand edge of the Front Sighting Plate as shown. Make sure to align it accurately before pressing it into its permanent position.

Setting the Enumerator

The Enumerator is divided into two areas or sections, each of which provides two horizontal slots for indicating the test parameter settings. The top "AF ADJUST" section indicates the magnitude and direction of the AF Adjustment being tested; the bottom "DISTANCE" section indicates the shooting distance. By varying the position of the markers in the two slots in each section, you can set AF and Focus adjustments over a very wide range.

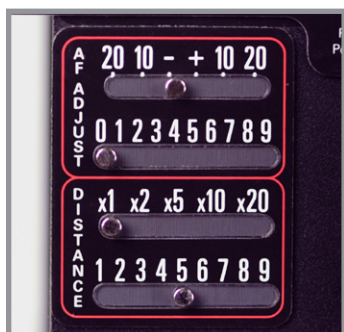
Following are four examples:



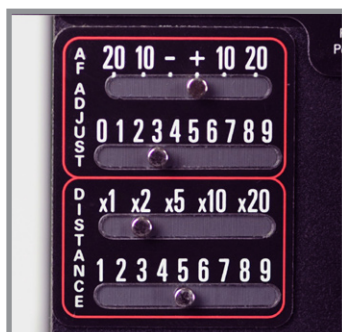
Remove and separate magnets



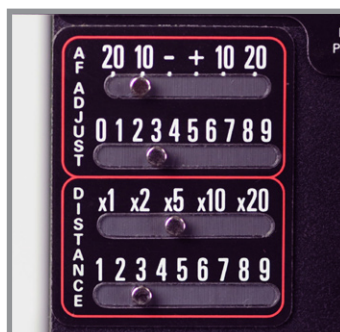
Remove backing and mount on Front Sighting Plate



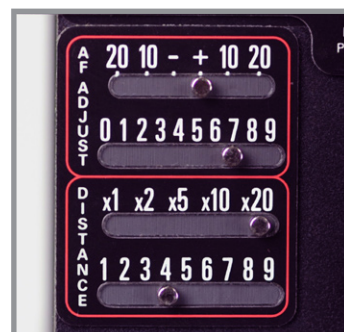
AF Adjust: 0
Camera to LA Distance: 5 ft



AF Adjust: +3
Camera to LA Distance: 10 ft



AF Adjust: -13
Camera to LA Distance: 15 ft



AF Adjust: +7
Camera to LA Distance: 80 ft