

PARALLAX RIFLE SIGHTING SYSTEM AND CLEANING VISE

3 SHOTS ~ 5 MINUTES ~ SIGHTED IN!



Sighting

Cleaning



Always Use Appropriate Eye & Ear Protection When Using This Device!

Introduction:

This system will allow you to sight-in in 5 shots or less. You only need to follow the instructions & be able to shoot a reasonable group. Here's how it works. You aim at a fixed point (target or bulls eye) & carefully fire a 3-5 shot group. You have now established the *POINT OF IMPACT* versus the *POINT OF AIM*. Now clamp the gun in the vise and *USE THE ADJUSTMENTS ON THE VISE* to center the reticle (red dot or cross-hairs) on the point of aim (target). *WITHOUT MOVING THE GUN OR THE VISE* use the adjustments on the sight to move the reticle to the center of the group. You have just mechanically and optically aligned the points of aim and impact i.e., you're on target.

SIGHTING IN

Step 1: Make a target. We suggest using a marker to make a cross + on a piece of plain white paper (or the back side of a standard target). This will make it much easier to identify the center of the point of aim. Set Target 50 - 100 yards away.

Step 2: Shoot a 3- 5 shot group using the rest as pictured in Step 2. At this point UNLOAD THE GUN. If your group is off the paper move the target closer to the gun.

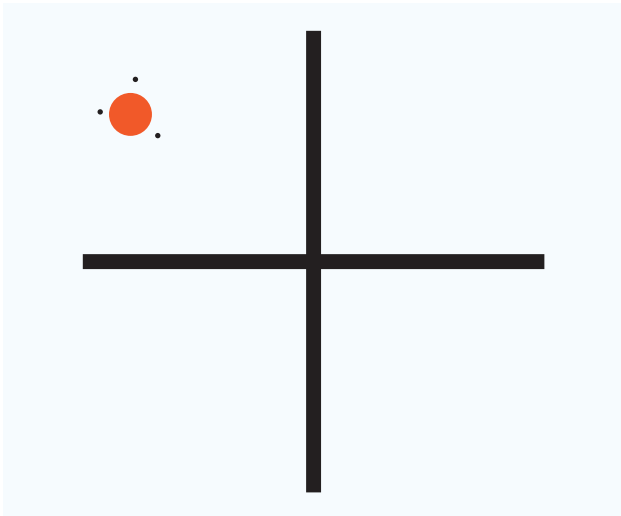
Step 3: Mark Center of group. High visibility dots work best!



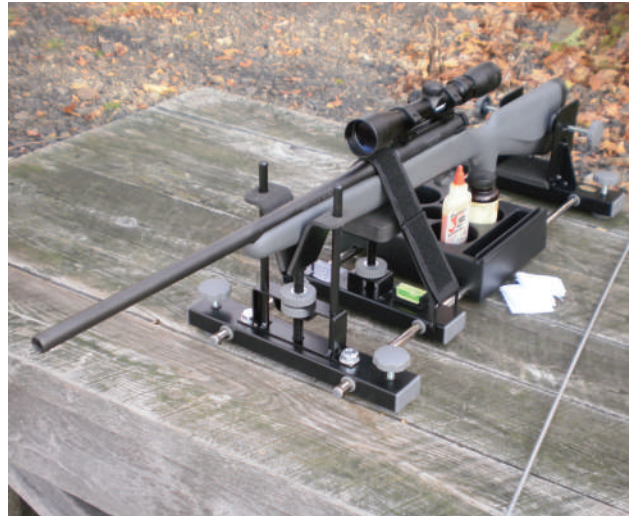
Assembly: The only assembly necessary is to fit the elevator assembly to the base. Use the 2 hex bolts as shown. Tighten snug (about 4-6 lbs./ft. torque).



Shoot a 3 -5 shot group & Unload Gun



Mark center of group



Cleaning Configuration: The vise is also a solid, stable cleaning platform. The padded forend support adjusts to any long gun. It has a Velcro strap that securely anchors the gun. In addition the vise holds the stock firmly in place. Both the forward elevator assembly and the forend rest adjust to accommodate any length gun.

Step 4: With Gun Unloaded -Place it in the vise & clamp it in place (4A). Locate the vise in the same approximate location as when you fired your group (4B). Remove the adjusting caps from the sight.

Step 5: Using the elevation adjustments on the vise and by moving the vise from side to side set the reticle on the center of the + mark (Target).

Step 6: (THIS IS VERY IMPORTANT) WITHOUT MOVING THE GUN OR VISE adjust the windage & elevation screws on the sight until the reticle is centered on the mark at the center of the group. THE GUN IS NOW SIGHTED IN!



Step 4B: Set the vise in the same location as when you fired. Adjust vise so that reticle is on the + Mark.



Step 4A: Unload gun and clamp it in vise.

Warning: The gun should be unloaded when clamped in the vise. In addition to presenting a safety hazard, firing the gun from the clamped vise may result in damage to the gun & vise!



Step 5: Without moving the vise adjust sight until the reticle is on the center of the group.

A WORD ABOUT ACCURACY

When it comes to shooting, the word “accuracy” really refers to group size. Once the group is established, adjusting the sights to move the point of impact to the point of aim is a simple task. A gun/ammunition combination that shoots to 1, 3, or 5 MOA is just that. No matter what device you use to support the gun that group size will not change, not to mention extraneous factors such as sighting device, wind, stability of the shooting platform, trigger pull, parallax and/or the shooter. There is a long list of factors that can affect group size. Below we have attempted to briefly address a few of the more common ones. All comments are made with the “all things being equal” and “under perfect conditions” provisos. Please consider this a general guide that might point out a few things that might not have come to mind. Our #30013 Dangerous Game®, #30003 Precision Rifle Rest and #30088 DLX Precision Rifle Rest are designed to produce repeatable results. If the rests are properly assembled, securely anchored to a bench that is rock solid and does not shift under the stress of recoil, you will be able to maximize repeatability. Each rest will consistently repeat well under 3 MOA. What this means is that if the gun/ammunition combination is capable of shooting groups of less than 3 inches at 100 yards (nominal 3 MOA), you will be able to realize this degree of repeatability with either rest. The big word in the previous sentence is “IF”. Neither rest will make a 3 MOA gun place all of the bullets in one hole. The group will still be 3 MOA. If your bullets are not all forming a tight group, there is a high probability that the problem is a result of the gun, ammunition and/or the sight.

* MOA-Minute of arc - A circle has 360°, each degree has 60 minutes, i.e. 1/60th degree. 1.0 MOA is exactly 1.047 inches at 100 yards

CENTER FIRE ACCURACY

A large percentage of the rifles, old and new, in the hands of American sportsmen will not shoot much better than 2.5 MOA with exceptional guns shooting 1.0- 1.5 MOA, (assuming the ammunition is correctly matched to the gun). The average deer rifle, using popular brand, off the shelf ammunition is probably capable of 2.5-3.0 MOA because the gun and ammunition manufacturers know that a typical white tail is statistically harvested at a range of less than 100 yards, and a gun that places the bullets within 3 MOA will easily place all of them within a heart sized circle. Manufacturing guns and ammunition that will shoot under 1 MOA is, of course, done every day. There are only a few manufacturers that guarantee that result, and then only with ammunition that they specify. The costs associated with the manufacturing, quality control, and attention to detail, price these guns out of reach of a large part of the market. With that being said, a gun/ammunition combination with 3 MOA accuracy, properly sighted in, will usually get the job done and nobody will know the difference. The target is dead - end of story. The point here is that if your gun is shooting at or beyond 3 MOA, the issue is, in all probability, a combination, of factors that can affect accuracy. We have prepared a short list of issues you may want to consider in examining the group size of your rifle.

- A. Bolt action sporting rifles are by nature and design typically more accurate than pump, lever, or semiautomatic rifles. The reason for this is the bolt action tends to be much more rigid, and therefore flexes less. In addition, a bolt action usually has a larger and stronger extraction mechanism, which means the chamber can be made to closer tolerances than other types of actions. Believe it or not, not all ammunition in the same caliber is made to the exact same dimensions by all manufacturers. For example, SAAMI (Sporting Arms and Ammunition Manufacturers Institute, publication ANSI/SAAMI Z299-1992) allows a variance of up to -.008 under the standard for diameter, and up to -.007 under for the standard distance from the base to the shoulder (this determines headspacing) for center fire 30-06 ammunition. (Variances across most calibers are similar.) The extraction mechanism in pump, lever, and especially in semi-automatic weapons must be able to consistently and effectively extract cartridge cases at a rate equal to the cyclic rate of the weapon using the entire range of commercially available ammunition. This can be problematic if the cartridge fits too tight in the chamber. As a result manufacturers tend to make these chambers more tolerant of ammunition that may tend towards the larger end of the size range. Conversely, if ammunition manufacturers want their product to function in guns typically in the hands of sportsmen, they must also consider how easily the cartridge seats and extracts. Needless to say, there are exceptions to this, but as a rule as you move away from a precise cartridge chamber fit accuracy suffers. This is especially apparent in military weapons because they must chamber ammunition from various sources (therefore with various tolerances) and must function even if the ammunition is corroded or dirty. Reliability, not pinpoint accuracy is the primary criteria.
- B. Match the correct bullet weight to the twist of the rifling. This is one of the most commonly overlooked factors that determines group size. If the bullet length and twist rate of the barrel are not synchronized, accuracy will suffer. A 110 grain .308 bullet is, of necessity, shorter than a 220 grain .308 bullet. For proper stabilization the heavier, and hence longer bullet, requires a faster rate of rifling twist than a short, light bullet. Further to this point, different guns respond differently to ammunition from different manufacturers. The point here is that you should test fire ammunition from several manufacturers and select bullet weights that are compatible with the rate of twist of the gun's rifling. Generally speaking, twist rate is stamped on the barrel or the information is available from the manufacturer. You need to test different bullet weights to optimize results.)

Calculating Twist Rate

Legend:

BL = Bullet Length

BD = Bullet Diameter

C = 150 constant for muzzle velocity 1500-2800 FPS

C = 180 constant for muzzle velocity over 2800 FPS

(choose the correct constant for the ammunition you are using)

Formula:

$$\frac{C}{\frac{BL}{BD}} \times BD$$

First divide the bullet diameter (for example .224) into the bullet length (for example .712). Divide the result into the correct constant (150 or 180) and multiply the result by the BD (for example .224). The results is the **approximate minimum** twist rate necessary to stabilize the bullet - Remember a 1:9 rate is faster than a 1:14 rate.

Example A: .223 (5.56 x 45) @ 3200 FPS, 52 Grain, BL= .712 BD=.224

$$\frac{180}{\frac{.712}{.224}} = \frac{180}{3.178} = 56.64 \times BD = 56.64 \times .224 = 12.7$$

12.7 is the optimum rate of twist

Example B: .223 (5.56 x 45) @ 2500 FPS, 75 Grain, BL= 1.095 BD=.224

$$\frac{150}{\frac{1.095}{.224}} = \frac{150}{4.9} = 30.6 \times BD = 30.6 \times .224 = 6.86$$

6.9 is the optimum rate of twist

If you use the 52 grain bullets in a 7.0 twist barrel the result will be fairly accurate. If you use the 75 grain bullet in a 12.0 or 13.0 twist barrel your group will probably be all over the target.

Diameters of Popular Bullets

.204 - .204	7mm - .284.
.223 - .224	.308 - .308
.243 - .243	.338 - .338
.270 - .277	.375 - .375

Note: 7.5:1 is about the fastest you will find in any barrel. Even though calculated results may indicate a faster rate, too fast will cause the bullet to disintergrate. At 3000 FPS in a slow 1:12 twist barrel a bullet spins at about 90,000 RPM.

Bullet length varies by manufacturer and style. For this information check with the manufacturer or take an actual measurement.

- C. A perfectly formed muzzle crown allows the gas to escape in a uniform pattern around the base of the bullet as it exits. Through improper cleaning and handling the crown of the muzzle can be easily damaged. Even a small ding, which may not necessarily be visible to the naked eye, can cause an uneven release of gas, which can heel the bullet over slightly, producing a yaw attitude. This will affect the bullet's stability and accuracy, as the long axis of the bullet will no longer be coincidental with the path of travel.
- D. The quality of the ammunition you use can have a direct result on repeatable group size; the more consistent the ammunition, and the components from which it is manufactured, the more consistent the results. Several manufactures make match grade ammunition where the components are carefully selected and screened for consistency and conformance to specification. (One of the manufacturers that are best known for achieving the most consistent results is Black Hills). There are several other manufacturers that make acceptable match grade ammunition, and there are other options. If you are a re-loader, you are already aware of the range of quality components available and in all probability you are able to produce consistent, high quality ammunition.
- E. Vertical Grouping – See Rim Fire section point D.
- F. Check Your Scope and Mounting – With older and especially inexpensive scopes it is not uncommon for the reticle to stick or shift, especially under heavy recoil and/or temperature extremes. If this happens your muzzle could end up pointing in a slightly different direction after each shot. To check for this condition, lock the gun in a vise that doesn't move and sight the reticle on a set point/target then use a piece of wood or other object (that will not do damage), to tap the scope tube to imitate recoil. If the reticle moves from the original point of aim, you have a problem with the scope. Also check the scope mounting using the same procedure. Mounts and rings frequently become loose due to recoil and heat. In addition to properly mounting a scope the rings must be lapped and centered otherwise there may not be sufficient contact to secure the scope. Even Locktite doesn't insure that mounts and rings will not shift.

- G. Parallax is the apparent shift of the target relative to the reticle due to the horizontal movement of the observer. Scopes with parallax adjustments must be correctly adjusted. Scopes without a parallax adjustment are generally range specific for parallax free sighting. If you have made the adjustments to eliminate parallax you are good to go. If not, it is important to make sure that the longitudinal optical axis of the scope that runs through the center of the cross-hairs is directly aligned with the pupil of your eye. If you have an inconsistent cheek weld to your stock or fail in any other way to address parallax your groups will suffer from horizontal dispersion, i.e.:open up left to right. This will happen because your view of the target in the horizontal plane will vary with each shot.
- H. Barrel temperature plays a major role in maintaining group size. As a barrel heats up torsional stress will cause the barrel to twist. Bench rest shooters wait several minutes between each shot to keep the barrel from overheating. If you fire 10 or 12 shots in rapid succession from a sporter weight barrel your groups will expand.
- I. Other factors, which we will not explore here include: Free floating barrels, bedding, barrel harmonics, etc. - Not to mention the shooter!

RIM FIRE ACCURACY

(Some of this applies to center fire rifles also.)

Accuracy in a rim fire rifle is to a large degree more dependent upon the ammunition as opposed to the equipment. Center fire ammunition can be loaded and/or reloaded to precise and consistent specifications. Rim fire ammunition can only be loaded at the factory level. Since rim fire ammunition is not re-loadable, it's necessary to use whatever is commercially available. Factors affecting rim fire accuracy are:

- A. As with a center fire cartridge there is a SAAMI specification (ANSI/SAAMI Z 299.1-1992) and variance for the dimensional aspects of rim fire ammunition that allows up to $-.004$ under the standard diameter for $.22$ long rifle match or sporting ammunition. Consequently, manufacturers make ammunition within the entire range of this variance. As a direct result a gun that is expected to perform reliably must be able to accept the full range of available ammunition. What this has led to are guns that are match chambered which are invariably bolt action. (The chambers in these guns have a tight precise cartridge fit and the guns perform best with match grade ammunition that is made to close tolerance), and then we have most other guns that have sporting chambers, many of which are auto loaders. The chambers in these guns must be made large enough so that the gun will cycle correctly with any off the shelf brand of ammunition which could be manufactured to any size within the allowable range of tolerance. i.e., this means the cartridge may fit loosely in the chamber. Due to gravity the cartridge settles into the lowest portion of the chamber. The result is that the center axis of the chamber, and hence the center axis of the barrel is not aligned with the center axis of the bullet. This means that the bullet will engage the rifling off center and will travel down the barrel and exit the muzzle at an angle resulting in a loss of stability and accuracy.
- B. Concentrically – If the long axis of the bullet is not concentric with the long axis of the case it will also not be concentric with the long axis of the bore, as above the bullet will travel down the barrel and exit the muzzle at an angle with similar results. As little as $.002''$ – $.003''$ off center will cause a noticeable enlargement of the grouping.
- C. Head Spacing is the distance the bullet must move from the casing until it engages the rifling. In a rim fire this is controlled by thickness of the rim. According to SAAMI standard rim thicknesses may vary from as little as $.036''$ to as much as $.043''$. A gun may perform much better with one rim thickness as opposed to others. It is therefore important to test your gun with a wide range of ammunition. Typically in a box of inexpensive ammunition you will find a considerable variance in rim thicknesses. This will usually result in expanding the group size; consistency of rim thickness will result in smaller, consistent group sizes. Both concentrically and rim thickness can be measured by using the HYSKORE® #30075 Ammo Analyzer.
- D. If the group spread is more vertical than horizontal it is usually the fault of the ammunition. At a known distance, a faster bullet reaches the target quicker and drops less, i.e. gravity has less time to act. As you may appreciate, the small quantities of primer and propellant used in a rim fire cartridge must be precisely and accurately measured in order to produce consistent velocity. Only a small variance in absolute terms translates to a significant percentage variation and by extension, variation in velocity. Maintaining this type of consistency across large production runs is incompatible with maintaining low cost. Primer compound has an explosive force in the magnitude of 25 to 50 times that of the propellant. As little as 1/10 grain (1/70,000 lb.) deviation will cause a velocity differential. With these thoughts in mind, the culprit in groups that open top to bottom is almost always inconsistent velocity. The faster bullets strike higher and the slower ones lower.
- E. Scope Problems -See “F” and “G” under Center Fire.

The aforementioned issues represent a brief synopsis of various conditions that may affect accuracy. There are numerous in depth studies that can provide detailed analysis of each situation. We are not experts and do not intend to be. Our comments and suggestions are the result of studying and compiling data from a wide range of sources. Furthermore, we have only touched on the more significant factors that affect accuracy. If you elect to make adjustments to your gun/ammunition combination to increase accuracy, we suggest that you address each issue one at a time. Do not try to make multiple corrections at the same time as you may contaminate the results, and possibly obscure important issues that need further attention.

SAFETY WARNING

- This Rest is designed to be used for cleaning and sighting only.
- The gun should never be fired when clamped in the vise.
- Loading the rest with sandbags or bags of shot and then firing a gun that is clamped in the vise will probably damage the rest beyond repair and cause damage to your gun.

This type of damage to the rest will void any warranty.

If this doesn't impress you, the improperly supported gun may rotate upwards and to rear potentially resulting in serious Injury.

**Follow instructions and use common sense.
If you do something dumb, bad things can happen.**

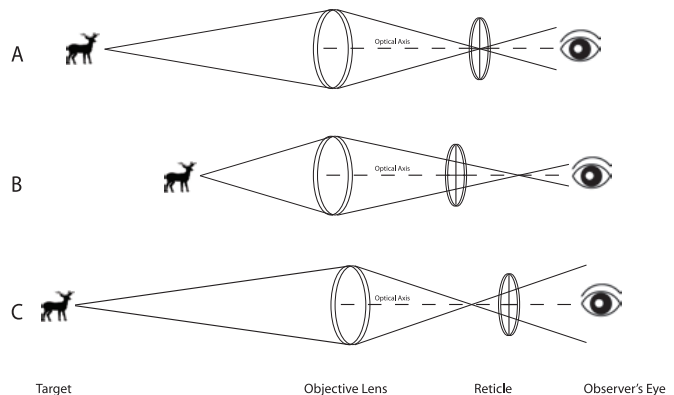
PARALLAX

When attempting to achieve the highest degree of repeatability i.e. smallest group size with any HYSKORE® shooting rest, it is important to have a clear understanding of parallax. Even experienced, good shots can improve their group size by up to 30% by paying close attention to parallax. Parallax is the difference in apparent position of an object viewed along two different lines of sight. To experience parallax extend one of your arms, hold an index finger up, close your left eye, and align the index finger with an object on the distant wall. Now close your right eye and open your left. The object has appeared to have moved. What has actually happened is that you are now viewing the object along a different line of sight. This is exactly what happens inside a rifle scope. We have prepared three diagrams to show you the various conditions that may develop in sighting with a scope.

- This is a parallax free focusing arrangement. The image of the target is focused on the reticle.
(The reticle is the optical element inside the scope on which the cross-hairs are inscribed.)
- The image focuses in front of the reticle and in this case you would experience parallax.
- The image focuses behind the reticle and also in this instance you could experience parallax.

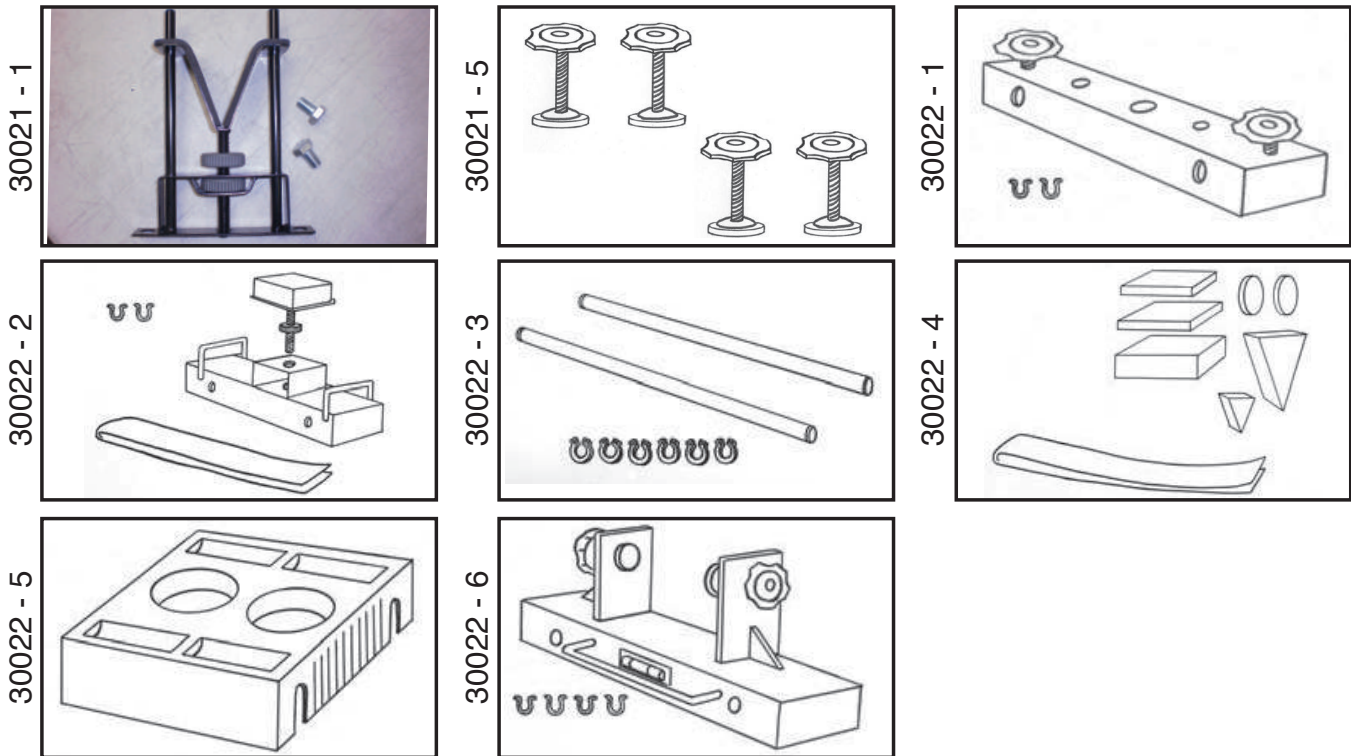
The correction in diagrams B and C is to adjust the objective lens of the scope so the image focuses on the reticle. On better scopes there is usually an adjustment on the objective bell (this is the end of the scope facing the target) with yardage markings. By turning this you can approximate the correct adjustment. However, since parallax is magnification and range variable, it is a good idea to clamp the rifle in a solid vise on the bench top (The HYSKORE® #30022 Parallax Cleaning and Sighting Vise is perfect for this.) Look at the target through the scope and shift your eye left to right. If the cross-hairs remain dead center on the target you are parallax free. If not, you need to do additional adjustments. Inexpensive and low magnification scopes are usually parallax free at a specific range, and do not have parallax adjustments.

Keeping the pupil of your eye concentric with the optical axis of the scope is critical to eliminating parallax. If you can keep your eye positioned on the axis every time you will experience parallax free shooting. Of course, this is almost impossible to do and repeat shot after shot. Moving your eye even a few thousandths of an inch off dead center, when parallax is present, will influence your visual alignment and cause you to change your point of aim, resulting in expanding your group. Therefore, you must make the appropriate adjustments at the designated range to remove parallax. Unfortunately, most scope manufacturers assume that all shooters have a working knowledge of parallax. As a result, the instructions they provide give little or incomplete details regarding this optic condition.



• REPLACEMENT PARTS •

These are replacement parts for purchase. Pictures do not represent contents of set.



Parts List:

- 30021 - 1 Elevator Assembly
- 30021 - 5 Leveling Jack (4 Pc. Set)
- 30022 - 1 Front Support Base (Includes 2 Snap Rings)
- 30022 - 2 Forend Support Base (Includes Strap & 2 Snap Rings)
- 30022 - 3 Extension Tube Set (Includes 6 Snap Rings)
- 30022 - 4 Pad Set (Includes Strap)
- 30022 - 5 Utility Tray
- 30022 - 6 Vise Assembly (Includes 4 Snap Rings)

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