

BY DEAN MAISEY

SCOPE MOUNTING BASICS

Scope rings and bases are essential to the pursuit of accuracy and also to ensure that your precision rifle optics are securely and precisely mounted.

Mounting a riflescope to a rifle action (or barrel) in most cases starts with a pair of rings fitted to the tube/body of the scope, which attach to a base that is attached to the action or barrel, usually by way of small threaded screws. Of course there are some variations to this; some actions such as Sako, Tikka, CZ, Ruger, etc have an integral base/dovetail rail incorporated into their action design and only require rings to affix the scope. Some expensive European scopes have a dovetail/rail on the underside of their tube/body, and some new laser rangefinder scopes such as the Burris Eliminator III scopes have their own clamping mechanism on their underside. In these cases conventional rings are not required. For the purposes of this feature let's assume we want to mount a conventional rifle

scope, in the standard manner, to your centre-fire rifle, such as a Remington 700, Howa 1500, Mauser 98 or Winchester Model 70, etc.

WHAT WE WANT TO ACHIEVE

- Scope secured tightly enough so that it will maintain correct alignment/position and not shake loose under recoil.
- Scope body aligned to the action/barrel as truly as possible to minimise the amount of adjustment required using the scope's internal adjustment mechanism.
- The two scope rings' internal bore surfaces aligned with each other as best as possible to prevent unwanted stressing or damage to the scope tube/body when the ring clamps are tightened.

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SCOPE MOUNTING PROBLEMS

One of the main reasons for scope base/ring alignment problems is due to assuming that selecting the mount base/s listed for your rifle in the manufacturer's chart will guarantee a perfect fit to your

rifle. This is often not the case. The saying that 'assumption is the mother of all stuff-ups' is very relevant here. Even if you think that you have the correct bases or rings for your rifle's action, you must still check when installed that the bases are the same height »

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as each other, are both level with each other, and are not canted or twisted in relation to each other. Bases that are of differing heights can be corrected by shims placed under the lower base, but the other problems can be more difficult to correct.

A few specialist tooling companies in the US make 'scope ring alignment reamers', which will ream the inner diameter of the installed scope rings truly and in perfect alignment with each other. The rings' lower and upper parts will need to be index-marked so that they don't get mismatched later on. Once the rings are installed to the bases they should not be removed again, otherwise the alignment can no longer be guaranteed to be true. Forget about the 'lapping bars' and grinding paste method - it's too time consuming for a professional gunsmith - what we want to do is remove just enough metal to get a significant proportion of the inner surfaces of both rings to run true. How much reaming depth is required will be a judgement call for the gunsmith. In extreme cases of really bad misalignment the rings may need to be replaced altogether.

There are some rings that cannot be corrected by reaming though - Weaver rings with their steel top strap and aluminium lower are one example. Others that have soft aluminium or vertically split rings can also be difficult or impossible to ream true.

One easy method of overcoming scope base misalignment problems quickly and economically is to use rings with the self-aligning ball/socket type plastic inserts, such as the Sako Optilock or Burris Signature Rings. The unique design of these rings can compensate for all of the misalignment scenarios possible (within reason) with the plastic inserts floating in a ball/socket recess while piloting off the scope tube body itself. When the top strap of the rings is tightened the alignment is maintained and the scope tube secured.

WHAT IS THE REASON FOR ENSURING CORRECT SCOPE RING ALIGNMENT?

- To prevent permanent damage to the scope tube body. Misaligned rings can result in dents or kinks in the scope tube or in extreme cases may even bend the tube body - sometimes permanently.
- A dented or stressed scope tube may affect the operation of the scope's magnification (power) ring

adjustment mechanism.

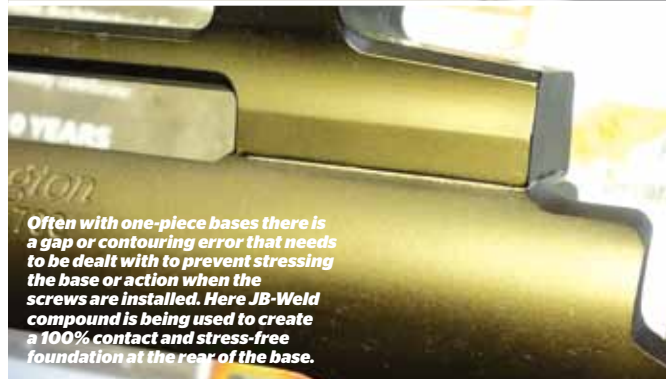
- A stressed scope tube can be the cause of fliers, or variations in point-of-aim / point-of-impact with changes in ambient temperature.
- A poorly aligned scope may result in an inability to correctly sight the rifle in at all if the misalignment is so bad that you run out of travel on the adjustment turrets.
- A scope damaged by poor mounting may affect its value, or may even affect or negate its warranty cover.

OTHER THINGS TO BE AWARE OF

- Loctite is a great product to prevent screws rattling loose, but there are places it should and shouldn't be used. Loctite applied to the base screws and the underside of bases is fine, but don't apply it to the screws on the rings themselves, as it can be a real pain to deal with later.
- On actions that have the front screw hole for the front base going in directly over the barrel threads, always ensure that the screw end does not touch or 'bottom out' on the barrel threads. This may mean having to grind the screw thread a bit shorter to ensure clearance. It's amazing how many broken 6-48 screws and accuracy problems are a direct result of having this front-most screw jammed hard onto the barrel extension threads.
- One-piece scope bases can be better than two-piece bases in so far as they can help to minimise misalignment, but they are not always a foolproof arrangement that you can just screw on and expect the alignment to be perfect. Steel one-piece bases are often bowed slightly from the stresses of the machining processes. One-piece alloy bases are usually straighter, but manufacturing tolerances and differences with both the bases and the rifle action itself often mean that some shimming or custom fitting/bedding of the base may still be required to prevent the base twisting and to ensure that it stays straight and 'stress free'.
- Be aware that barrel/receiver alignment is not always perfect, and while you may have the scope and mounts nicely aligned to the action, the barrel itself may be pointing slightly off-centre. Sorting out severe misalignment in this area can be a major problem.
- If using Loctite on the underside of bases, remember that this product requires a couple of things in order for it to set. Contact with



»Technical
Looking down along the edge of a one-piece base is one quick way of checking straightness. A engineer's steel ruler laid along the top surface is also another method of visual inspection. The base in the pic here is stressed/bowed in the mid-section.



Often with one-piece bases there is a gap or contouring error that needs to be dealt with to prevent stressing the base or action when the screws are installed. Here JB-Weld compound is being used to create a 100% contact and stress-free foundation at the rear of the base.



Burris signature series rings with the pos-align plastic inserts; 'Zee ring' style shown here - to fit the common Weaver style bases.



Close up (top view) of rifle action showing how front screw hole is located directly over the barrel threads. The scope base screw must NOT touch the barrel threads, or there will be problems.



Top view of a crooked rear base. This can be due to problems with the alignment of the threaded holes, the contouring of the base or the action itself - or all of the above.

a metal or metallic coating and the absence of air.

Occasionally on rifles that come in for repair, I find that the Loctite that has been applied has not gone off or set, leaving a soft, gluggy mess under the bases. This is common if one of the metal surfaces has been painted, or similar. In these cases - or where significant gaps or misalignment errors need to be corrected - then Loctite is not the right product to use. Two-part epoxy type compounds such as JB-Weld, Devcon, or Araldite (mixed with powdered metal) can be more suitable solutions. These should be allowed to set overnight, under correct alignment, before the screws are later tightened down. (The screw threads themselves can be Loctited if required.) Your wife's nail polish, RTV silicone or UHU glue are NOT suitable products for scope base mounting applications!

Extra care and diligence in the scope mounting process can play a huge part in helping to achieve consistent accuracy and preventing damage to the scope system, as well as providing peace of mind that the job has been 'done right.' **R&R**



Reaming the internal surfaces of the two scope rings to be 100% true with a special purpose reamer. This method is not possible on some types of scope rings. The reamer is turned slowly with a large spanner.

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