GunDigest

AR-15 OPTICS

Optics Ideas for AR-15 Rifles

OPTICS & SIGHTING GEAR

Not only is the 6X48 big on a rifle, but it takes up so much rail estate there is no room for a back-up iron sight.

In the old days, a scope on a rifle meant it was a sniper rifle and, as such, had to be treated with kid gloves. Back in the Vietnam era there was a brief attempt at putting a scope on every rifle. The Colt 3X scope was interesting then, and is a sought-after collectible now. As modern as it was, it is pretty tame now, and its limitations show.

We are in the middle of a revolution of sighting gear. Oh, I'm sure you thought that happened some time ago. Depending on how old you are, you may remember the idea that scopes on hunting rifles were just an affectation. Later, the idea that a scope could be used on a military rifle that wasn't a sniper rifle was heresy. And now? You can scour the photos coming back from Iraq (at least, until we leave Iraq, leaving behind more military equipment than we abandoned in Vietnam) and Afghanistan, and search in vain for a rifle *lacking* optics. Well, at least a rifle that is an M16 or M4.

These days you can see a scope on just about every rifle and carbine, and even most of the machine guns, in the places where we are currently and regularly shooting people. The military tends to favor "one size fits all" approaches, but there is still some variety, in part because a lot of unit commanders are a lot more concerned with food, water, ammo resupply, and keeping the village elder in the loop, than what new-and-improved scope the latest replacement thinks will solve his problems. As long as his scope choice doesn't attract more than its fair share of incoming, it is no big deal in a lot of units.

We, of course, have little in the way of restrictions in that regard. So, we're going to consider a lot of the optics you might want, lust after, or just want to know about.

Leupold CQBSS

Man, whatta scope. First, it is a low-powered variable, from 1.1X to 8X. At the low end, the 1.1 power, it is a wide-open field of view scope that you can use quickly.

There are two places to put a reticle, two locations in the tube where the light path is focused, and they have been named the front and rear, or first and second. The CQBSS has a front focal plane reticle, which means as you change the power, the apparent size of the reticle changes. As you zoom up (or in) the reticle gets bigger. Why? Because when you do so, the relative size of the reticle to the target does not change. And you can use the reticle as a range-finder. (From surveying, and classic sniper scope use, using mil-dots as a rangefinder, like a survey crew would.) If the reticle stayed the same apparent size in your field of view and as you zoomed the image got larger, you could use the reticle as a rangefinder only at one particular power setting.

That means at the 1.1 setting the reticle is pretty small. No problem. The CQBSS has an illuminated reticle. Turn the power on, and the reticle glows. You can use the glowing reticle as a fast-shooting close range red-dot scope, or zoom the power up and get to a reticle size you can use. Your choice.

The Leupold CQBSS is one industrial-strength piece of optical aiming gear. If offered, don't turn down a chance to try one.

Oh, and the power setting? On most scopes you turn a ring on the scope. On the CQBSS, you turn the whole eyepiece. No fumbling around for the power ring, just grab the whole back cylinder and turn.

The CQBSS has a bullet drop compensator, so once you know the distance to your target (mil-dot, reticle or an accessory laser), you just dial it to that figure, hold and squeeze. The windage and elevation adjustment knobs don't have covers. They have locking knobs that you squeeze to unlock. Squeeze, move, let go, it locks.

The reticle, the M-TMR, has elevation marks, windage marks, and hashmarks on the crossbar, so you can adjust on the fly if you have to. There is one curious aspect to it, however, the M-TMR is meant for the Marine Corps. And the reticle, while being a very useful one for rifles, is actually meant to be used on M2HB machine guns and Mk19 grenade launchers.

I know what some of you are thinking: a scope on a machine gun? Well, we've seen plenty of M249s, and M240s in the field with scopes on them, but this is meant for a slightly different use. You see, units are under-strength. Even if a unit leaves the US at full strength, as soon as they get into the field they start losing people. Oh, not lost as in killed (although that does happen, it is a war, after all), but a sprained ankle here, the flu there, a dropped wrench and the visiting dignitary "needs" more security. When a unit hits the field they need every pair of boots combing the terrain, that leaves fewer on overwatch, on the vehicles.

With a scope and a ranging reticle, a marine on an M2 or a Mk19 can still do well without an assistant gunner. He can't do without someone watching the team's six, but the Marine using that pair of eyes can't be an AG while also watching the teams back.

The optics are state-of-the-art, coated, coated again and coated who knows how many times, for clarity, contrast and light transmission. It may seem odd, counter-intuitive, that a coating would increase light transmission. Basically, uncoated glass reflects light. Coatings prevent reflection, and thus light loss. Also, reflected light inside of the tube causes glare, further hindering a good view.

Now, to get the performance you desire, Leupold had to go an extra step. Instead of a mere one-inch tube, or even the metric step up, they went with a 34mm tube, which will cause problems when it comes time to source scope rings. Unless you ring up LaRue, and they have plenty of 34mm adapters or mounts ready for you.

There is also the matter of weight. A scope with a 34mm main tube is a big chunk of aluminum. Add glass, and it gets heavier. Make it just shy of a foot long, and it becomes a real serious hunk of optics. At a smidge under 24 ounces, it is nearly a pound-and-a-half of optical goodness. Add in a mount, and we're past two pounds added to your AR. For a scope meant to be used on a Browning .50, or a 40mm grenade launcher, the weight is nothing. But for an AR, it adds up fast. I hope you started light, because if you opted for a heavy barrel, your rifle is now past ten pounds, and you haven't added any other goodies yet.

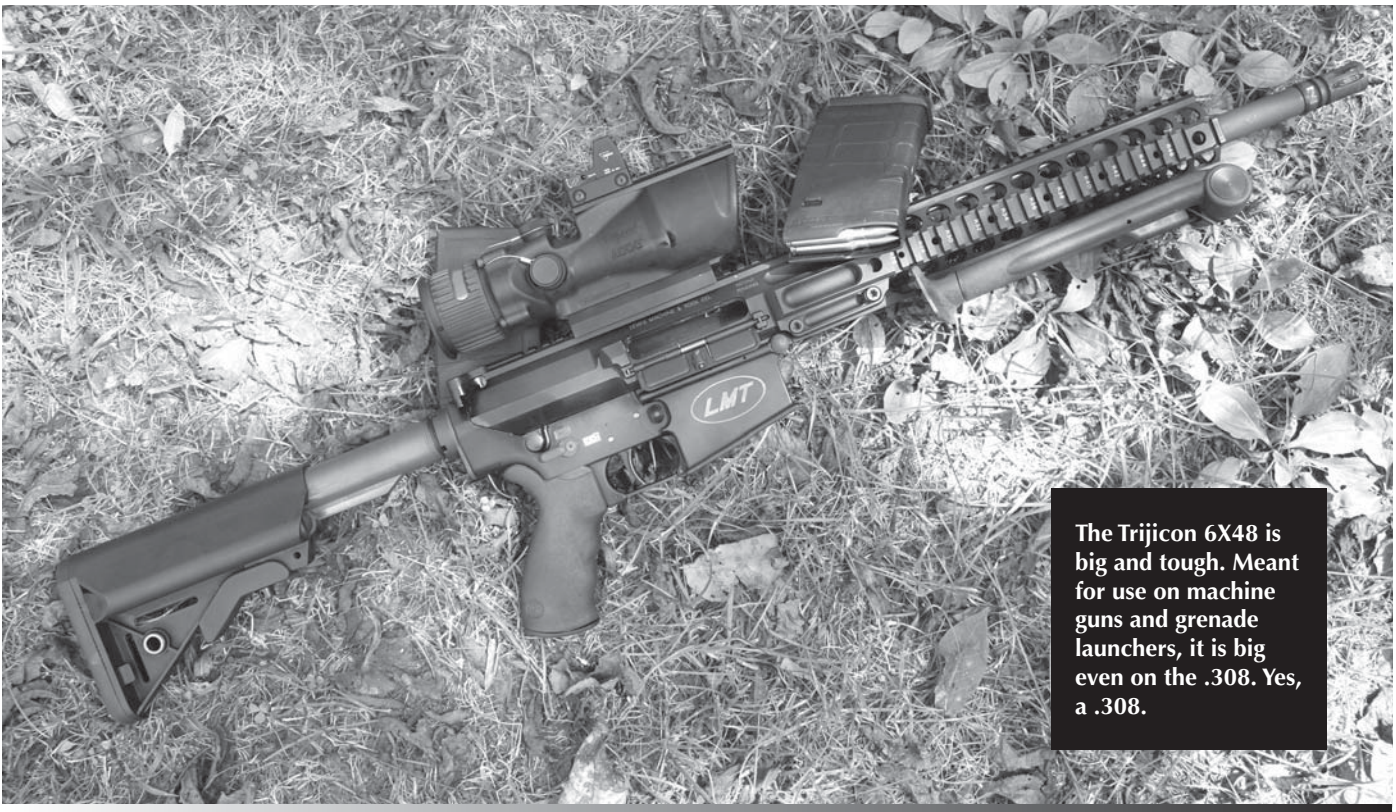
And last, the biggest obstacle of all: cost. Consider what you'd pay for a first-class scope. Then make it tough enough to withstand military use, that purchase the USMC has made to mount a bunch of the CQBSS on M2HB and Mk19, remember? They spent 2.43 million for 728 scopes. That comes to $3,400 each. Ouch.

Despite that, Leupold can't keep up. They filled the Marine order, and they can't make more fast enough to satisfy everyone else who wants one.

Trijicon

You say "Trijicon" and the first thing that comes to mind is the Acog. The photos from the desert are full of Acogs for one simple reason: the Marines adopted them, they work, and as a result the Army did too. The Acog is a product of not just thinking out of the box, but ignoring any box-like structures. Instead of an aluminum tube stuffed full of glass, Trijicon went at it from another direction. They designed the optics, then went the extra step and designed an aluminum housing to hold the glass. That means an aluminum forging has to be machined to hold the optics. That means more cost. An Acog of "only" 3.5X will cost twice what a straight 4X scope built on a tube would cost. It is also half the length and has a built-in mount, but that's part of the design.

They also brought with them two ideas that originated with Trijicon: tritium and fiber optics. Tritium is the radioactive isotope of hydrogen, where the nucleus holds one proton and two neutrons. (Normal hydrogen has one proton and no neutrons.) When the electron in each atom of Tritium decides to jump ship, also known as decaying, it does so in an orderly manner. Known as the half-life (the time in which half the isotope decays into its lower-energy residue) Tritium loses half its radioactivity in twelve years. When the electron leaves, the energy it takes with it is enough to energize phosphors. So, the tritium decays, and as it



The Trijicon 6X48 is big and tough. Meant for use on machine guns and grenade launchers, it is big even on the .308. Yes, a .308.

emits electrons those electrons make phosphors glow.

Inside of each Acog is a minute amount of tritium. On the reticle, there is phosphor in the shape of the aiming point. As the tritium decays, it lights up the phosphor reticle. You have a night sight. The human eye is remarkably sensitive, so you don't need much to see at night. However, in the day, there isn't enough tritium to power the phosphor, so you need something else.

A fiber optic takes advantage of a property of light: reflection. If light enters a tube, it is refracted by the surface of the tube and changes direction slightly. If the tube is made of the proper material, the light will then carom down the tube and not escape from the sides. The angle of incidence inside the tube is not great enough to allow much light to escape. In effect, the ends of the tube "glow" with the captured light. What Trijicon does is take advantage of this and use the captured light to illuminate the reticle. In the daylight, the reticle glows from daylight. At night, it glows from the tritium.

Trijicon has been so good at this that reports back from the troops indicate it is too good. In the bright desert, the reticle glows so ferociously that you can't use it as an aiming point. They actually cover up half the fiber optic collection tube (duct tape is a wonder, isn't it?) and in essence dial back the power.

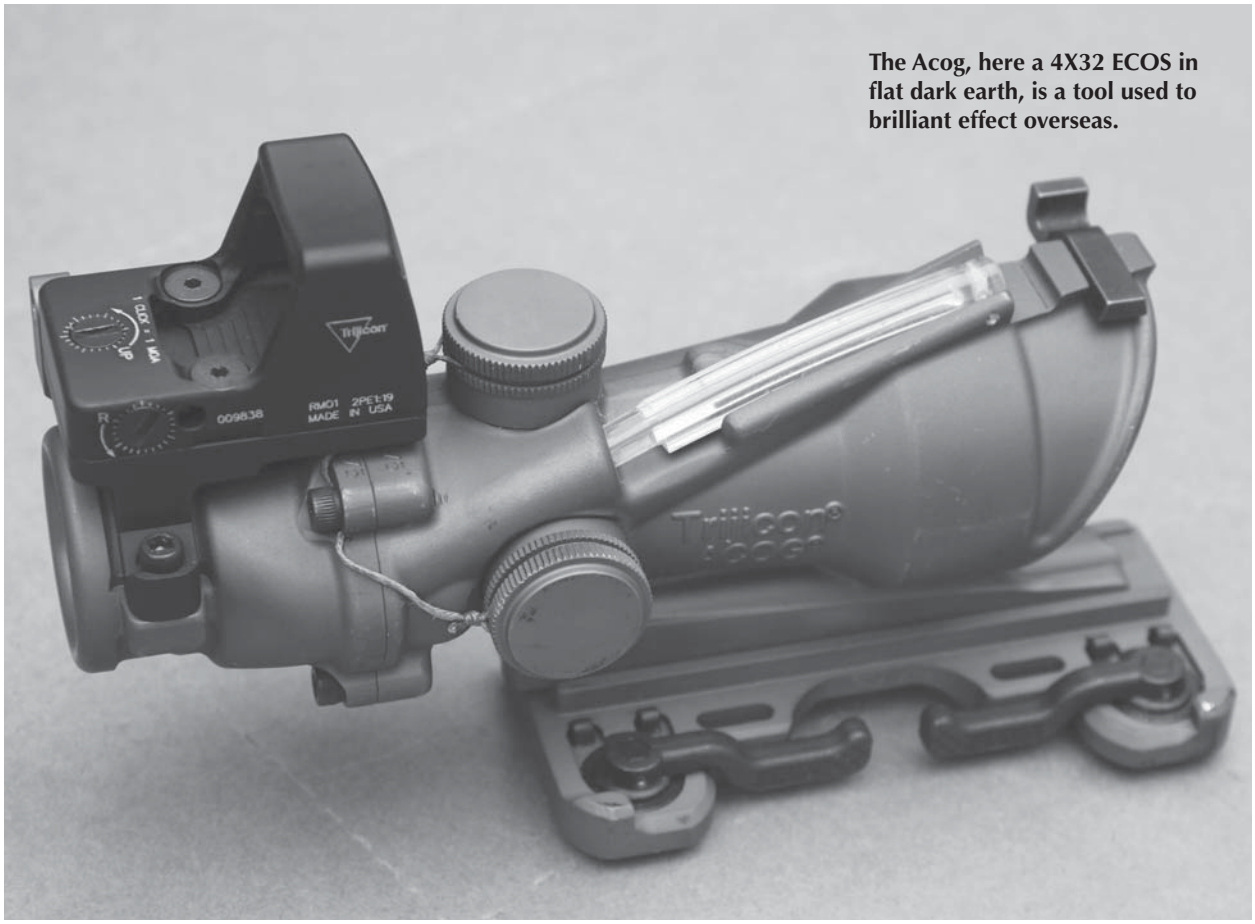
The Acog is fast to use, and the reticle is simple and easy, regardless of which one you select. You can start religious-level arguments over reticle design, and my choice is simple: whatever is in the Acog I'm using. I really don't care.

Now, the choice of but a single magnification can be a problem. If you are doing room-to-room work, you don't need 3.5X or 4X, or whatever else you have. If you are in the wide-open, you need more than "just" 3.5X. And what if the scope breaks. Yes, Trijicon makes tough stuff, but they are made, in part, from glass. And we all know what can happen to glass.

So, Trijicon puts backup iron sights on the Acog. Well, some of them. You have lots of choices when it comes to Trijicon, that's for sure. The sights, unlike the typical folding BUIS, are emergency-use only. You are not going to win a match with them, what you are expected to do is keep the bad guys at bay while your buddies, the ones with un-busted optics, settle accounts. This is not a slam at Trijicon, there is only so much they can do on a scope that compact.

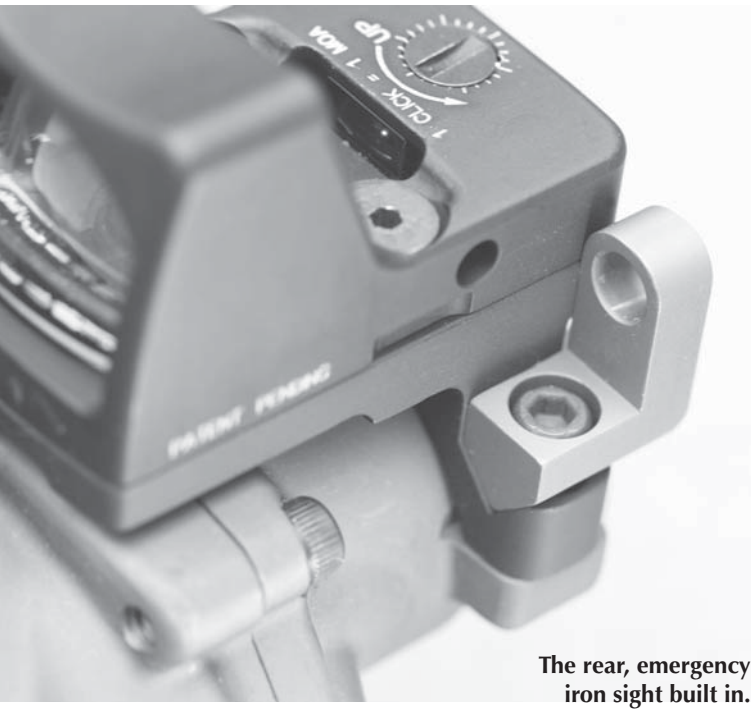
Now, 3.5X indoors is no fun. So, why not mount a red-dot optic, something compact, on the rifle?

6X, through the Trijicon scope, provides you with this view at 100 yards.



The Acog, here a 4X32 ECOS in flat dark earth, is a tool used to brilliant effect overseas.

Trijicon did so, at the request of the guys in the field. With all due respect to the guys on the sharp end, they did it wrong. The red-dot optic on the Acog is mounted up on top of the scope.



The rear, emergency iron sight built in.

One of the things we struggle with in patrol rifle classes is reminding people that the sights are above the bore. Above them by a significant amount – 2.6 inches. So, if you have to shoot someone across the room, your bullet is going to hit low, below your aiming point. Well, the red-dot optic on top of the scope just makes things worse. Far better to use an angle-mount, and put your red-dot optic (compact version) on the side, where a quick partial rotation of the rifle brings it right to the eye, like the Dueck Defense sights.

Acog Big Iron

Okay, if you just must have the biggest, baddest optics available, you want to hunt down a 6X48 Acog. The 6X power is one clue to its use, but the various reticles you can select from are a big hint. You can have a chevron (upside-down V) or a horseshoe, and the vertical bar with hashmarks can be had with ranging marks for .223, .308 and .50 BMG. Yes, a full-on Acog for machine guns. Of course it works on rifles too, since it has, like all Acogs, a Picatinny rail mount built in.

In a moment of beating Murphy's Law, I had an afternoon with one of these beasts, and I also hap-

The front blade of the emergency sights. Yes, you can adjust them, but don't get too wrapped up in it, they are only as precise as their four-inch sight radius allows.

The fiber optic collection tube on top. In extreme bright, the troops have been partially covering the tube, so it doesn't overwhelm their vision.

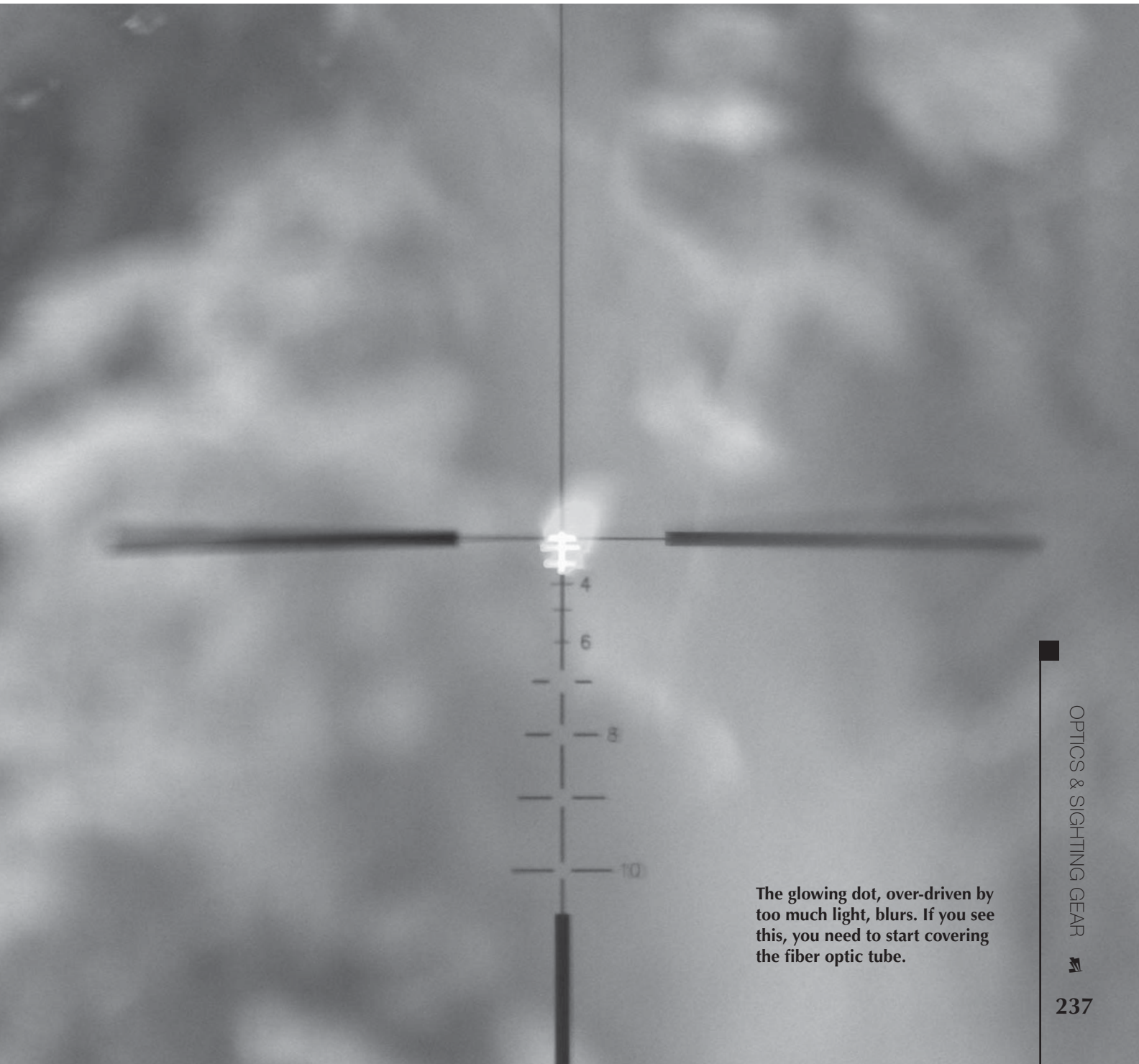
pened to have my camera bag along. Armed with a proper macro lens, I was able to steal the rifle away while it cooled and take some proper photos of the reticle on a target.

Own The Night

Back in Vietnam, we first fielded night vision gear, also known as night vision optics and night vision devices. I'm just going to cut to the chase and use the all-purpose acronym NVG. Actually, we fielded NVG earlier, in Korea. But those were active systems. They were mounted on M1 carbines, marked M3 carbine, and used an infra-red spotlight and an IR viewer. To someone else with an IR viewer, you were waving a spotlight around.

The Vietnam era scopes, known as "Starlight" scopes, were passive. They simply amplified the existing light. They made things-only-dreamed-of possible, and they made it clear to the US army that there was a future in certain electronics.

How do they work? Basically, the heart of a NVG is the photocathode plate. Light striking the plate is recorded, and the signal of that impact is then multiplied. Like the amplifier in your stereo (I admit, old technology for comparison, but those who play electric guitar will get it), you are greatly in-



The glowing dot, over-driven by too much light, blurs. If you see this, you need to start covering the fiber optic tube.

creasing the signal, but also some noise. Improved electronics have allowed us to magnify the received light a lot more than we could, and produce an image. The image comes when the signal from the plate and magnifier combo is projected onto the screen, the green image we're all familiar with.

The electronics are all dead-simple and understandable. The photocathode plate, however is another matter. Making those is more art than science, and when a batch is done the work begins. They are inspected, graded and sorted. The US government has a standing order with the few companies that make these gizmos, and the government lays claim to all those made in the highest quality grades. They go into the units shipped to our folks in the armed forces.

What's left is for us. Which in most instances is quite good, just not always good enough to fly choppers by. I was on a rifle class when we hauled out the AN/PVS-7. This is the military monocular/binocular sight, that in the latest version (7D? 7E? I've heard both) is used extensively by the military. When I attached it to my helmet, turned it on and swung it down, the view was okay, about what my commercial units did, but with a lot more "sparkles." As we were discussing the targets up against the treeline, the instructor looked over and said, "Oh, I didn't take off the day cap." He grabbed the AN/PVS-7, whichever, and suddenly the night was bright. Too bright, I had to turn down the gain.

Wow. I could recognize faces at more than CQB distances, and I could distinguish objects at the back of the 100-yard range. This on a moonless night with a few building lights nearly a mile behind us.

The first generation NVGs had shortcomings. Battery life was short. Plate life was short, on the order of a thousand hours. The image would "bloom" from a too-bright light source, and if you weren't careful you could burn out an essential part of the unit.

These problems have been solved, or at least mitigated. The NVG device family went through a second generation and into a third. Some manufacturers call their products Gen 3+, or Gen 4, but the military hasn't laid down the specifications for anything past 3, so it may be better, and it may just be different.

The best right now have a unit life of 10,000 hours or so. That means, if you are a serious hog hunter and go out a couple of nights a week and keep your Gen 3 NVG on for three hours each night, you'll get four-and-a-half years of use out of your system. Now, they do cost. They may be as little as five grand for a top-end system that is a military refurb, or twice that new. You can spend less, I've seen surplus and Gen 2 units for two grand, and some large, heavy surplus ones that make your rifle a real anvil for less than a grand.

The best allow the armed forces to own the night. No one can operate in the open at night when they are being watched. And since the systems are passive, watching doesn't disclose itself.

Given that they can't be exported, the market here in the US for NVG is part of the "man jewelry" I mention in the SBR chapter. Seeing in the dark is cool. Shooting safely in the dark is even cooler. And if you are doing this for animal control, i.e. shooting destructive hogs to save a farmer's crops, then the coolness factor goes off the charts.

Yes, there are those who have bought and stored their NVG for TEOTWAKI, but a lot more owners want to use them, and that means nighttime predator control.

Boost to passive

Since the units amplify existing light, if you add a bit, you get better viewing. The trick is to add light that doesn't reveal itself. Simply, NVG systems are sensitive to infrared light. So a small IR flashlight will boost visibility, albeit at the cost of showing yourself to someone who has NVG. Since that is mostly us, it isn't a big problem in military uses. For the rest of us, an IR source can be a big help. They do, however, tend to be pretty low-powered. You may have a tactical flashlight that powers out 100 lumens of white light, but the IR equivalent pushes a small fraction of that.

For the military the answer is lasers. The AN/PEQ-2 or 2/A is a laser projector that beams in the IR spectrum. In the narrow beam setting, it sends a tight beam that is seen as a dot on the target. With NVG, you (or your team) can see exactly where the beam hits. This is useful to machine gunners and snipers. Also, the beam is "seen" by smart bombs. Let's say you want a bomb (pick a weight) to hit exactly where you want it to, and not anywhere else. So you have an F15 Strike Eagle, circling at 30,000 feet, pitch one off. As long as the target location is within the cone of maneuverability, the bomb will see the dot, adjust its vanes and zoom in to the exact spot indicated. Woo-haa, one pesky thought-to-be-armored bunker gone.

In the wide-beam setting, the laser acts as a really strong IR light source, one your NVG goggles, sight, whatever sees and changes into a visible image for you.

At the high power setting, the AN/PEQ-2 can cause eye damage, so the 2A has a blue locking block that blocks it from the high settings.

The ATN Night Arrow 4, on an SBR with a suppressor on it. Getting ready for some night work.

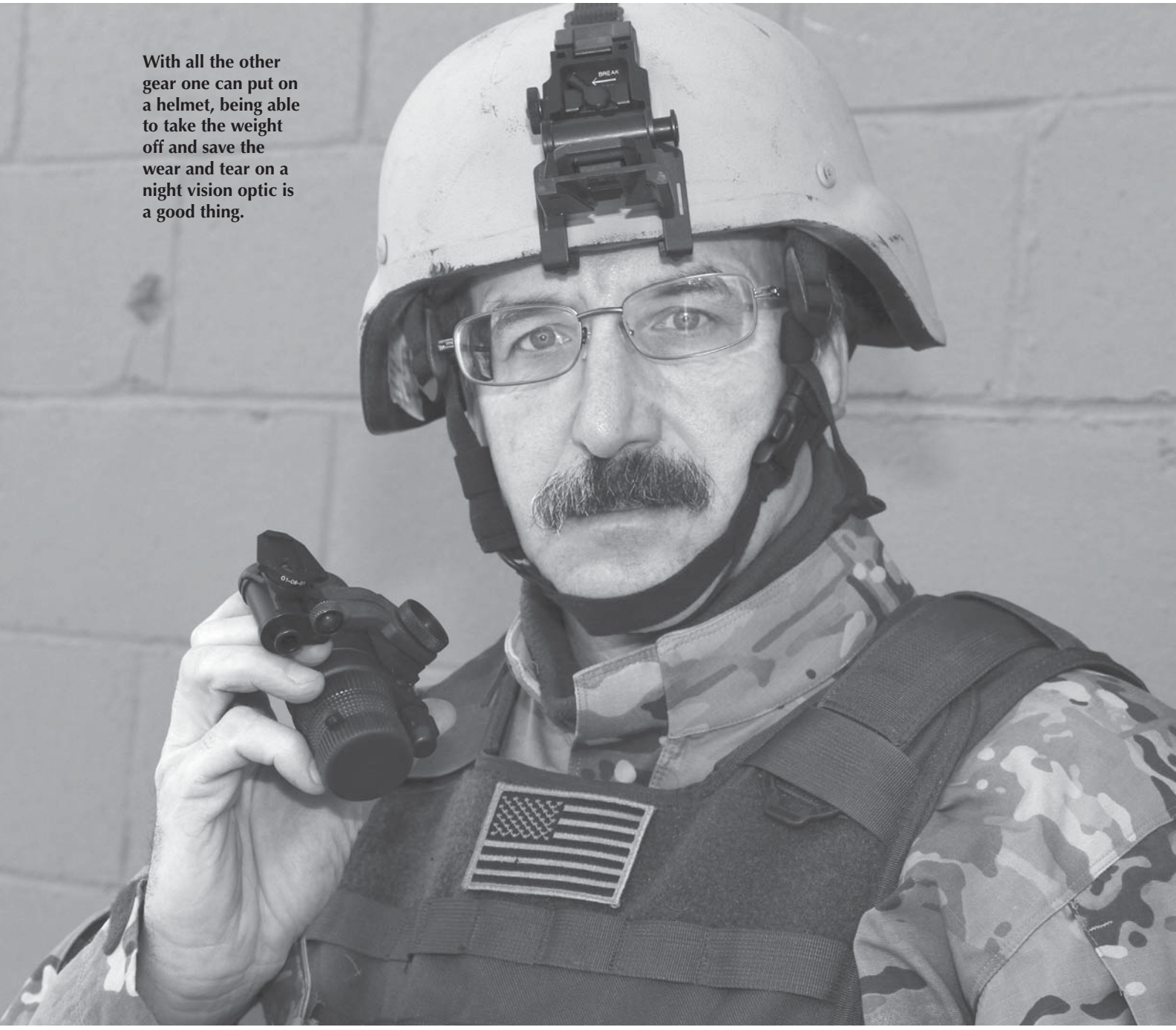
ATN

ATN Night Arrow 4

The NA4 is a weapon sight, which means that in addition to having NVG, it also has a reticle for aiming. In this, it has an illuminated reticle, so you can use it day and night, with the reticle lit or not lit. As a day system, it and you won't be happy. You're asking a lot of a Gen 2+ system. Battery life isn't a problem, as it uses vanilla-plain AA batteries, actually just one of them. The mean time between failure (MTBF) is 5,000 hours, so our pig-hunter would have over two years of use, on average, before it needs to be refurbed. The listed battery life is "only" 30 hours, but considering that it is a AA battery, and you can use rechargeables if you want, that is hardly an obstacle.

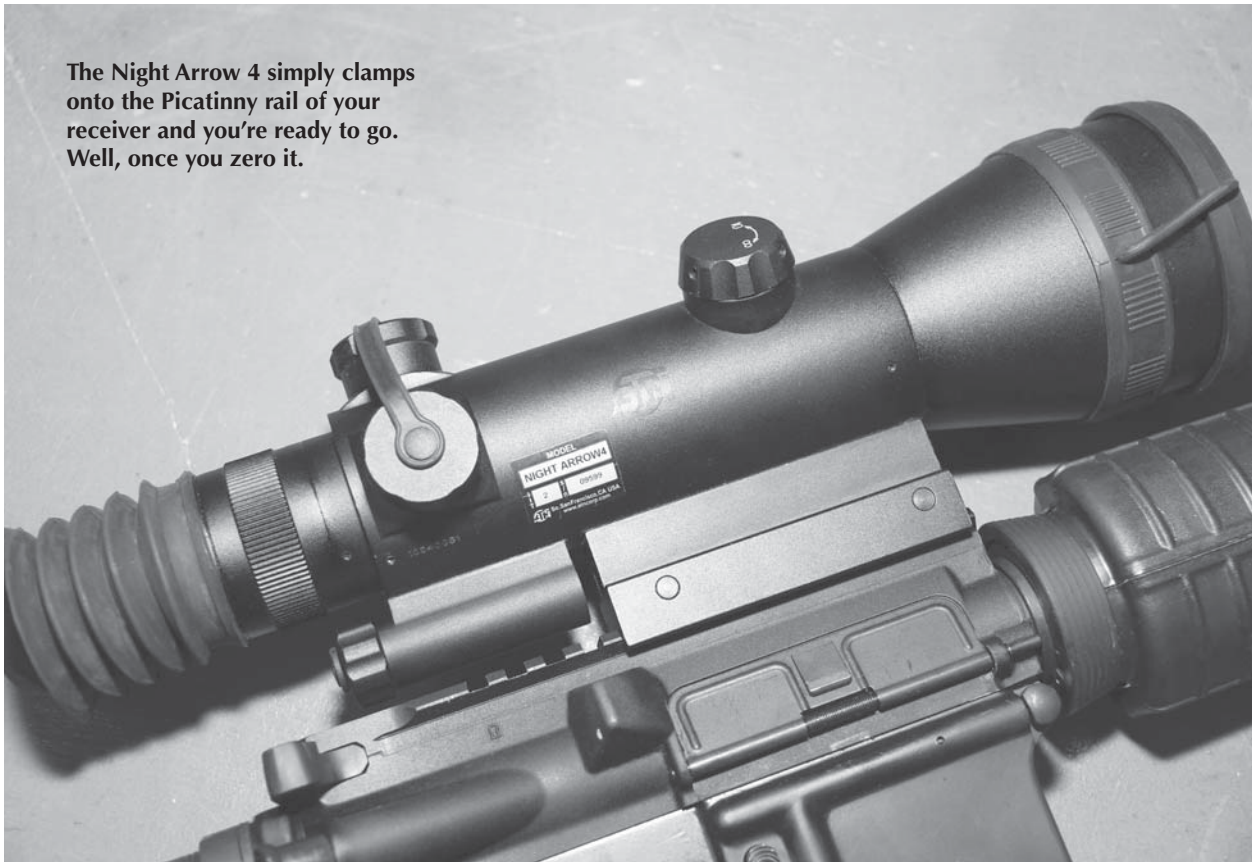
To boost viewing, it comes with an IR module, which you can either attach to the sight (if you're in the habit of swapping the sight around) or just attach to the rifle itself, where you can turn it on or off with your support hand.

Given that it has a built-in reticle, lit, and while usable in daytime, isn't happy with it, I'd use the Night Arrow 4 on a dedicated night-time upper. If

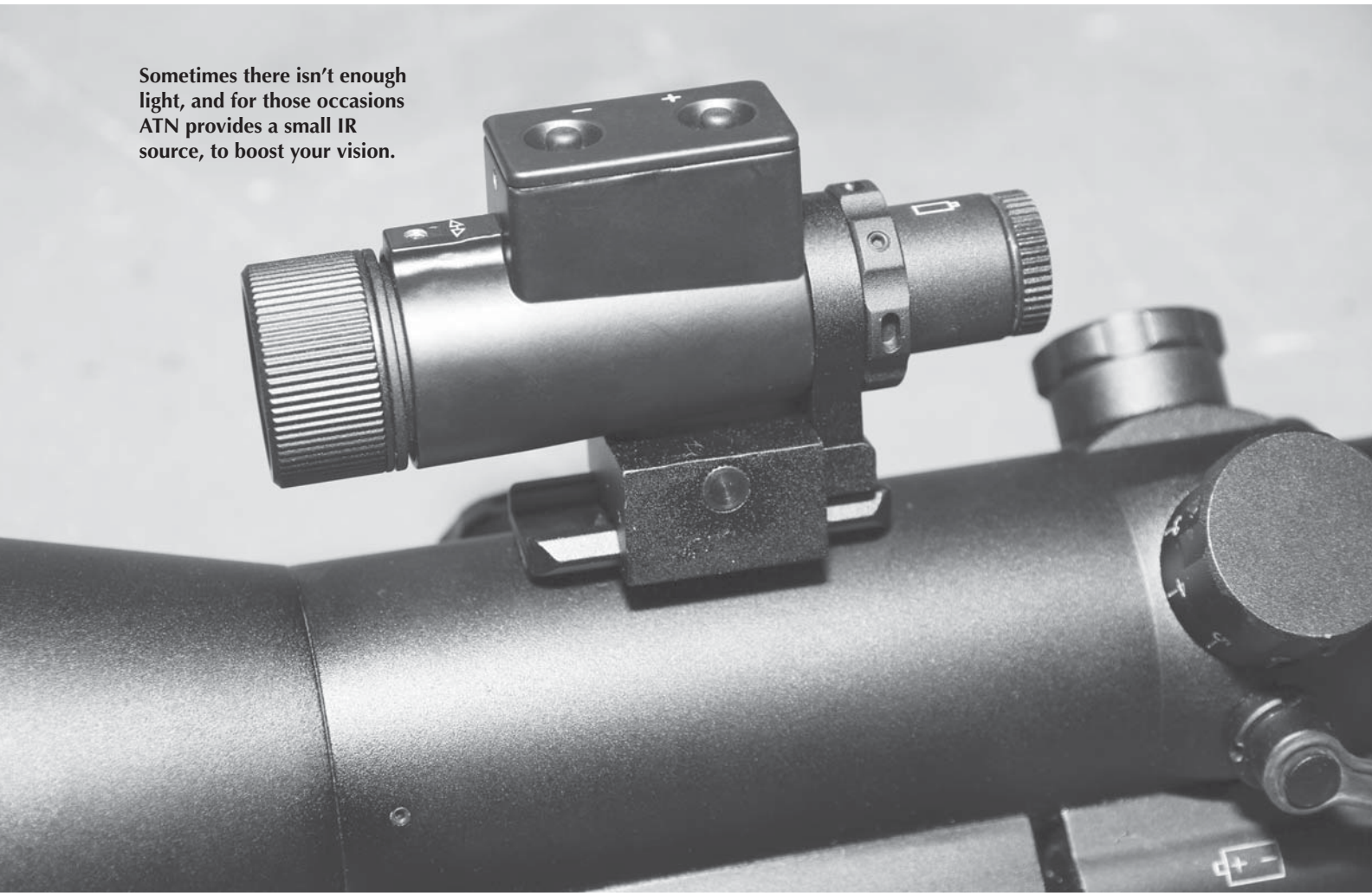


With all the other gear one can put on a helmet, being able to take the weight off and save the wear and tear on a night vision optic is a good thing.

The Insight NVM-001 and the Wilcox mount to keep it on a helmet. Useful, but stay in shape, this all adds weight.



The Night Arrow 4 simply clamps onto the Picatinny rail of your receiver and you're ready to go. Well, once you zero it.



Sometimes there isn't enough light, and for those occasions ATN provides a small IR source, to boost your vision.

you're going to go out on hog control, you'll be using something suitably-chambered for hogs, and for that just use a dedicated upper or rifle. The Night Arrow 4 lists for about as much as a rifle does, so you aren't breaking the bank while you're hammering the porcine population.

If you want to get into NVG and you aren't prepared to drop the cost of a compact car into one, this is a solid option.

ATN PS40

The PS40 is a change from, and up from, the Night Arrow. First of all, it is a Gen 3 optic. That means a 10,000 hour MTBF, up from the 5k of the NA4. It has much better resolution (64-72 lines per millimeter vs. 40-45 l/mm) and this happens in a package that is two-thirds the weight of the Night Arrow. However, there is a cost for this performance. Where the NA4 lists at $1600, the PS40 is listed at $4900.

It runs on either AA or CR123, and battery life is impressive here, too. On the AAs, it runs 50 hours; on the CR123s, 25 hours. Again, rechargeables give you a low-cost option for viewing juice. The PS40 passes the MIL-STD-810 spec, and while I've had some say "It isn't real military NVG," they are happy to take a look through it and exclaim at how good it is.

But you have to keep in mind one salient fact; it isn't a weapon sight. It is a night vision optic, which means you have to have some sort of aiming device to go with it. What and where matters.

If you have a day optic on your rifle that is a magnifying optic, then you mount the scope in its regular place and the PS40 ahead of it. Take the PS40 off in the day, you won't lose your zero. That's what I did for one class. We had a chance to do some night shooting, and the results were impressive. I had the PS40 on my LWRCI, and a Leupold 3.5-10 in LaRue mount. Downrange at 300 meters, I had my choice of two targets, a LaRue steel re-setting target and a deuce-and-a-half.

The LaRue was a little tough to see. Easy when the moon came out from behind the clouds, but tougher when it wasn't, and tougher still once

The ATN PS40 is a night vision scope that mounts ahead of your standard magnifying optics. You get the best of both worlds, albeit at a price in weight.

Putting the ATN PS40 on or off of your regular scope does not change the zero, a big advantage for this design.

we'd tagged it enough to blast the paint off it. The truck? It had been used over on the grenade range, and someone had poked impressive holes through it with various 40mm practice grenades.

I could easily pick out various features of the truck and select to plink the cab, door, hood, box or frame rails. The pitch of the "plink" that came back through the night confirmed what kind of steel I was hitting. A lot of fun. A person at 300 meters would not have been a difficult target.

Had I decided to use a red-dot scope, I would have had to mount the PS40 to the rear and put the RDS out front. You see, using the red-dot in the regular place would put the unmagnified PS40 a foot from my face, trying to peer into a cathode ray tube display an inch across. No fun, and not much use in aiming. So, dots out front.

Our moonlight pig-slayer, using a PS40, will have a breathtakingly clear view of the hog, and on the schedule we discussed, his four and a half years of ham sandwich shooting will cost him just over a thousand dollars a year, which is about as much as he'd have spent on ammo in that time, too.

ATN Night Spirit 2

Sometimes you don't need to have NVG on a weapon, If you just want to observe and decide if you are going to shoot after watching, you don't need a weapons-mount NVG. Something with a tripod bushing would work just fine. The Night Spirit 2 is a Gen 2+ system, and you mount it on a tripod, turn it on and take a look. You can hold it as a monocular, but why do that, if you have the option of mounting it?

AA batteries again, and as a Gen 2+ system you have a 5,000-hour life and batteries last you a listed 30 hours. (I've gotten more than that, but I don't turn the gain way up on any NVG I use.)

With a built-in IR illumination, you can boost the Gen 2+ performance in a non-critical application and get a better view of things.

You have to be careful playing in the dark, so we used Airsoft guns. This Insight thermal sight, a CNVD-T, allowed me to see hot objects in the dark. Remember, if it's all the same temp, it is all the same image.

Insight

The first time I saw Insight night vision gear, it was at an industry gathering where we got to use their thermal imagers. Instead of amplifying existing light, the thermal imagers display the image as seen further down the spectrum, into heat. When I first looked through one, I could see the impression of someone's hand, where they had been leaning on a fence rail for a moment and then lifted their hand.

We later used them on Airsoft carbines and I noticed something extremely cool; I could see the heat produced by a plastic Airsoft pellet plowing though a cardboard target. I could watch the heat signature fade over the minute or so it took to completely cool. Wow. People in the darkness could not hide their heat, unless they were behind something so substantial it defeated all attempts at observation.

In passive starlight-type scopes, someone who is camouflaged and not moving can pass undetected. As long as you fade into the background, you essentially aren't there. Well, when we had a chance to use the Insight thermal imagers on a willing test subject who was invisible to regular passive NVG, he stood out like a sore thumb on thermal. Despite a really good ghillie suit, he was easy to see, track and shoot. (Yes, howls of outrage, as I directed a full-auto stream of Airsoft pellets onto him.)

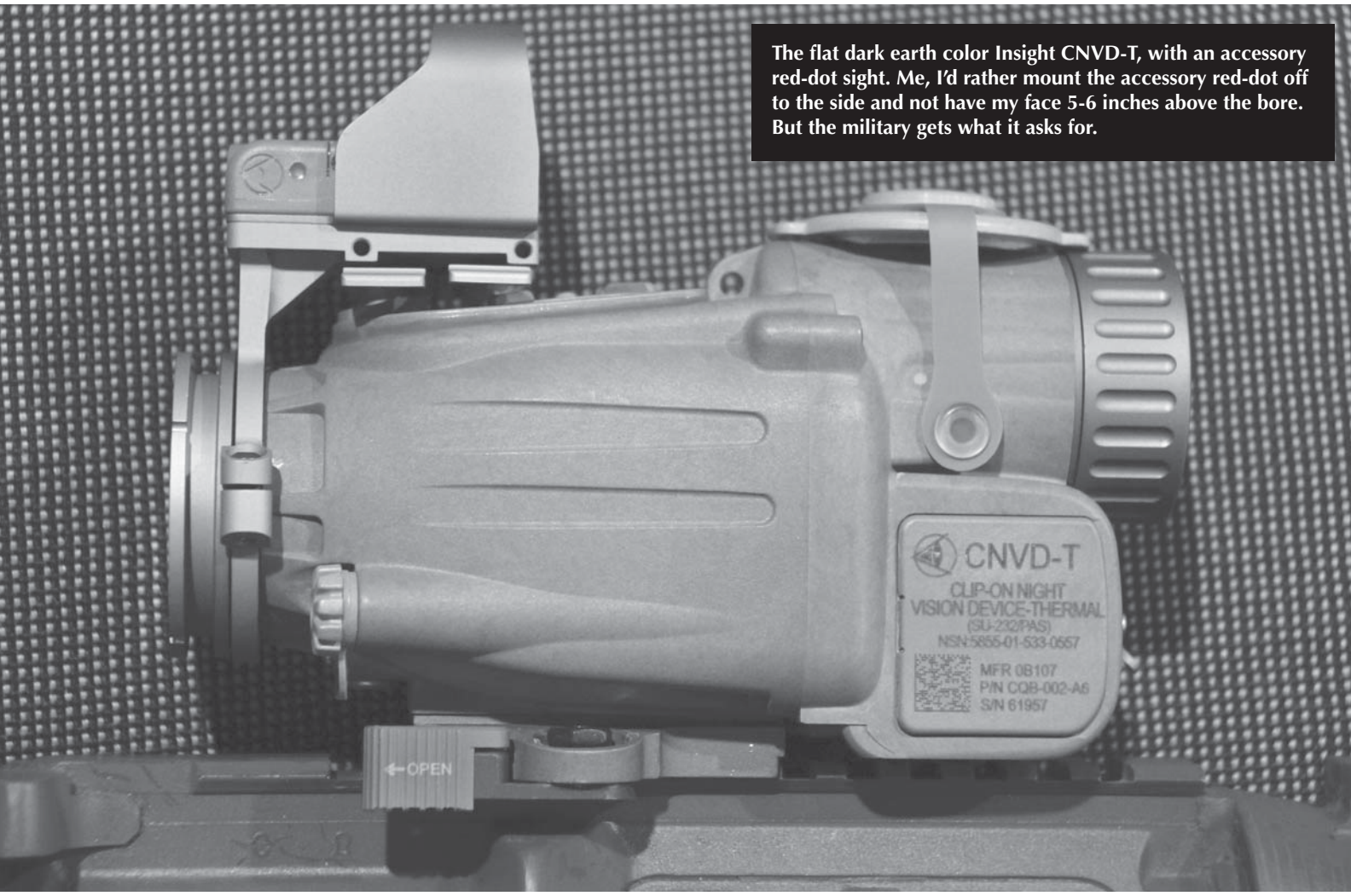
Insight AN/PAS-23

This was the one I first looked through, and it is simply a thermal-imaging monocular viewer. You can't mount it onto anything, and when it first came out the government price on one was a cool $13,000. If you want that price, you'll have to buy in volume. But cool? Ye god, yes.

Insight AN/PAS-27

This is the weapon-mount sight, and all you have to do is bolt it on and turn it on. What you see through it is the heat signature of whatever you are viewing. The image is ghostly, grainy and not all that easy on the eyes. But you can see in the dark. It has a built-in mount, but it is still just a viewer, and you need some sort of aiming optic to use with it.

If you want an all-in-one thermal and aiming device, then the CNVD-T is the Insight model you want.



The flat dark earth color Insight CNVD-T, with an accessory red-dot sight. Me, I'd rather mount the accessory red-dot off to the side and not have my face 5-6 inches above the bore. But the military gets what it asks for.

Not all NVG are mounted on the weapon, because not all night-time viewing needs require a weapon. Walking, driving, flying or working some sort of device at night require vision. The best way to manage that is to either wear it, or bolt it to something you are wearing.

Insight NVM

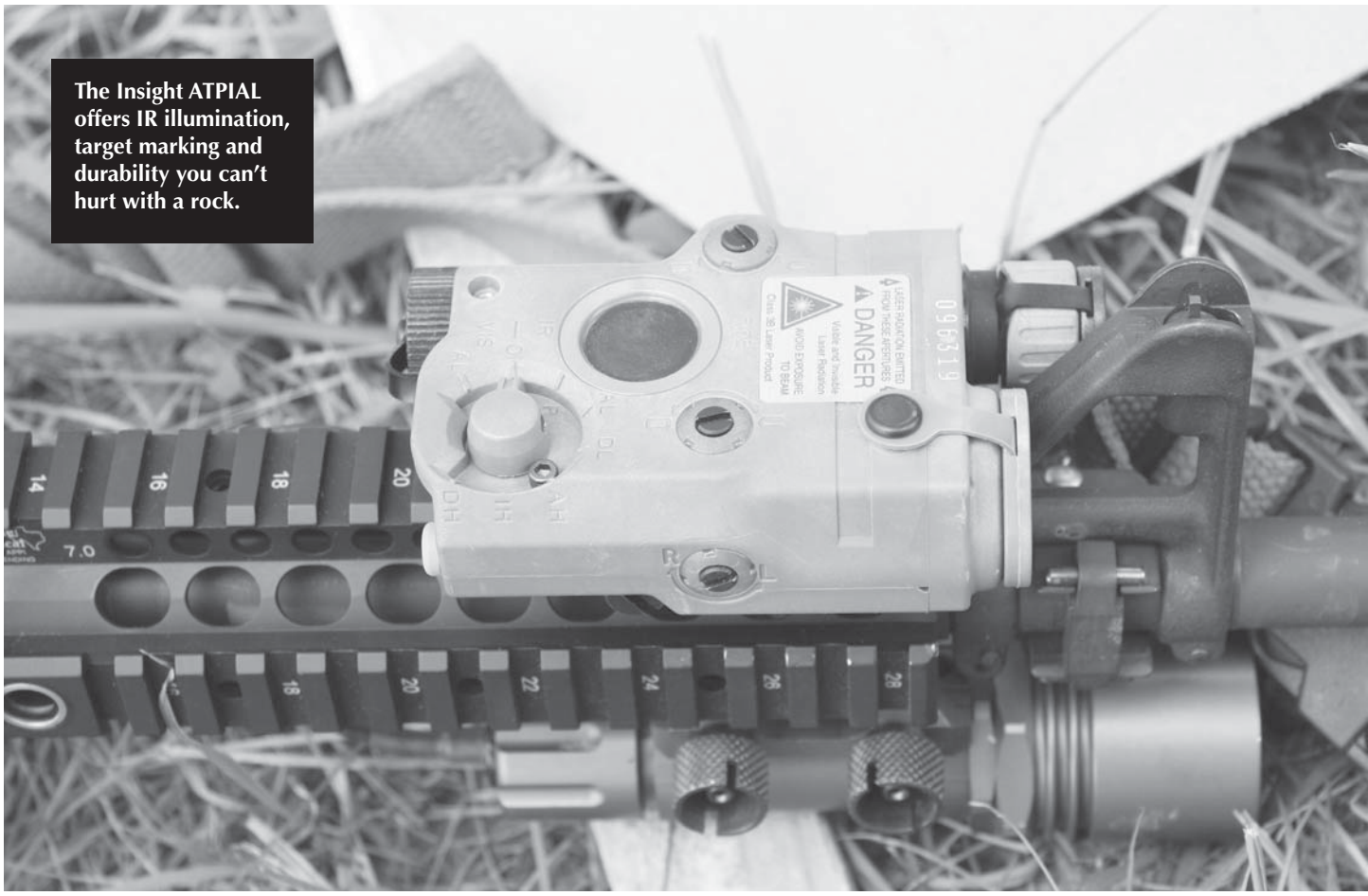
The Night Vision Monocular is a relatively simple NVG tube that you either bolt to your rifle in a special mount, or wear on a headpiece or attach to a helmet. It is a simple NVG, and for observation it is very good. If you need it to read a map or work a radio, etc., you can turn on the built-in IR illumination and the IR light provides the light source you need.

I took a Blackhawk helmet and attached a Wilcox Industries NVG mount to it. I bolted the Insight NVM to the Wilcox mount, and *viola*. I could flip up the NVM to get it out of the way. I could adjust it up, down and side to side as well as forwards or back, to get it in just the right location for viewing. And, if I didn't need it, I could detach the NVM and mount from the Wilcox rig and stash it in a storage pouch. No point in subjecting it to day-to-day daytime abuse.

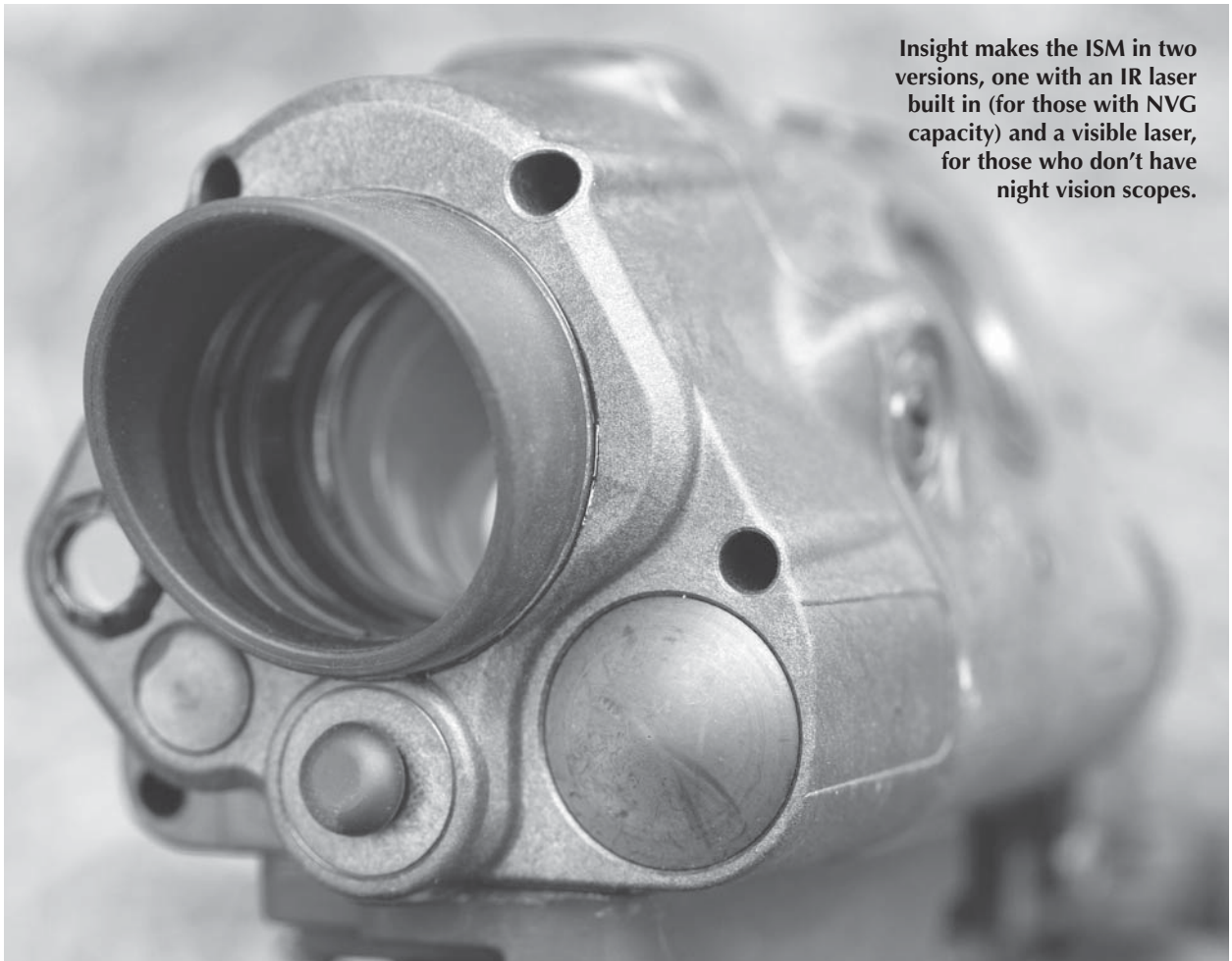
On the helmet, once properly positioned, I could use it with a regular day sight for aiming. Iron sights are not much of an option, but a scope or red-dot would be fine. Reading, walking, etc., are all do-able. It just takes some practice, because you have no depth perception. It takes some getting used to, as one eye is seeing things and the other isn't, and that can lead to headaches as you learn the system.

Insight AN/PEQ-15

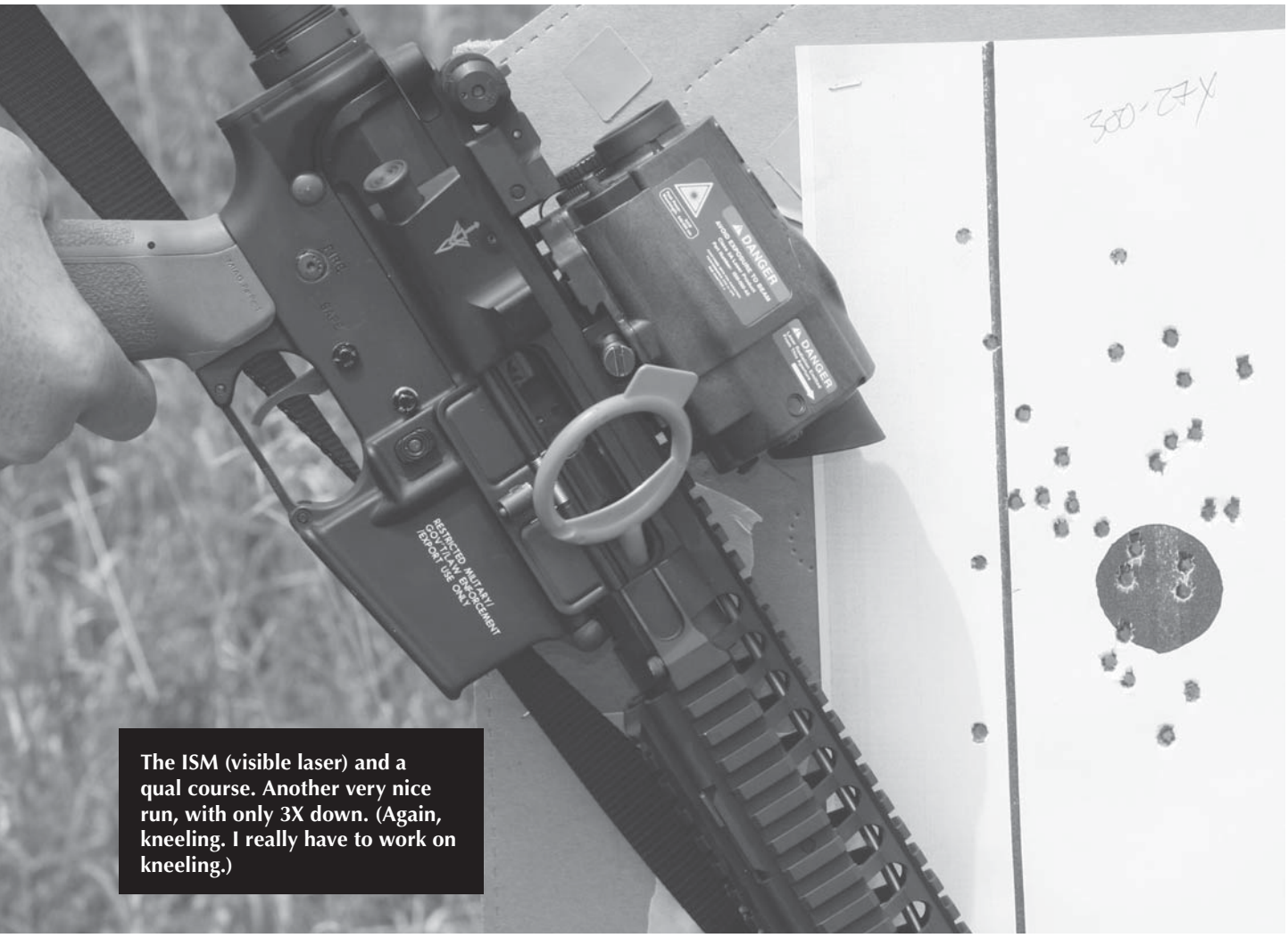
For the latest in illumination and identification, the "15" is the thing. It is smaller and lighter, has a longer battery life than the 2 or 2/A, and it comes in everyone's current favorite color: flat dark earth. Also known at the ATPIAL, if you see a tan block on the



The Insight ATPIAL offers IR illumination, target marking and durability you can't hurt with a rock.



Insight makes the ISM in two versions, one with an IR laser built in (for those with NVG capacity) and a visible laser, for those who don't have night vision scopes.



The ISM (visible laser) and a qual course. Another very nice run, with only 3X down. (Again, kneeling. I really have to work on kneeling.)

front of an M4 in Afghanistan, this is it. It does everything that the AN/PEQ-2 or 2/A does, but better.

Insight ISM

The Integrated Sighting Module is for those of us who do not need night vision capability very often, or at all. For the someone in Afghanistan, for instance, taking fire in a remote outpost, night vision is a big help. You're receiving fire and you can see someone moving towards your position in the dark. There are no friendlies out there, so see and shoot. In a law enforcement role, that is not an option.

The ISM offers a red-dot sight and a built-in targeting laser. Rather than have them as separate items, you have it all in one.

MARS

The MARS comes to us courtesy of the Israelis. And as combat-savvy as they are, I have to wonder just what they were thinking. It isn't particularly compact, and while it has a built-in laser, it is proportioned such that you can't use your back-up iron sights unless you pry the MARS off.

But it is cool, and for those who are building an IDF clone, a must-have of the first order.

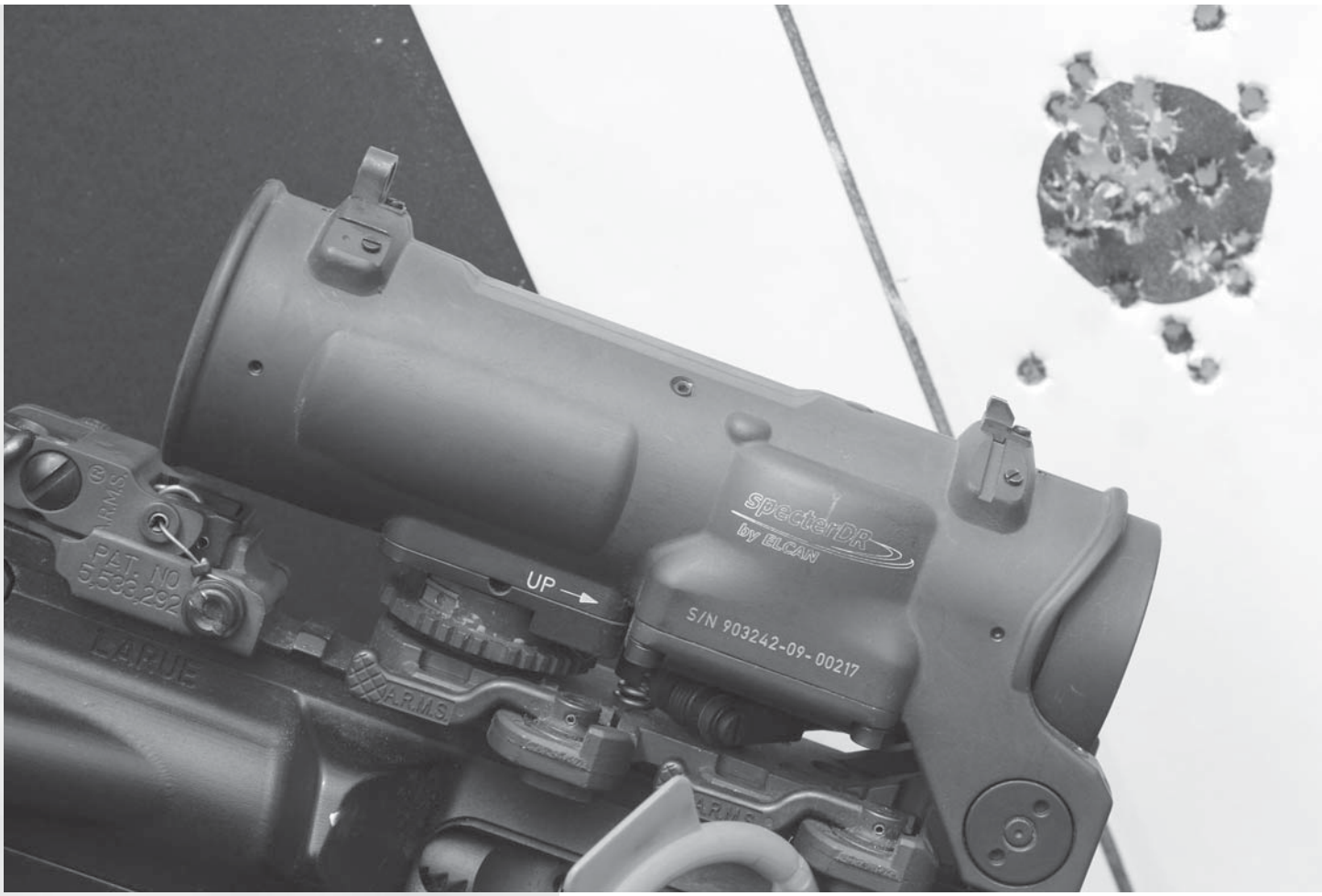
Elcan Specter OS4X scope

Okay, an interesting approach to optic. Instead of trying to make internal adjustments robust enough to withstand heavy use, why not make the adjustments external? That way they can be a lot more robust, and the scope can more easily be sealed. And while you're at it, why not make it a switch instead of a zoom? Instead of having everything from 1X to 4X and all in-between, why not just make it 1X or 4X?

That's what the new Elcan is. At 1X it is wide-open. Pull down on the lever, then swing it the other way, and it becomes a 4X scope. As an idea, it is great. As an actual scope, it rubs me the wrong way. First of all, while it is not as heavy as I'd expected, it is every bit as bulky and full of angles, gaps and

To use your BUIS, you have to pry the Mars off, as it blocks your view and there is no co-witness capability.

The Mars sight is both red-dot and built-in laser.



The SpecterDR is one really cool piece of optical engineering, and if you like it, it will do great things for your shooting.

protuberances. The external adjustments are neat and easy to use, but they are a lot bigger than I think they should be.

Also, the reticle is all wrong. At 1X it is so small you can't see it, and you must use the illumination to make it useful. At 4X, the reticle is big and busy.

And, it is listed at $1200.

Now, a friend of mind owns one of these and it is his favorite scope in all the world. He can do amazing bits of shooting with it. (Then again, he could do amazing bits of shooting with two match sticks duct-taped to his rifle.) Me, I pick up his rifle and I just can't get used to the scope, which only goes to show that you really need to try stuff before you plunk down your hard-earned cash. Just because Delta/SEALS/ninjas use it, doesn't mean it is right for you. And if my friend had heard me not liking it before he tried it, he might not have such a good scope.

With some fine-tuning I think it could be a really brilliant optic.

The zero adjustments for the SpecterDR are on the outside, and as a result they are hell for stout. Just bulky, is all.


BYCE
THALES

If you pay attention to photos from Afghanistan, you'll see lots of Acogs. The 3X or greater magnification makes it useful in the wide-open between villages.

Optics have become so common that it is rare to see a rifle, or even a machine gun, without.

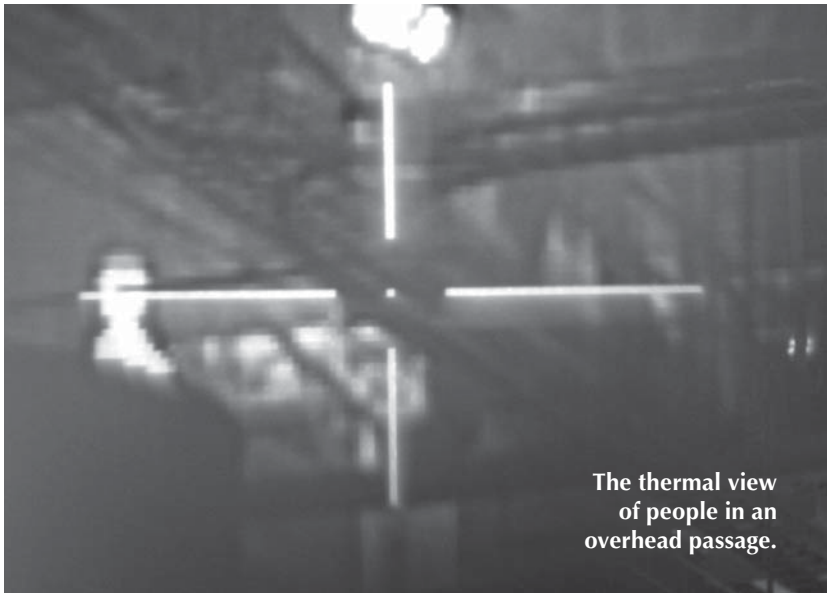
A lot of commanders allow the troops to use their own choice of optics. Plus, the SOPMOD kits each have an EOTech, so you can see a bunch of them overseas, too.

LEFT: A red-dot is useful, but if you have to reply to long-range machine gun fire, magnifying optics are useful.

Sig makes a red-dot scope for use on their AR, and anyone else's you wish to attach it to.

GG&G makes rubber optics covers for your EOTech, with only a small amount of assembly required.

ABOVE: EOTech to the max. Their holosight, for the rifle, and the M4GL sight, for the M203.



The thermal view of people in an overhead passage.

Extra optics

Just when you thought there wasn't enough that could be bolted to an AR/M4, along come electronic grenade sights. Some are simple, a scaled illuminated reticle with range hash marks on it. Others are more complex, like the Wilcox, with a built-in rangefinder and auto-cam setting so the red dot is moved to the correct angle for the range you just lased.

Between the scopes, lasers, grenade launcher and who-knows-what-else, soon a rifle is going to be 20 pounds, and firing bullets will be the least of what it does.

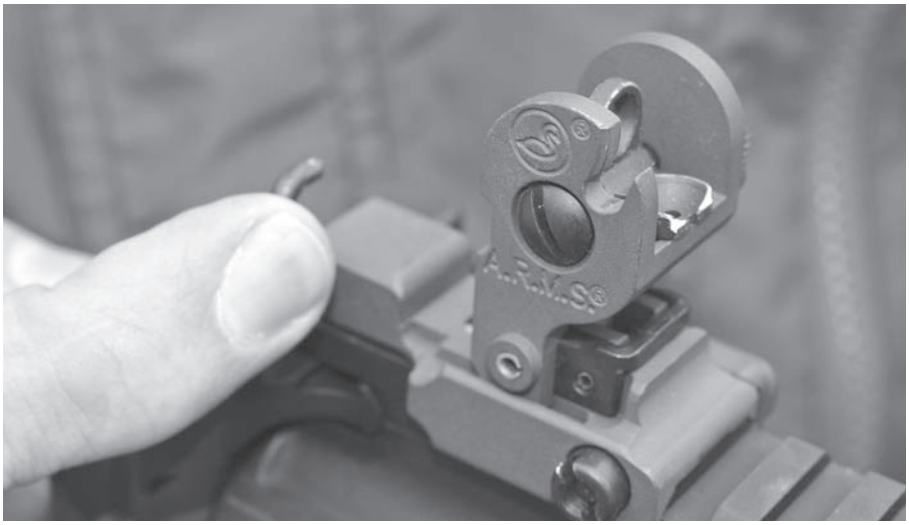
Underneath the rear housing is the reticle selector. On top, the knob controls intensity.

The big advantage a rifle has over handguns and shotguns is accuracy – sufficient accuracy that extended range use becomes viable. Where a 200-yard shot with a handgun (for most handguns and shooters) becomes a "lottery shot" (your odds are about the same), for someone with even a little instruction and practice with a rifle, 200 yards is no big deal.

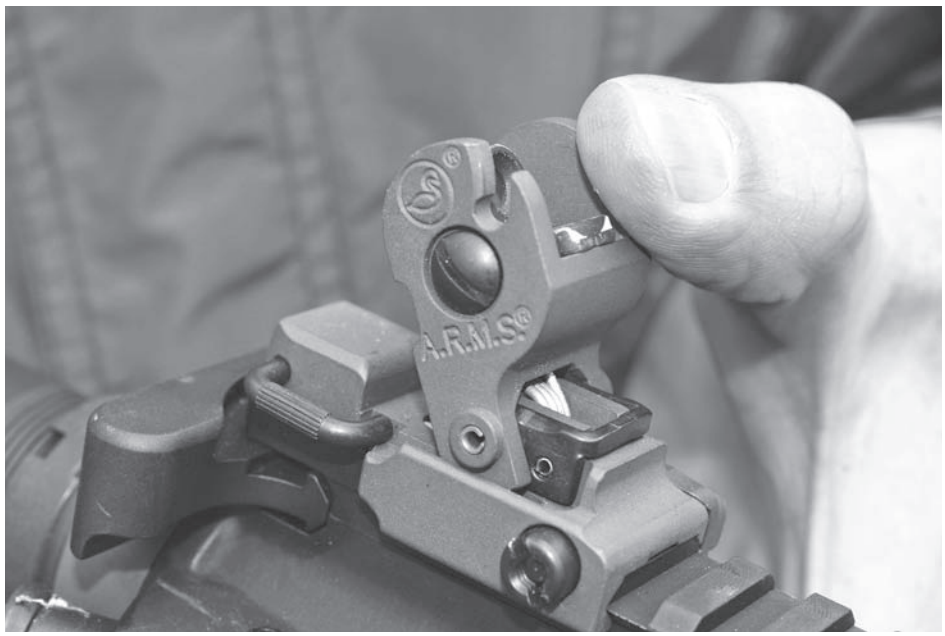
Magnifying optics allow for more precision in aiming at distance, but at a cost. The optics cost money, they are more fragile than the rifle, and once you start looking through a scope you tend to exclude things not seen through the scope. Non-magnifying optics do not have the advantage of increased magnification aiming ability. They are less fragile than magnifying optics. Some are downright durable. And you are less likely to fall into tunnel vision, as the non-magnifying scopes are simply a "dot in front of the world" view. But even non-magnifying (also known as "red-dot" scopes) can break. For that, you need iron sights. Since the easiest way of mounting a scope is to use a flat-top upper, and such uppers have, by definition, no iron sights, you need a bolt-on sight. Known as Back Up Iron Sights or BUIS, you can have any of a host of them to put on your rifle. The available sights are limited pretty much just by the makers' imaginations and ability to fabricate a product. They are usually quite durable. After all, they are expected to be there after the optics have been lost, busted or otherwise rendered unusable.

We've been putting scopes on ARs for a long time. Almost from the beginning, in fact. In the early years of the AR-15 and M-16, Colt even offered (they didn't make it, despite what some "experts" have told me) a 3X scope that you could clamp right into the carry handle. Later, that scope was copied by an endless series of Chinese optics companies, some even with faux Colt logos on them. As collectors pieces they compliment a Vietnam-era rifle or build. As optics, they're better than irons, but not much. The Colt had a built-in trajectory cam. By turning the dial to the target range you'd have the holdover adjusted. Quite a trick for 1967, but the whole package is pretty much a curiosity now.

The original ARs weren't all that cool for mounting a scope. The carry handle provided a convenient location. Well, convenient as far as "having a place to clamp" is



The ARMS #40 sight is solid, dependable, beautifully machined and very desirable.



A proper BUIS either locks upright, or is spring-loaded. That way, your sights can't be knocked askew without your knowing it.

concerned. It isn't so convenient when you try to aim. The line of sight of any scope so-mounted is so high over the stock that you can't really maintain a check weld. It's more like a "chin weld." Still, we got by. Some of us went so far as to butcher perfectly-good ARs. We'd lop off the carry handle and drill, tap and screw on a Weaver scope base. The accomplished among us used a milling machine and actually got the top level and the holes in a line. Some I've seen looked as if they were done with a hacksaw and belt sander. If you have a so-modified upper, and are having a heck of a (or even impossible) time getting your BUIS zeroed, there's a simple reason: it is too high.

Fast-forward from the Vietnam War to the 1990s. The need for a flat-top upper is apparent. But what dimensions? Bartocci, in his *The Black Rifle II,* gives you the blow-by-blow rundown of who, when, where, and who else tried to take the credit. For our discussion here, the fact you need to know is this: the current flat-top top deck height is lower than we fabricated back then by installing a Weaver mount. The "typical" (every gunsmith had his own way of doing it) handle cut-off lowered the top deck of the upper to about 1.80". Add on the thinnest Weaver base and you're left with a top deck height of 1.900" or more. Over the usual M4/flat-top measurement of 1.83"-1.84" by enough to cause problems. Could the upper have been shaved down some more? Sure, but the lower you go the thinner the wall, and fewer threads are available to clamp the base to the upper. So, most of the old flat-top jobs are unsuited for a

modern BUIS install. You can still put a scope on them, but you can't install back-up iron sights unless they are custom-made for that particular rifle.

As recently as just before the Iraq war, an AR with a scope, or red-dot sight on it, was viewed by many as a "competition gun," something real men wouldn't take into a real war. This despite the fact that the government had been buying truckloads of optics, magnifying and red-dot, for some years. Due to the wonders of digital photography the Iraq war has more images, more available for inspection, than any previous conflict. Anyone with a fast internet hookup can search out and closely inspect hundreds or thousands of photos. Having done just that, I can make a bet I heard a long time ago, with a twist: The bet was simple: you paid a dollar for every police officer without a mustache, if the other guy paid you a nickel for every one with a moustache. Only here, it would be pay a dollar for every M-16 or M4 you see with only iron sights, and collect a nickel for every one with a scope of some kind. You might not get rich, but you won't lose money.

I have seen more than one rifle in Iraq photos that would have been a pretty well-equipped Open class gun in IPSC competition.

Yankeee Hill Machine so far makes the only BUIS that can be folded with the small aperture ready to go.

Optics

Optics choices for the AR are pretty simple; after all, you're just picking a scope for a rifle. You'd use the same criteria you'd use for any other rifle: expected ranges, anticipated target size, amount of light available, and durability desired. Of course in the defensive, law-enforcement or military context, durability becomes much more important than in hunting. If I'm spending an afternoon on a ridgeline over a prairie dog town and my scope breaks, I can get another out of the truck. (Rifle or scope, my choice.) Or come back another day. If the bad guys are shooting at me and my scope breaks, I might not have the option of going back to the truck. As for the option of coming back another day – well, things don't work that way.

Scopes selected for military use tend to be heavier, bulkier and a lot more costly than what would be "good enough" for hunting. That's why you see bullet-proof rings like LaRue and Badger Ordnance on military rifles, and honkin' big scopes like Leupold or the European makers. A few ounces, or even a pound, of extra weight don't matter in those circumstances. Consider the situation of a squad designated marksman (or even a school-trained sniper) in a small group of SpecOps troopers, hiding on a ridgeline. Between the bunch of them, the government has spent a staggering amount of money: they all draw pay (not enough, in my opinion) and have since they enlisted. They've been fed, housed, clothed, and sent to an impressive number of schools. They've been through training exercises that cost bundles of money. Then, the government ships them and all their gear halfway around the world. Going over on a C-5A or a C-17 costs a lot more per-person than flying coach on a commercial airliner. Then, they took a helicopter ride. That chopper requires another group of people; pilots, maintenance techs, air traffic controllers, all of whom cost the government a lot of money. Lying there in the dust, each one of those SpecOps troopers represents a million dollars or more of invested money. Do you really think, once you start considering the costs, that the government really cares that another scope is "just as good" and costs "hundreds less"? If the troopers

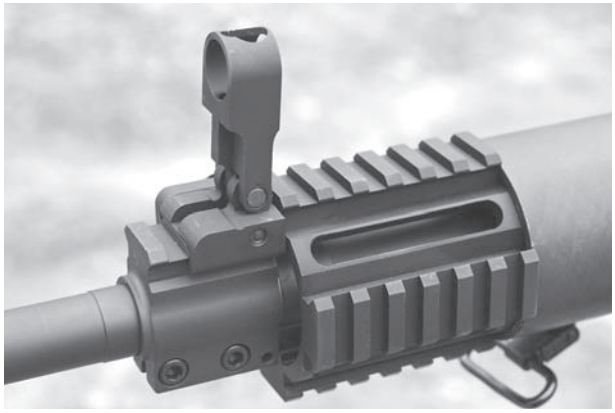
The Armalite BUIS looks a lot like the FG-42 rear sight.

miss because the scope croaks, then the government may have to marshal millions more in air-delivered ordnance, artillery or drones. My only surprise is that there isn't a "ball peen hammer" mil-spec test.

You, however, do not have that luxury. You may well find that a less-expensive scope (optic or red-dot) serves your needs just fine, and at much lesser cost. Lesser cost is good, if the savings are spent on practice ammo. Buy as good a scope as you can afford, but always buy enough ammo to be in practice.

Optics and Choices

When I worked in radio, I quickly found out that not just DJs had impressive record collections. Everyone at any radio station who wanted records could collect them. At one radio station, the record representatives showed up on Tuesdays. The playlist committee met on Wednesday, and on Thursday morning, Tanya's office was opened. When you could go in depended on your place in the pecking order. Typically, there was at least one full stack of records, as tall as my shoulder. What were those records played on? Now there is where



The Armalite hooded folding front BUIS.

The LMT BUIS looks like it is simply a carry handle chopped off. There's more to it than that, but you wouldn't be far off.

The M4 carry handle is a BUIS. You just have to carry it and bolt it on when you need it.

they interesting part comes in. DJs typically fell into one of two extremes: they either had a sound system to rival that of the station, or they had a phonographic "system" one step above a child's Close 'n Play. Why? Good systems cost money. What the station could afford was the best. It took a lot of money to match that sound quality. A lot of DJs didn't care, they were "hearing" what they remembered anyway, so a simple, discount system from the local chain store was good enough.

And so it is with optics. You can spend for the best, and nothing less. Or you can get optics that are good enough, and put the rest of your money into practice ammo. The Marine Corps (one of those groups sending people to exotic places) has decided the Schmidt & Bender scopes are all that will do. Even with the volume discount, they are spending a lot on glass. If you're prepared to spend that much, you'll get optics that will knock your socks off. But so will the price.

Leupold

Leupold & Stevens makes first-class optics, and if you're serious about shooting then they should be the scopes you use. Yes, there are better optics, but you'll pay, and pay dearly, for better optics. I covered them in Volume 1, so I need not review them again. I did, however, hang on to them to use them in this book too. That's how good Leupold scopes are.

Famous Maker

For those not needing (or needing yet) optics in the "make your wallet bleed" category, Famous Maker offers entirely serviceable optics. Well, some are. While I would get Leupold optics sight unseen, you should look through lesser optics before buying. Famous Maker sent me two scopes. One, a compact 2-6X that looked perfect for the AR, proved not to be. The eye relief is so short that I was hard-pressed to mount it far enough back to

The ADCO Tactical meets the SEP and is judged "good" – as in "Get this one and then spend your money on practice ammo."

The OSTI night vision scopes can be removed from one rifl e and bolted to another, without losing zero. It simply intensifi es what's there and doesn't provide any aiming of its own.

be able to see through it. And the center portion of the scope was the only part usable. Outside of the center, the field of view had noticeable distortion. Until they make a "MkII" of this scope, pass on it. And I had high hopes for it, too. However, the 2.5-10X Tactical scope is different. Bright, clear and with a mil-dot reticle, it proved quite up to the task of shooting small groups from the bench. Upon arrival I slapped it on the S&W M&P-15, and proceeded to bang a dead-center group sub-MOA with Wolf Performance ammo. The Wolf ammo is an M-193 equivalent, and I have not had it fail to work properly in any of over a dozen rifles. The S&W loves it. The Famous Maker 2.5-10 suffers from the same fault that a lot of "not the most expensive" optics suffer from: narrow eye relief. Any scope you get that isn't Leupold quality (and thus price) or greater will suffer from narrow eye relief. The scope is a one-inch tube with a 44mm objective. You can get the basic scope for about a hundred dollars, or you can get the illuminated reticle one for two hundred. As an entirely serviceable practice/learning scope, before you spring for your $1200 scope, consider the FM 2.5-10X. It has a lot going for it.

OSTI

Optical Systems Technology, Inc., makes perhaps the coolest thing a poor, underpaid gun writer gets to play with: an AN/PVS-22 night vision scope. For those of you who have not updated your knowledge since reading of the "starlight" scopes of the Vietnam War, hold on. We've 35 years of updating to do in a couple of paragraphs. A night vision scope is basically a television camera. Inside it is an extra electronic array known as a "photomultiplier." The p-m is an amplifier. When it gets "hit" by a photon on the front (actually, it takes more than one, and the sensitivity of an NVG device is dependant on the threshold of light it reacts to) it responds by squirting ten, a hundred, a thousand out the back. The smaller the photo-sensitive locations on the p-m, the greater the resolution. The greater the amplification, the more it sees. However, you can't get something for nothing, Early NVGs suffered from "bloom" which is an over-amping of the p-m, causing the whole screen to wash out or have haloes around light sources. Early screens also suffered from "burn-in" in the same way early computer screens did.

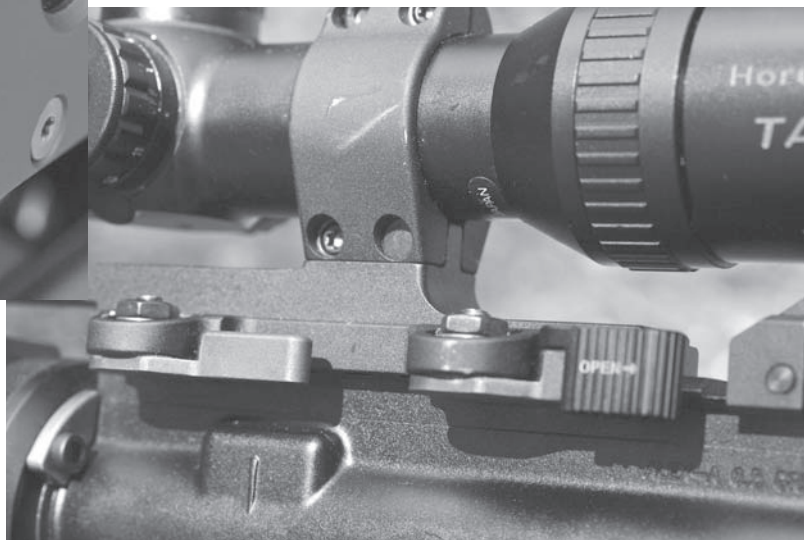
Having a high-resolution NVG suite simply means you own the night. Our military owns the night. NVG are also sensitive to infra-red light. So the I-R lasers on every other rifle, vehicle and lamp-post allow our NVG-equipped soldiers, Marines and airmen to see even in total darkness. (Of course, someone else with NVG can see the "flashlight" effect of the IR laser, too.

We are not alone in making NVG. However, we are the best. When the first Russian NVG scopes appeared on the market, they were simply awful. I mounted one for a customer and attempted to bore-scope it. All I got for my efforts was a splitting headache. Trying to discern objects in the dark, grainy, out-of-focus screen was enough to make you crazy. Some users even joke about needing lead shorts to stop the radiation rumored to be coming from them. Newer ones are much better, but still not as good as American NVG. Of course, better costs more, and the best are in use overseas.

What OSTI sent me was their Universal Night Sight, which mounts in front of regular optics. As the AN/PVS-22 is a television camera, you can't look "through" it when it isn't on. NVGs don't work in the daytime. (The military has special day/night scopes but they make regular NVG scopes look inexpensive.) So, the OSTI has a quick-removal mount that lets you attach it directly to a rail in front of a scope. Since the UNS simply transmits

The GG&G A2 (here behind a Holosight) offers two apertures and windage adjustments.

The new Holosights have a better water seal and thus better water resistance.

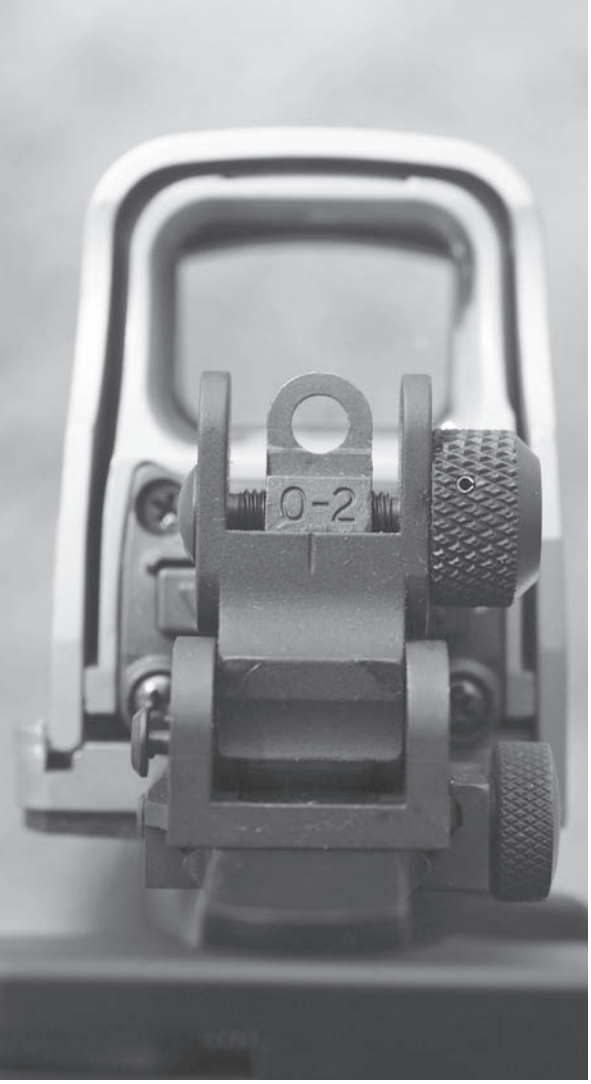


If you plan to mount optics to your AR, and have them stay and survive, you need a tough mounting system. You're hard-put to get tougher than LaRue.

an image back, and your regular scope hasn't been moved, you don't change your zero. You simply attach and turn on the UNS.

When I showed it to a friend of mine who is a Chief of Police, he and several other departments were in the process of looking at NVGs for disaster preparedness. He took one look through the OSTI UNS and remarked, "This is worth the price of admission." And it is. The view is clear enough to read license plates across a parking lot. On a hazily-overcast night out at a military base, I was able to see the stars through the cloud cover, and identify the constellations.

I had a great deal of fun with the UNS OSTI sent me. I first mounted it on my "Police Sniper" 6.8 Remington SPC rifle, and it is a hoot to use. Given even a slight amount of light from someplace (the stars will do, even a sliver of moon is enough to make the world light up) I had no problems whacking gongs or dropping the computer pop-ups on the NG base. What I found was that the OSTI AN/PVS-22 turns on first at the highest gain, and the best setting for me (and many others) was with the gain turned down. Way down. Too much gain interfered with resolution and was tiring to look at for any length of time. I'm sure turning down the gain increases battery life as well as increasing "eye endurance." However, I have yet to use up the two AA batteries I put in to start this "research" so battery life is obviously not a problem. And you can find AA batteries



It is important that you be able to co-witness your irons and your red-dot reticle.

The Meprolight Mepro-21 is a solid and quick-to-use red-dot with a triangle as an aiming reticle.

The Zeiss red-dot is a compact, bright and great little scope. You just can't co-witness your irons through it.

at any location on earth. If there is a store with batteries, they have AAs.

Once I'd played with it for a while on the 6.8 Police Sniper I then mounted it on the 5.56 DMR. Since the UNS simply transmits its image back to the scope, you can swap it from rifle to rifle without a change in zero. The UNS was even more fun on the DMR. If you had a DMR, a UNS and IR-trace 5.56 ammo, you could indicate a position for someone else with NVG. Thinking about that in a military context (and IR lasers) gets downright scary. Scary for the other side, that is.

The downside? Cost. You're going to be spending thousands of dollars at the very least. Six or eight, probably. If you buy more, the unit cost comes down, but you'll have a heck of a time finding five or six friends who also want night vision gear. Of course, for many of us, that isn't that much for something this fun. And from someone doing predator control, the expenditure is recouped pretty quickly in prevention of cattle losses. If you want something smaller OSTI makes the TaNS, the Tactical Night Sight, which is petite compared to the bigger optics.

You want night-time fun, look into the OSTI UNS. Lest you think they are just re-badged Russian optics, the UNS has a National Stock Number, and is listed with the Defense Logistics Agency.

Man, I hated sending it back. But what's a poor, under-paid gun writer to do? (Besides take lots and lots of photos?)

The Troy front.

Insights

Insights makes lights and lasers and is in the process of making an optical system. The IOSS is a red dot sight with integrated laser. At the moment of this paragraph it is still in R&D, and the original models appear to be LE or military use only. But give them time, and there will be one for the rest of us.

Optics Bases

The ways to mount magnifying optics to an AR are legion. Well, there are a lot. At the low end, you could do something as simple as fit a Weaver ring set to your M4 upper rail. Or bolt a Weaver adapter into the carry handle of your A1 or A2. While the purists might look down on you (and the second method does have drawbacks) it gets the job done. The more durable, convenient and modern method is a throw-lever mount like the LaRue. Another approach is the GG&G lever, which clamps their bases or mounts to the top of your flat-top AR with a single swing of a large lever. At the top end, Badger Ordnance makes rings that are tougher than your rifle. If you were to mount a scope to your AR with Badger Ordnance rings, and then beat the snot out of the rifle and scope with a hammer, the rings would survive even after the scope and rifle were scrap. A real-world

The OSTI night vision scope, mounted ahead of a Leupold 3.5-10X sniper scope. Own this, own the night.

You can't look through the AN/PVS-22 unless it is on. (Don't turn it on in daylight.) But you don't lose your zero taking it on and off.

example would be an AR sniper rifle being ejected out of a police car during a collision. The result was a scrapped rifle and scope. But not the Badger Ordnance rings, which survived. Most things that go onto your AR need mounts, but some don't.

Red-dot Mounts

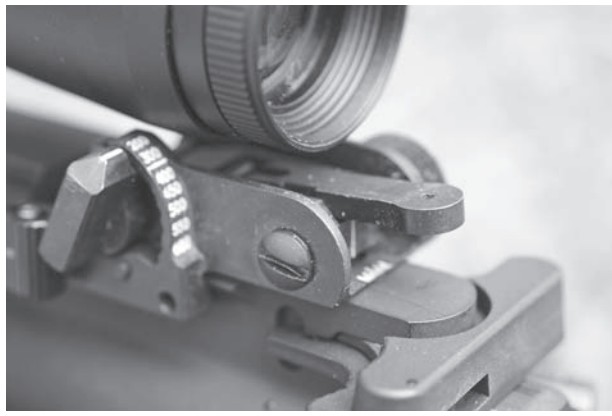
Many red-dot mounts are simply built into the scope body. Others require a base and ring system. There are advantages and disadvantages to both. What you'll often see with the separate optics and mount system is that the mount is cantilevered forward. Also known as a gooseneck mount, the angle is there to increase usable real estate on the top rail of the rifle. Unless there is a rail system on the handguard (and mounting scopes there can be chancy) you have to mount the scope on the rail. You also need room for the BUIS. And in military use you often need a night vision gear or optic, too. By angling the red-dot optic forward you make room for the NVG. Since the red-dot has no need for eye relief, it can be anywhere. You could mount it at the muzzle if you wished, provided it stayed aligned with the bore. The ideal mounting of the red-dot optic would put it in line with the iron sights so you would not have to change your cheekweld for one or the other.

One advantage to non-magnifying optics is the ability to "co-witness" sights. Simply put, you zero your irons and you zero your optics. Then you turn on your optics and aim through your iron sights. Note the relationship between the dot and your irons. They should agree as to the point of aim/point of impact. Once done, you can check your sights at any time. Let's say your rifle takes a tumble. If you think your optic or irons took the hit, turn on the optics and aim through your irons. (In a safe direction, please!) If your sights no longer agree as to point of aim/point of impact, then something is amiss. If you know which took the impact, then that's likely the one damaged. If you don't, at least you know one of them is wrong, and can set about finding and correcting.

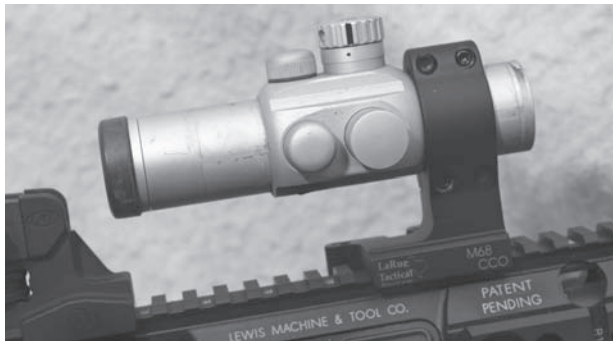
Red-Dot Scopes

The beginning of red-dot scopes in practical competition began with Jerry Barnhart in 1990. He mounted an Aimpoint on a .38 Super Open gun and proceeded to win the Nationals with it. Later that year, Doug Koenig, having mounted a red-dot scope on his Open gun, won the World Shoot. After that, there was no going back. Well, at least not for a few years. The original scopes were dim, had narrow tubes and were quite fragile. It was not unheard of for a competitor to

Scopes are no good if they lose zero. And they are much more useful if they can be quickly removed. LaRue answers both needs.



The Matech BUIS is a real-deal DoD sight. It's compact and offers ranging settings.



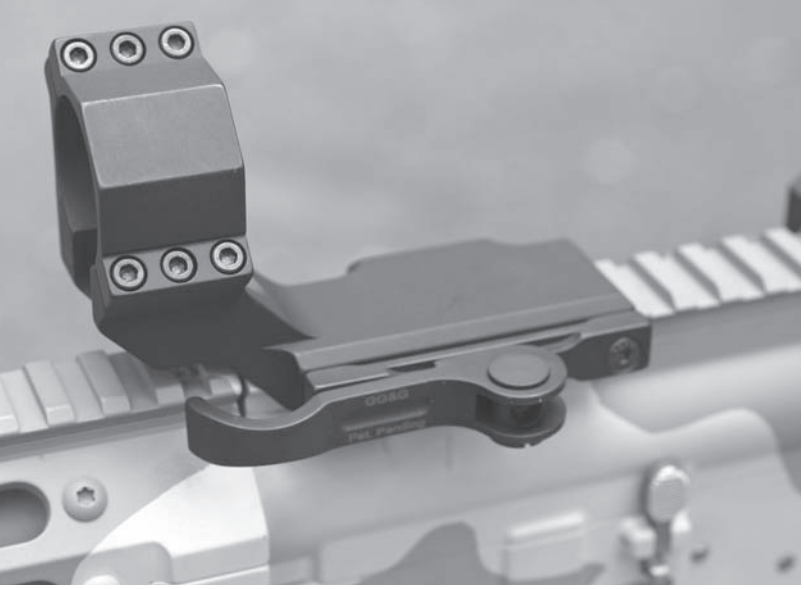
No, this isn't a combo you'd see in Iraq. But with an accurate rifl e and a solid mount, a cheap scope serves until you're practiced or can afford the better optics. Don't be a slave to fashion.

have two or three pre-zeroed scopes in their gear bag. Should one decide to break, they'd unbolt the old one and install the new one. I recall one time, at a USPSA Nationals, after a hard rain the sun came out. My extensively-modified and unsealed scope fogged up. By holding a butane lighter flame against it, I was able to dry it out. We've come a long way since then, and Aimpoint has done a lot to advance the field.

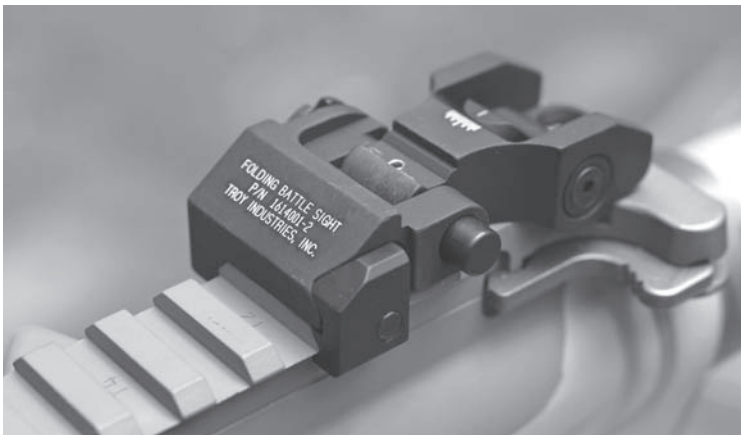
The method of operation of any red-dot scope is the same: you look through it, at the target. For fast, close-in shooting, you simply let the dot "float" in your field of view. Where it is, is where you hit. Optical purists quibble about which red-dots are and are not perfectly parallax-free. Parallax is the change in point of impact from the dot (or crosshairs) of a scope, when you move the dot or crosshairs from the optical center of the scope by moving your head. A scope with parallax will have the point of impact away from the dot or crosshairs when they are near the edge of the field of view.

In a magnifying optic, parallax can be a problem. Optically, the magnifying scope can be adjusted so it is parallax-free at a single distance. However, the effect is so small at distance that scopes can be said to be "parallax-free" at or beyond a certain distance when properly adjusted. Target competitors fuss over it greatly. A scope adjusted to be parallax-free at fifty yards will show parallax at 100, and vice-versa. When a change of fractions of an inch can mean lost points and lost matches, target shooters get fussy. The lack of magnification and the large dot size means that even a

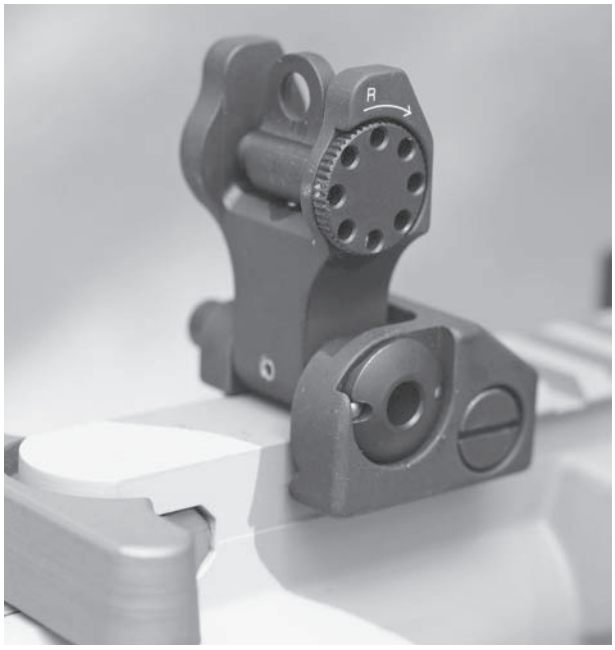
Here, a Famous Maker 2.5-10X scope, in an Armalite mount, turns in an excellent group with Wolf ammo out of the S&W M&P-15. Bet against this combo at your peril, as it will kick your butt in competition.



The GG&G Accu-cam mount for the Aimpoint is fast, solid and easy to use.



Troy knows about the desire some of us have for a folded BUIS with the small aperture ready to go. They're working on it.



The Troy rear, stood up and with the large aperture swung around.

The GG&G 3X adapter for the Aimpoint 3X optic. Fast, but you'll need a pocket for it.

red-dot optic that is not well-engineered and has parallax hardly matters. At worst, the parallax in a red-dot scope is not enough to move the point of impact out of the "shadow" of the dot. As one example, if the parallax error of a Brand-X red-dot scope is three-quarters of an inch at 100 yards, and the dot itself is 2MOA, then moving your head is not going to move the point of impact off of the dot. If the dot is on the target, you get a hit. And the parallax error may well be less than the accuracy limits of the ammo being used. So, the short explanation is: don't sweat it. If a manufacturer tells you their red-dot is parallax free, it probably is. And even if it isn't, you aren't going to miss your target because of it. At least not this side of 300 yards.

How red-dot sights work is also pretty much the same, with one big exception. Basically, a low-powered laser inside of the scope body reflects off of an internal plate that is partially-mirrored. The mirrored plate does not interfere with seeing through the scope. (But does explain why red-dot optics are often a bit dimmer than outside light.) You see the dot. You aim with the dot. At close range you use binocular vision, let the dot "float" and get your hits. At distance you mentally focus, see only the view through the scope, and put your dot on your target. The ability to look through an optic without seeing it is part of the "Bindon Aiming Concept." The late Glyn Bindon figured out that a glowing dot against a black background was as good as transparent to the human brain when viewed with binocular vision. (Actually, our mind. Our brain is simply the mechanico-chemical processor of the thought processes of our

The original AR optic, a Colt-procured 3X scope that fi ts on the carry handle. Better than nothing, but not by much.

sentience. But let's not complicate things.) By looking "through" an otherwise solid aiming device, you could shoot quickly and still be accurate. Even though you can look through most red-dot optics, your mind is following the same pattern that Glyn figured out. Some competition shooters use this concept with magnifying optics. If they have a scope with a battery-powered or fiber optic enhanced aiming point, they will close the front scope cover on a magnifying scope. The result is an opaque optic they can aim "through" using the Bindon Aiming Concept. They get both a magnifying optic when they want it, and a red-dot when they need it.

ADCO

Adco scopes are mostly of the "tube you mount" type. And used for competition. But they make a pair of scopes that are more in line with what 3-gun competitors and defensive shooting types are looking for. First, the Solo. The Solo is a "heads up" type optic. Instead of a tube, it has a screen mounted at the front of the unit. The Solo is compact, and has built-in rails for mounting. The big advantage in the Solo are its reticle options. In addition to variable power in the display, you get multiple dot sizes, a "T" display and a bracketed dot. In a competition, you can be faced with many aiming needs. The ability to crank the power up, the dot size, and select other reticles, can be very useful. If you're in a super-bright range (say, in the desert) and the targets are out a ways, you can select a small dot and high power. If the next match finds you in a heavily-forested range, and the targets are close in, you can dial back power and select the T or bracketed dot for maximum speed.

Mounting a red-dot (this Midwest Industries mount is for an Aimpoint) has become so popular that everyone makes mounts for them. Get a good one (this one is), make it tight, and paint it in.

GG&G makes an Accu-cam mount for the Holosight. Better than the knob.

The LaRue M-68 CCO or "gooseneck" mount gets the Aimpoint forward of any NVG you might mount.

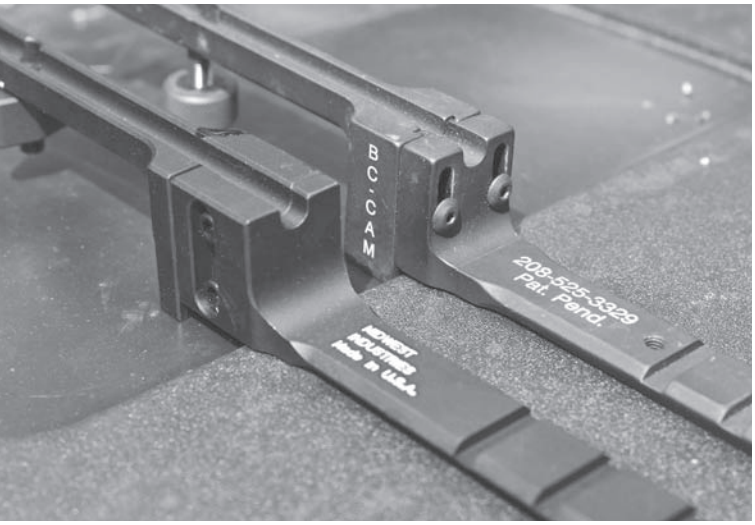
The only hesitation any of my test-shooting crew have had is with its apparent fragility. I say apparent, because some of them worried that they'd break it. I haven't, in months of shooting, and tossing cased guns in and out of my truck. But some of my testers could break a crowbar, and they worry. I'm not, and unless your job includes jumping out of perfectly good aircraft, I don't think you need to either.

The Tactical looks like an Aimpoint. It comes with its own mount. The mount does not appear as strong as the mil-spec mounts others make, and the clamping knob and plate are not as large. But the Tactical is not made to be mil-spec. Why, then, get one? Simple: cost. The Tactical is entirely serviceable. I haven't broken mine, and I've shot it on a bunch of rifles. I've put a lot of ammo through those rifles, including some really stout kickers. While I haven't deliberately abused it, any rifle that my test-fire crew handles gets knocked around. While they're careful, they still will be dropping rifles onto the shooting benches, banging gear against them, and occasionally whacking barricades with the rifles or the gear bolted to them. (Then there's the whole "into and out of the truck" thing; loading up for every range trip.) The Adco Tactical has survived all that and still works fine. It hasn't even changed zero. The suggested price of the Tactical is just under two hundred dollars. You'd be hard-pressed to buy just a mil-spec gooseneck mount for that. Add in shipping, and the mil-spec mount would cost more than the actual retail price of the Adco Tactical complete with mount. For the cost of the optic that you'd then mount in the mil-spec gooseneck, you could have bought two or three cases of practice ammo.

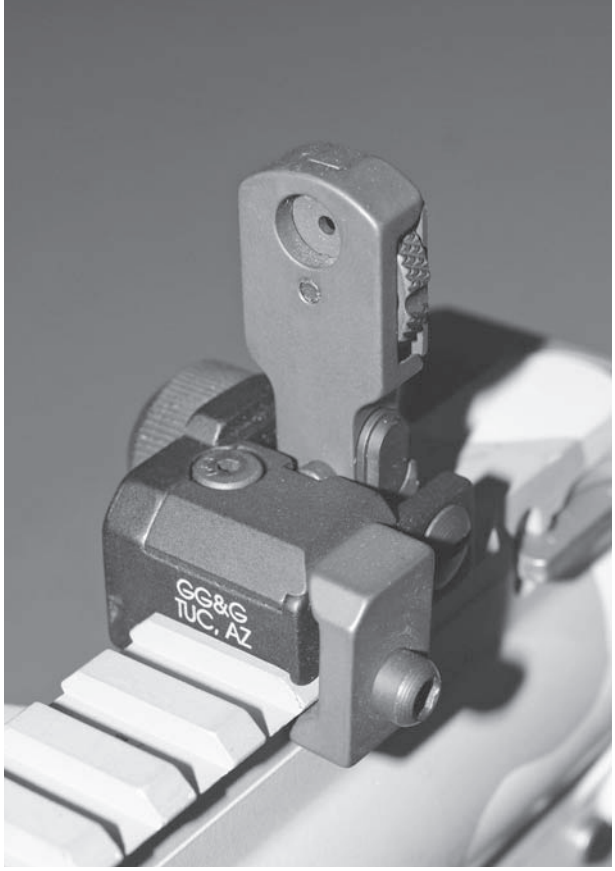
Which brings me once again to "Sweeney's Equipment Paradigm." The SEP tells us that when the choice is between the best gear, and gear that is good enough and money for practice ammo, then "good enough" wins the prize. If you buy the Adco, and the practice ammo, and actually learn to shoot, you'll be far ahead of the guy who bought the "cool gear" and no practice ammo. If you continue to practice until the Adco breaks (And there's no telling how long that may take. It might never happen.) you will always be one or more steps ahead of the guy who insists on only buying what the government buys. If at every step you buy gear that is good enough, and plow the difference into practice ammo, you'll crush that other guy in every match.

The SEP is based on buying gear that is good enough, but durable enough. If you buy cheap, crappy stuff, it won't work. Adco does not make cheap, crappy stuff.

It isn't easy getting a photo through a scope meant for the eye, but here's an idea of what the OSTI does for you. There's a streetlight a hundred yards behind the camera.



The Bennie Cooley and Midwest Industries cantilever mounts both let you put a red-dot on a rifl e with a carry handle.



My favorite GG&G BUIS (and fi nalist for overall BUIS) is the MAD.

I'm not sure you could harm the LaRue BUIS with a hammer. With its QD lever you can have it off or on in a moment.

Aimpoint CompM3

The first Aimpoint to gain military acceptance was called the M-68. We know it as the CompM2. Like the M2, the M3 is hell for tough. They both have parallax-free viewing, no broadcast light, and a whole host of makers who make bases for them. Not that you need others, as Aimpoint has their own base. (More on that later.) The CompM3 has five times the battery life of the M2. At the lowest visible setting it will run for 50,000 hours. On the lowest NVG setting it will run for 500,000 hours. For those math-challenged, that means just under seventy months for visible (five and three-quarter years) and just under seven hundred months for NVG. Basically, if you install a set of batteries, leave them on the lowest NVG setting, and put them in your gear bag, you will be retired, living in a warm, sunny clime, and looking at photos of your great-grandkids before you need to change those batteries. Fifty-seven years later. Yow! The CompM3 comes in two dot sizes, 2 and 4 moa, and is submersible to a greater depth than the M2, 135 ft vs. 75. For those who swim to work, the depth matters. For the rest of us it simply means they are waterproof to any rainstorm we'll be working in. to further armor the M3, Aimpoint ships it with a rubber cover.

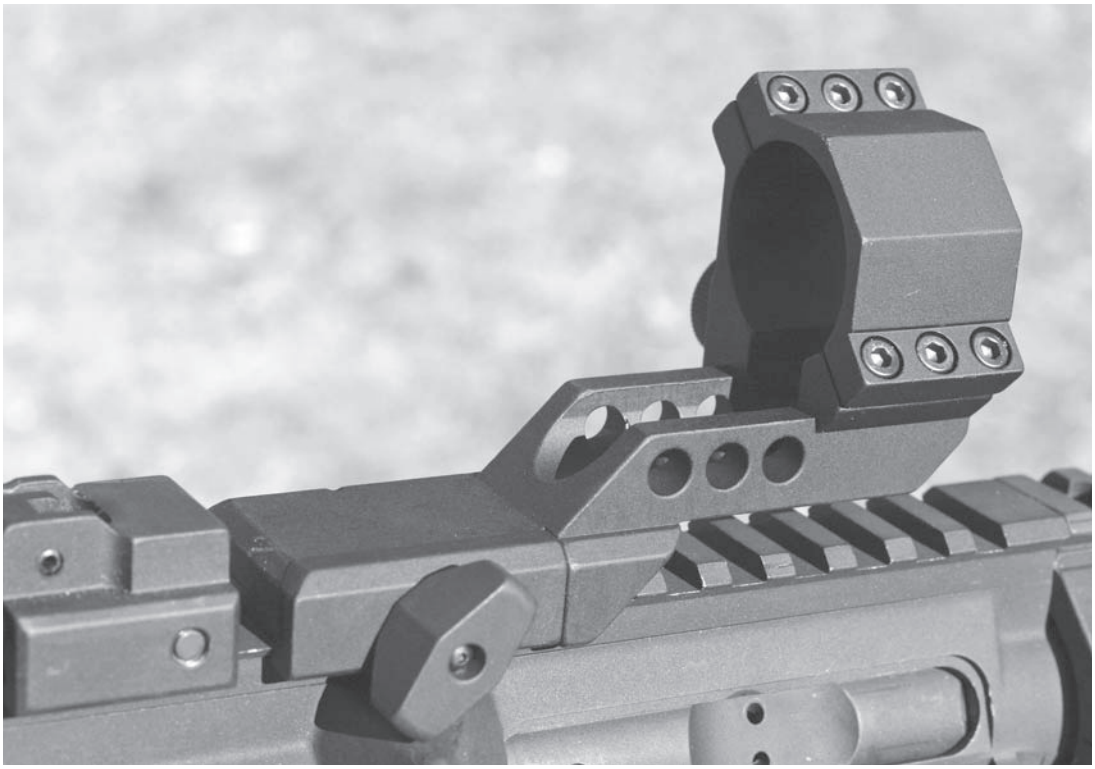
The Aimpoint base has a clamping knob with a ratchet and gear teeth in it. Once you've located the scope on the rifle, you simply tighten the knob until the ratchet slips and the rod clicks. That's as tight as it will let you tighten it. If it works loose you can simply tighten again. At any time, you can apply tension to the knob. If you see the ratchet start to slip, you know the base is still tight. With other tightening knobs you have to torque it down, and then mark the knob or shaft with paint drops. If your paint breaks, the knob is loosening. However paint flakes off, or gets obscured by dust, dirt, or darkness. Even in the dark you can check your Aimpoint base by simply turning the knob until the ratchet slips and clicks. Aimpoint bases are all over the

If you're a machinist or gunsmith, you can solve most any problem. Here's an early solution to the problem of how to mount a red-dot scope to a carry handle: on the side.

place in Iraq and Afghanistan. You can spot them by the longer shaft of the tightening knob. Some complain that the shaft is too long and gets in the way. Perhaps they'd like to design a new one on their lathe, one that is less obtrusive? (I'll bet Aimpoint already tried that.) Me, I don't even notice it.

The one shortcoming that red-dot scopes have is the lack of magnification. There have been some attempts at making 2X and 3X red-dot scopes, but they have not been well-received. What Aimpoint has done is make a separate magnifier. The 3X attachment needs its own base. It rides behind the Aimpoint (or other scopes, too) and simply magnifies your view through the scope. The drawback is that while the view is magnified, so is the dot. A 4-MOA dot viewed at one power with the naked eye, on a 100 yard target, seems OK. The same dot, viewed at 3X, seems too big. Optically, it is the same size on the target as it was before. But some object to suddenly seeing, what appears to their eye as, a 12-MOA dot. Me, I don't care, or notice. You might want to try a rifle with the Aimpoint installed before you go out and get one, just in case it is something you might not like.

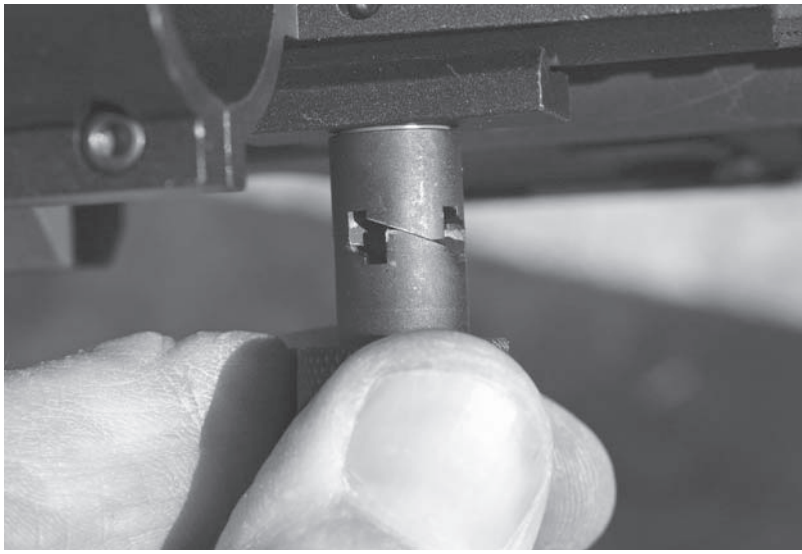
To mount it, Aimpoint came up with a trick mount. You clamp the base to the rifle, behind the M2 or M3. You clamp the adapter ring to the 3X optics. (You have to cut off the rubber cover on the front.) Clamp the adapter onto the optic. Then simply press the optic with adapter down onto the base post, and turn. The optic will rotate and then lock into place. To remove it, thumb the locking lever, turn the optic the other way, and lift. You will need a convenient pocket or pouch on your gear where you can stash the 3X and adapter. A compass pouch or bandage pouch, strapped to your load-bearing vest (if you're geared up for SWAT or Fallujah) would be cool and convenient. Using a spare-mag pouch strapped to the buttstock for your 3X instead of a magazine could work. If you use some other spare magazine solution, then you're all set. It isn't an instantly-available solution,



The GG&G gooseneck mount for the Aimpoint is solidly made and will look good on any AR.

but the need for 3X magnification is not usually a close-range one. More likely you're getting shot at from someone way out there. If they miss (and if they didn't, you'd have other, larger, problems) then you can dig the 3X out of the pouch while you're behind cover, and once it is mounted be ready to locate and deal with the bad guy.

Samson makes a very cool 3X mount: it swings clear. Press the latch and the springs swing the 3X adapter off to the side. No need for a pocket. An additional advantage for competition shooters: a detachable mount, in USPSA 3-Guhn competition, makes the3X an extra optic. Boom, instant Open Division. However, if you use the Samson swing-adapter, your red-dot and the 3X are a single optic (equivalent to a zoom scope) and thus allowed in tactical Division. If you want the power, and either lose things or want to stay in Tactical, then you simply must have the Samson 3X adapter.



The Aimpoint knob is viewed by some as bulky but solves a number of tightness issues for any combat arm.

Mounts for the Aimpoint

With the government having bought something like half a million Aimpoints (as I was writing this chapter, Aimpoint received another contract, for an additional 160,000 scopes!) there is an impressive segment of the accessories industry devoted just to attaching Aimpoints to rifles. There are a number of reliable, solid mounts to choose from. GG&G makes a gooseneck mount with its own lever-clamping system. (Or a model without, if you distrust quick-detach mount systems.) The lever has a fingerloop at the front, and is adjustable. GG&G also makes a quick-detach mount for the 3X optics for your Aimpoint. The GG&G 3X mount rides over a folding BUIS, if the BUIS is low enough. Troy sights are. LaRue makes several mounts, the CCO68 and the gooseneck '68.

Aimpoint makes tough optics. They must; they've sold literal truckloads to DoD.

Midwest Industries A2 sight folds down out of the way.

EOTech Holosight

The EOTech Holosight came about from basic research into optics. The sight works differently than others. On other red-dot sights, the internal laser sends a beam up to a reflector plate, a partially-mirrored internal (or external) screen. Your eye sees the reflected dot. On the Holosight, the laser reflect off of a diffraction grid. The grid then forms a three-dimensional image of the reticle as engraved/etched on the reflector plate. If there is enough surviving plate, you see the reticle. Where other red-dot sights lose effectiveness in rain or dirt, the EOTech doesn't. As long as there is enough reflector plate unobscured (or undamaged) to send a visible amount of light to your eye, you see a reticle. Holosights work even when partially broken, muddy, rained on, and other indignities that other styles cannot work through. However, as we all know, you can't get something for nothing. The miniature reticle pattern etched on the reflector plate, while offering redundancy in case of damage, means the reticle is grainy. Some shooters simply can't reconcile themselves to the grainy image they see. The Holosight is also a bit bulky (although not much, compared to other units) and a bit heavy. However, the apparent heaviness is offset by the built-in mount. While the threads of the clamping bar are a bit to fine for my tastes, the Holosight does not need an extra mount. If you want one, however, GG&G makes a lever mount that replaces the EOTech screw. Once adjusted, it clamps the Holosight on with one movement of the lever.

You can have Holosights that use standard AA batteries, Lithium batteries, with dots compatible for night vision gear or not. The newest model, the 553, offers a built-in quick-dismount throwlever mounting system.

As I was working on this, EOTech showed me their proposed new magnifier. The base mounts behind the Holosight, and the magnifier snugs up against the rear of the sight. The one I had a chance to try was a prototype, and the production models will probably look a bit different. But for the fans of the Holosight, it will be a really good thing.

Zeiss Z-Point

The Z-Point is a compact battery driven red-dot sight. How compact? About the size of a prescription drug bottle, on its side, with a flat base. Very compact. Which is also its problem. As a sight by itself it is great. The view is bright and clear, the dot is sharp. But the center of the Z-Point view is too low. The view center of the Z-Point is about .875" off the top of the receiver. The line of sight of your BUIS is about 1.325" above the receiver. Not only can you not co-witness through the Z-Point, the line of sight for the irons is right on line with the housing of the Z-Point. Now, if we had a half-inch riser we could solve this problem. Without a riser the Z-Point is a wicked little backup sight on an Open gun, where you'd mount it on the side and tilt the gun to use the Z-Point on close targets at warp speed.

Meprolight

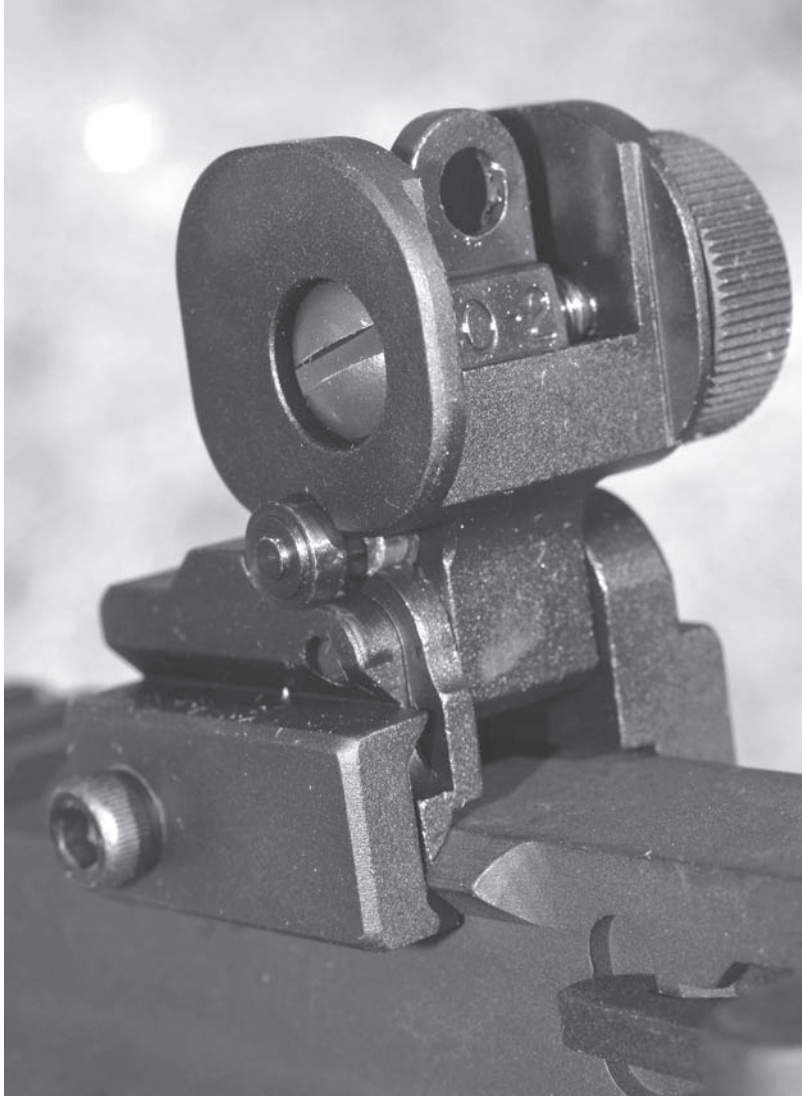
The Mepro 21 is another red-dot with a twist: it uses a triangle. Now, some love triangles, and some hate them. So you'd best try one before you spring for one. Me, I use whatever is there. The Mepro 21, with lever mounts, is easy to attach to your flat-top sight. Just open, slap on, close and zero. If it was already zeroed, and you get it on in the same slots, then you're still zeroed. The Mepro 21 is fast in use. While looking at it, someone asked me "How long do the batteries last?" I had to pause for a moment before answering "About ten years." No batteries. It uses Tritium and fiber optics to light up the diamond. In daylight the fiber optic pumps more light in, making the diamond brighter. In darkness the Tritium inside lights the triangle.

The Mepro 21 sits a bit high on the upper, but not so much so that aiming or cheek weld is a problem. Your BUIS will be visible in the lower part of the screen if you leave the Mepro 21 on to shoot irons.

Other Red-Dot Mounts

Not all ARs are flat-tops. Some have carry handles. Mounting a red-dot or other optic up there is not fun. So, more than one inventor has developed a cantilever mount. The rear of the mount clamps in the carry handle. The front drops down in front of the carry handle, hugging the handguards. You mount your optics out there.

The simplest is one like the California Competition Works rail, which is not adjustable. (At least not last I checked, but Bill Pallazzolo is a busy guy.) If you want a sturdy, straight-forward mount, you can't go wrong. There are, however two others that add more: one from Bennie Cooley, and one from Midwest Industries.



When stood up, the MI sight gives you an A2 sight picture.

The Bennie Cooley (I mention it first only because I saw it first) cantilever has a dovetail in the middle, and you can adjust the front rail up or down. Why would you want to do that? So you can get a co-witness between your irons and your optics, even with the cantilever rail. If there is one drawback to the Bennie Cooley rail, it is that the clamping/adjusting screws are on the front. If you have your optic too far back, adjusting the rail gets to be a hassle.

The Midwest Industries rail is much the same thing, but the clamping/adjusting screws are on the side. You can mount your rail, then the optic, and adjust the rail up or down until it is perfect for your aiming style.

If you want optics, and can't see the cost of a flat-top conversion (or upper) for your rifle, then one of these rails lets you get optics on.

The Aimpoint with the twist-off 3X adapter, being used to slam LaRue targets far downrange.

BUIS

The Back Up Iron Sight is the inevitable result of scope development. As good as scopes are, as durable as they are and despite the advantages the give us, iron sights can't be done away with. Scopes break. Batteries die. With iron sights ready on the rifle, you can stay in the fight. Here in the Midwest it gets very cold, and in a lot of locations, quite damp. A battery dead from the cold makes a red-dot sight useless. A rained-on, snowed-on or breathed-on scope is impossible to see through. So, having taken the carry handle off (and the sight that went with it) to install a scope, we're now putting iron sights back on.

The need for back-up iron sights comes about as a result of the evolution of optics. Back in the old days, optics, or scopes as they were more-often called, weren't durable enough for military use, a situation that many hunters found amusing. "Why, I've hunted with this scope for twenty years, and it has never given me a problem." Uh-huh. And in all that time, how often have you dropped it? Or had to dive into a ditch to avoid incoming artillery or rifle fire? No, scopes for a long time in military use were pampered snipers sights (the sights were pampered, not the sniper) and not depended on for general issue.

IPSC changed that, as it has for so many things firearms related. More than a lot of people are willing to admit. The beginning came in the very late 1980s, by way of a shooter by the name of Jerry Barnhart. IPSC shooters are a peculiar kind of competitor, and American competitors are unlike any in the world. Jerry (as are so many IPSC shooters) is a nice guy. He's also dedicated, analytical, driven and likes to win. He determined that a scope just might give him an advantage, if he could figure out the right one.

What he settled on was one of the earliest versions of the Aimpoint. Now Jerry wasn't the first to 'scope a handgun. The late Dean Grennell, and J.D. Jones, had been putting scopes on handguns a couple of decades earlier. But what Dean was doing was to wring more accuracy out of target guns. J.D. wanted scopes for hunting. Neither application made the demands on scopes that IPSC shooting did. Target shooting was done with really soft-recoiling ammo. Hunting (at least as done by J.D. Jones) involved very powerful rounds.

But even the most dedicated hunter wasn't gong to be shooting more than a few hundred, at most a thousand, rounds a year. The competition loads in IPSC involve the .38 Super. (At least in Open Division.) The recoil and vibration of a .38 Super at Major are intense. Back then, the formula was a 125-grain bullet at 1,400 fps, or a 115 at 1,520. Not bad, you say? Fine, then consider doing that twenty or thirty thousand times a year. IPSC shooters can wear out guns, something that few other competitive endeavors can claim. Jerry mounted an early Aimpoint, won the 1990 U.S. Nationals, and started the trend. Not to be out-done, Doug Koenig took his Aimpoint-equipped handgun to the IPSC World Championships later that year and won the 1990 World Shoot with it. After that, the floodgates were open; no one wanted to shoot iron sights any more.

That was with handguns. USPSA/IPSC 3-gun competition didn't get organized at the National level until the 1990s, but my club and others were doing it in the early 1980s. What we found was that a lot of cheap scopes couldn't take the regular volume of shooting we were doing.

The red-dot sights a decade later were not up to it either. Depending on the exact load, the scope mount used, and the luck of the shooter, optics died (the dot expired, flickered, lost zero) after a week, a month, or if you were really unlucky, a few days. The year before the "Blackhawk Down" incident in Mogadishu, one of the Rangers who would be there was in my squad at the Nationals. He had a supply of scopes for his Open gun sufficient to get him through the match if one croaked each day of shooting. But scopes improved. By 1994, I found myself at the Michigan Tactical Officers Association annual conference looking at a new scope by EOTech. It was scaled down from holographic three-dimensional sighting systems for aircraft. It was slick, promised to be durable, and would be available soon. I asked them if they were planning on getting into practical shooting. (I had two goals in mind: to find out if they knew what they were getting into, and to see if I could score a sight to write about.) "Yes, we've got a shooter who is going to be using our optics. Jerry… Barnhart?" So much for beating the rest of the guys to the punch.

Showing just what a red-dot, or any optic, looks like on target is next to impossible. The human eye is so much better than any camera that trying to take a picture is almost futile. That doesn't stop us from trying.

Just a short while ago, an AR with a red-dot scope on it would have been sneered at as "too gamey" and "not tactical." If you look closely, you'll see the EOTech and laser are lashed down with 550 cord. Spc. Anthony Noger, from Company B, 1st Battalion, 325th Airborne Infantry Regiment, 82nd Airborne Division on patrol in Tal Afar, Iraq. DoD ***photo by Staff Sgt. James Harper Jr.***

It took a few years, but optics makers developed the manufacturing methods ands optics designs that allowed them to make durable scopes. We now have optics so durable they can be mounted directly on a slide. Durable enough that they can be general-issue in the military. However, that brings up another problem: where to put the optics. For many years we had two choices, both bad: you could mount the scope in a base and rings clamped in the handle. Colt even offered a scope for mounting right there. (They didn't make them, they had an optics company make them, and marked them with the Colt logo.) Or, you could whack the carry handle of the upper receiver off, bolt a Weaver base on, and mount the scope there. The carry-handle mount problem is that the scope is too high. Your face comes off the stock in order for your eye to see through the scope. Without a solid check weld, aiming is difficult, and fast aiming is very difficult. Cutting the handle off had the dual problem of what do you do with a rifle no-one else wants, and how do you get irons back on if the scope croaks? Unless the Weaver mount conversion was perfectly done, it ended up ugly and weak. And there was no way to get iron sights back on. Luckily for us, Colt solved that problem. They made rifles with a Weaver-like base (called a picatinny rail) as an integral part of the upper receiver. Scope bases, or scopes with built-in bases, could be bolted right to the receiver.

But we still had the problem of what to do if the scope breaks. I know, someone is asking "If IPSC perfected the red-dot optic, then why worry if it breaks?" The best response is something that my friend John Farnam once described: "Put two Marines in a room, each with a ball bearing. Come back in fifteen minutes. One ball bearing will be broken, the other missing, and neither Marine will know what happened." Even outside of combat operations, the military is hard on gear. Add the stress of being shot at, and all sorts of equipment gets broken. A red-dot scope makes your shooting faster and more accurate, but not if it is broken.

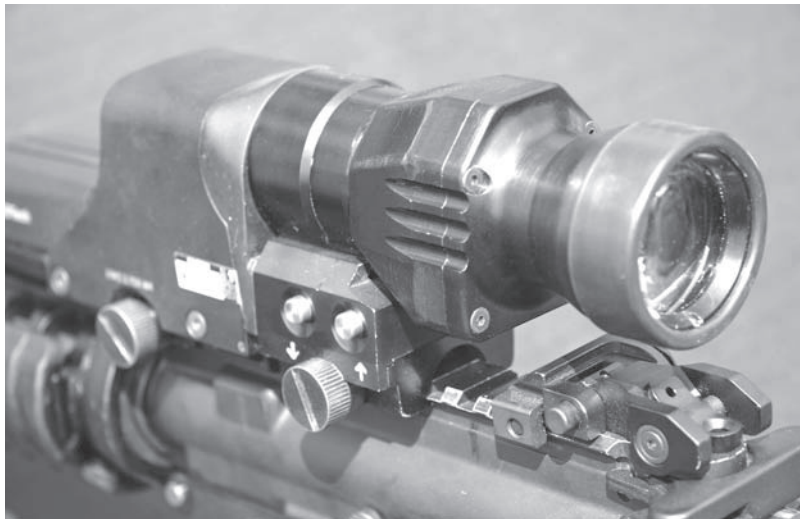
Thus, the back up iron sight, or BUIS. The ideal BUIS would be compact, durable, out of the way and quickly brought into action when the scope is toast. The ideal scope would survive anything. Failing that, then the ideal scope is one that will survive most anything, and when it doesn't you can easily take it off. The best way to keep the BUIS out of the way of the optics is to have it fold. The best way to get the scope off when it breaks is some sort of quick-detach or hand-unlocking mount.

There are BUIS that do not fold, and they are perfectly acceptable. They just get in the way a bit with your sighting through the optics. Some prefer a non-folding BUIS for the extra measure of durability. Me, I'd rather have something folded (which will be very durable, since it has nothing sticking up) that doesn't get in the way of my view through the optics. Folding BUIS depend on a pivot pin, some in springs, many on a locking button of some kind. All those small parts can break. The non-folding sights have small parts, too, but their small parts

A Colt M4 with a railed handguard, Aimpoint with Aimpoint mount, and a Matech. Dusty, worn, scratched and still working. Pvt. John Robinson and fellow Soldiers from Company A, 1st Battalion, 187th Infantry Regiment, 3rd Brigade Combat Team, 101st Airborne Division search houses for terrorists in Baji, Iraq. DoD ***photo by Spc. Charles W. Gill.***

are fewer in number and are not used to hold the iron sight upright. Which one you select depend on your needs, your budget, and for some what is the "uber-cool" sight of the moment. More than one shooter has been known to select a bit of gear by what they have seen in a photo from Iraq or Afghanistan.

Two things you need to be aware of about BUIS: You must zero them as you do any sight, and you must be sure you install/replace them to the same spot each time. I've had shooters install a BUIS on their rifle and not zero it. No manufacturer can guarantee that simply bolting their BUIS on will ensure you're sighted in. You still have to do the hard work. And, despite the top rail of a rifle being one piece and machined as precisely as possible, moving it to another slot may change your zero. In one of the classes we once had an officer suddenly experience a change in zero in his rifle. After a little investigation, we discovered that he'd removed his carry handle/sight, and when installing it had clamped it on one slot back. That was enough to throw off his zero.



The new EOTech magnifi er, in prototype form.

M4 Carry Handle

The original BUIS is the carry handle off of the M4. You take it off (after zeroing it) and stash it in your gear. When you need it you yank off the optics, install the M4 and go to work. For those anticipating a split-second assault, the whole affair seems pretty slap-dash. You can't be certain of your zero, it takes time, and where did you stash that sight, anyway? It works well enough that I've read more than one account of a soldier or Marine having to go through exactly that process, for a

Me, getting to shoot the new EOTech Holosight and magnifi er. Trust me, you'll want one when they become available.

good end result. One even had his buddy throw him a carry handle/sight. In a military context, "close enough" often is, fights are not always over in a few seconds, and equipment breaks. The use of IEDs (Improvised Explosive Explosives) in Iraq has lead to more optics being busted. To no one's surprise, people have a higher survival rate to nearby explosions than electronics or optics. A solder or Marine may be momentarily stunned by an IED, but his optics often are toast. With iron sights to use, he can still fight. The carry handle gives him/her that option. As bad as the city of Detroit was, there weren't any IEDs written up in the papers or police reports. However, sudden attacks were and still are common. (Not as much as in the past.) There, as with many civilian defensive encounters, you may not have the time to dig a carry handle out of your gear (if you even have it along) and so a bolted-on BUIS is the preferred solution to busted optics.

A.R.M.S.

Atlantic Research Marketing Systems makes gear that defines cool. Calling their S.I.R. a railed forearm is like calling a humvee a pickup truck. The 40 and 40L sights ARMS makes go about the process of standing up a bit differently. Where most sights must be pushed up, the ARMS 40 and 40L are spring-loaded. Move the locking lever and the sight pops up on its own. It remains spring-loaded but unlocked. If you bump it, it swings back but then stands upright again. The 40L is the low-profile version that blends in with the top rail of the SIR. In order to blend it has to be lower, and the adjustment parts thus smaller. It can be hard on your fingers to get the sight zeroed. But once set, you won't have to touch it again. The #40 is the standard A.R.M.S. sight, and for many shooters it's the definition of cool.

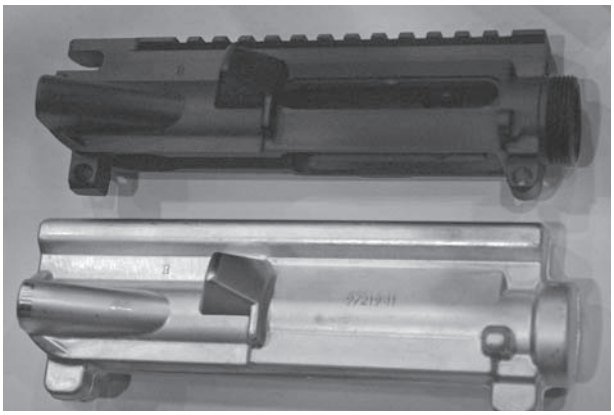
LaRue

The LaRue BUIS is a serious contender in the "brother-in-law with a ball peen hammer" survivability contest. A relatively simple upright machined housing protects the sight and its adjustment knobs. As with all LaRue products it is designed and built to be tough. The LaRue is windage adjustable without tools. Not everyone wants a folding BUIS, and for those individuals the LaRue is a damned good choice.

LMT

Lewis Machine & Tool is a basic manufacturer of things AR. That is, they make the rifles that other people sell as "made by XYZ." They also make rifles for themselves. Their BUIS appears to be a modified detachable carry handle. Lest you think making a BUIS this way is a cop-out, let me assure you it isn't. First, making one from a handle forging, while it requires some extra fixturing in the machining process, produces a first-rate product. It is as durable as the handle/sight would be. It uses the same parts, so if you need to

The EOTech Holosight is a durable red-dot with a "circle and dot" reticle, like a fi ghter jet sight.



The rail on your fl at-top is made by forging a rib on top of the receiver and machining the picatinny rail. The dimensions are not the same as earlier weaver-base conversions.

The DPMS Mangonel, front, stood up.

The DPMS Mangonel rear.

rebuild or want to replace something, standard A2 parts are what you'll need. And, as an A2 sight, if you know how to work the sights on an A2 AR then the LMT BUIS will hold no mysteries for you. You also get ranging adjustments with the LMT. Once you're zeroed, you can click up to a longer range, just like the A2.

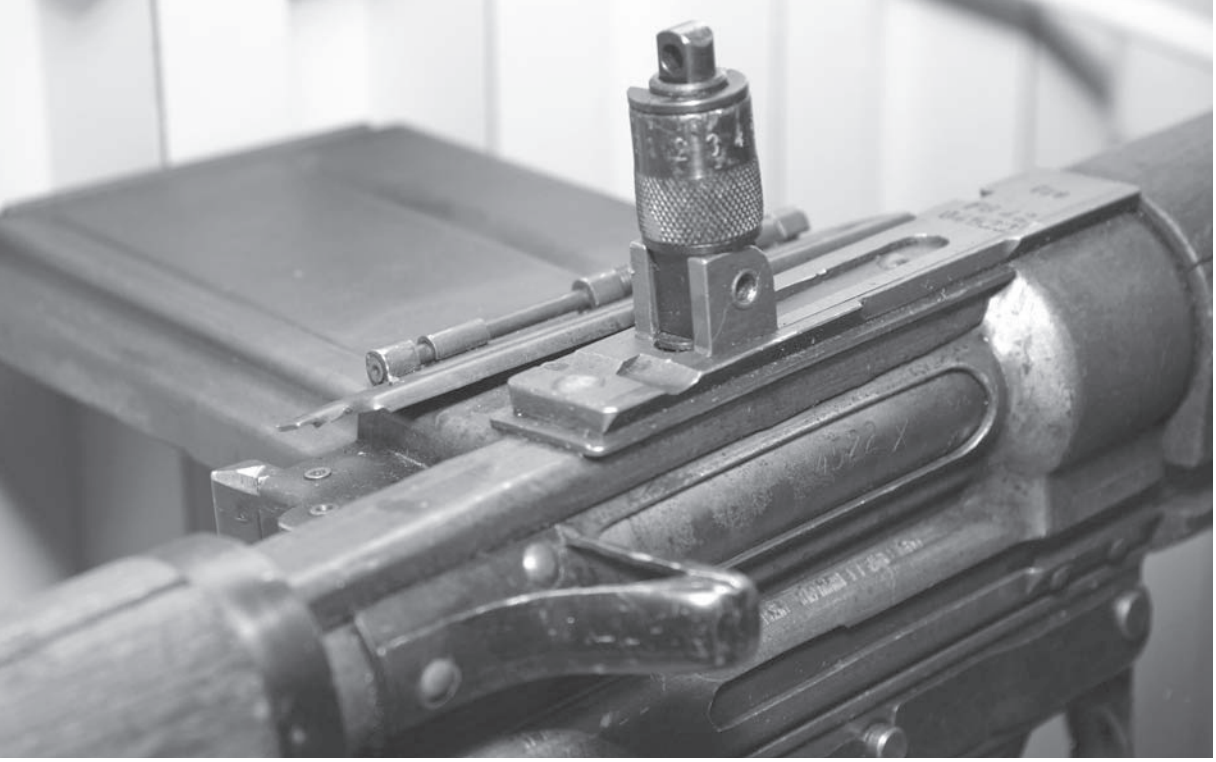
GG&G

Based in Arizona, GG&G makes a number of BUIS, two of which concern us. One is the MAD, or Multiple Aperture Device. The MAD is a folding sight, with a paddle-like sighting arm. Inside the arm is a wheel with four apertures; two big, two small. With a quick twist you can have a large aperture or a small one. The MAD came about from a Naval Surface Warfare request for sights with multiple size apertures that were in the same location in the sight. The old A1 sight had two apertures, but one was a long-range sight. The MAD is a low-profile sight, and will fit under many magnifying optics. You can have a scope in a quick detachable mount (Like the LaRue we've tested) and have irons underneath. If the scope goes toes up, or you have it off for cleaning or protection, your irons are right there. The MAD offers no ranging adjustment. You adjust your zero using the old A1 sight method: vertical in the front sight, and horizontal in the rear. The horizontal adjustment moves the whole MAD paddle. The MAD is low when folded, and durable. The older MAD sights flipped up and down. Newer ones lock upright, and you have to press the lock button to unlock it and fold it. A locked upright sight is an Airborne requirement. Yes, a folding sight is more compact, and less likely to injure an airborne trooper, but if it folds down when it gets bumped, it isn't much use. Many early designs of folding sights (and some still) didn't lock up. But many now lock upright.

The GG&G A2 is not a compact as the MAD, but uses many A2 parts. It locks up, and the windage adjustment knob works directly on the aperture, like the A2 sight. It does not offer ranging settings.

Matech

Matech makes what one contact in the Armed Forces has told me is the "Air Force sight." I don't know about that, but I do know that they have an open-ended contract for twenty thousand sights a month, and I see them in Iraq photos all the time. The Matech differs from the others in several respects. The housing is a steel casting, not an aluminum machining. The sighting stalk with its aperture folds down, and when upright is simply



The rear sight on this FG-42 isn't a BUIS, as there are no optics. Those came later, and on this same model rifl e.

a short stick. The Matech has ranging capabilities. The left side of the Matech has a paddle, with a set of range figures on the side. Crank the paddle until the range indicator corresponds to the distance you need. No clicks to count, just the actual range number. On a target range, you want clicks, so you can count and be dead-on. In a firefight, all you need is someone with a laser rangefinder to shout out the distance, set your Matech, and off you go. While the Matech is lower in profile than many, like the GG&G and Midwest Industries A2s, is isn't as low as the MAD.

Midwest Industries

The MI A2 BUIS and the GG&G are examples of convergent evolution. Yes, they look the same. But look at it from the viewpoint of a designer: you need a locking block, with crossbolt and clamping plate. You need a hinge and a sight. You need ears to protect the sight, and you need to round the edges so your customers don't cut themselves on our product. The remarkable thing isn't that two look alike, but that so many look different. The MI A2 has a different texture and color to the anodizing, and slightly different lines in its parts. But it is a folding A2 sight with two apertures, and works just like you'd expect an A2 sight to work. As with the GG&G, the MI is not as low-profile a sight at you can have with other designs. It is however, tough, it comes back to zero when folded and re-stood, it looks good, and stays put.

DPMS Mangonel

The DPMS Mangonel is a different approach to the BUIS. Instead of a folding assembly that then locks or is spring-loaded, the Mangonel has a spring-loaded locking bar. Lift the front or the rear and the locking bar lifts until it locks into the latching slot. The Mangonel lays flat, but is positively locked when it is up. The front is adjustable for vertical and the rear for windage. There are no protective wings for the rear aperture, but then for a BUIS, do you need them? We aren't talking a 600-yard target sight here, but something to keep you in the fight (or the match) when your optics croak on you. One thing you must be aware of: the Mangonel front has two locking slots. If you pop your front sight up and you get the locking slot that causes your sight to ride lower, you'll be shooting over your target. Why two slots? One for gas block rail mounting, and one for railed forearm mounting.

Troy

Troy Industries makes folding front and rear sights. They are the ones the S&W selected for their rifle, and a lot of other people have elected to go with Troy, too. The Troy rear is windage adjustable, and the apertures are on a paddle that swings back and forth to get you from the large to the small. They are durable, compact, and good looking. The Troy rear BUIS is the one I went with on my DMR.

Yankee Hill Machine

The YHM BUIS is the one Al Zitta uses, and they have a lot going for them. They don't fold as compact as others, but they can be folded with the small aperture ready to go instead of the large one.

The original night vision scope was active (the enemy could see your light), not passive. And large. This storage box for one should give you a clue. (That's an M1 Carbine next to it.)

Armalite

The Armalite BUIS looks a lot like the rear sight on the WWII German FG-42: a post with a vertically adjustable aperture in it. The idea works mechanically, but to have it you have to give up the option of other aperture sizes. So if you do not like the one that it comes as, you'll have to have your gunsmith disassemble the sight and bore out the aperture to the size you prefer. However, that is a small detail for a sight that works well.

As a sight by itself, the Zeiss is great. But you've got to have irons, and the Zeiss "doesn't play well with others."

BUIS Apertures

One thing that makes me a bit crazy is the apparent universal idea that when you need a BUIS, you'll want the large aperture. Me, I want the small for most anything. The large is best used for night shooting, and usually in a military context. In a law enforcement use, or defensive non-LEO use, the large is a bit coarse. However, you cannot fold most BUIS down with the small aperture ready to go. The YHM BUIS lets you do that. Some of the others (A.R.M.S. for one) can do that if you file off the top of the small aperture ring. I'm not cool with that, so I'll have to wait. Troy tells me that they know about some shooters who have the same crazy idea, and they're working on a way to make it so you can have either aperture selected and still fold the sight.

Chapter Eighteen

OPTICS

Optics allow for a more precise aim, and in some cases offer magnification to allow for better target identification. However, as with all things in life, nothing is free. Magnification is a good thing at distance but can be a problem at close range. Optics, while having become much more durable of late, are still less durable than iron sights. If they use batteries the batteries can die. Even if they don't, dust, rain or snow can cover the glass to make it more difficult to aim. Simply putting optics on rifles does not make the rifle more accurate, and it does not make you a better shot. Only training and practice will do that.

Selection

Optics can be had one of two ways: magnifying and non-magnifiying. The non-magnifying optics are primarily the "red-dot" sights. They use batteries and a reflector inside the housing to project the image of a red dot. The big advantage of these sights is that they are parallax-free. That means wherever the dot is, that is where the shot goes, assuming a properly-zeroed rifle. It doesn't matter where in the viewscreen the dot appears, that's where the bullet will hit. The disadvantages are these: if the battery quits, the sight stops working, and rain, snow frost and condensation

The two bases are simply held onto the scope (a most excellent Trijicon here) by bolts on the bottom.

Optics have become common on standard rifles, something unheard of a generation ago. (Thank IPSC shooters for that.)
U.S. Army photo by Staff Sgt. Russell Basset.

can cloud the view. (The latter disavantage is shared with all optics.) The government has bought hundreds of thousands of the Aimpoint M2 or M3 or M4 sights, calling all of them the M-68 CCO (Close Combat Optic). One can hardly look at a photo from Iraq or Afghanistan without seeing a rifle, and even belt-fed machine guns, with an M-68 mounted. One type of optic keeps working despite battery expiration, for it doesn't use batteries. And another keeps working despite rain, snow and condensation. The no-battery lighted optics are the Trijicons, which use a light-gathering bar on top to add light to the Tritium-powered reticle.

The EOTech Holosight does not need an entirely clear view though the scope. If there is enough of the side facing the shooter to reflect the reticle, then the shooter sees a reticle. But unlike the Trijicon, if the battery of the EOTech dies, it ceases being a useful aiming aid.

Magnification can be a good or bad thing, depending on what you need at the moment. The Marines in Iraq are finding that while a 3.5X scope is often useful, it has limits: at long range it isn't enough, and across a room it is too much. As neither you nor the police are highly unlikely to be trading shots at distances further than a medium-

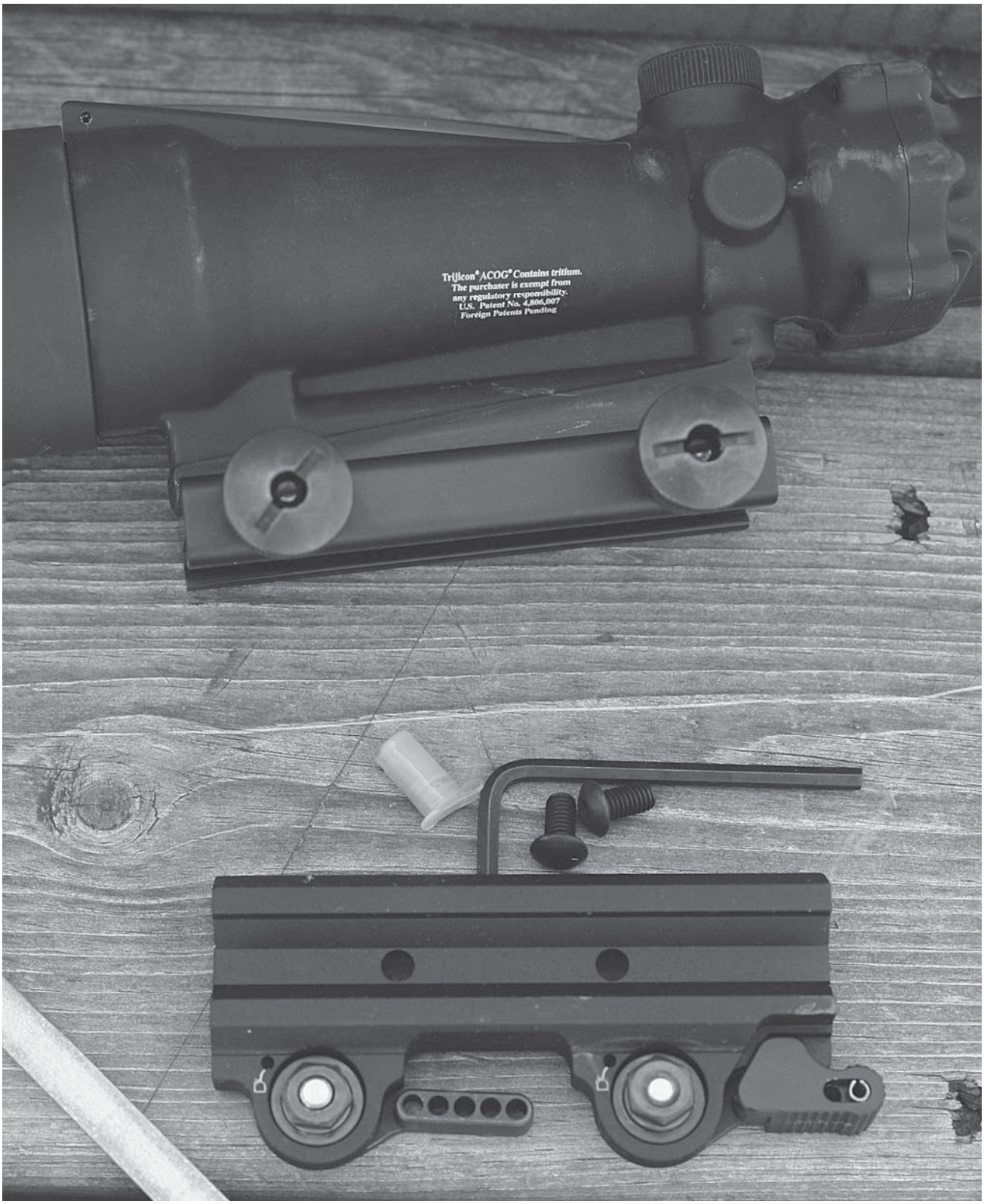
An EOTech, on a gooseneck mount.

sized parking lot, 3X might be a useful upper limit. If the department insists on magnifying optics, they should try to keep the magnification on issue scopes as low as possible.

Attachment

Avoid optics attachments that use the carry handle, unless they are the "gooseneck" mounts that extend over the handguards and are as low as possible. Ideally, optics would be mounted on the top rail of an M4 upper, or on the top rail of a railed handguard.

The locking screws of the mount must be painted-in once the rifle is zeroed. While the quick-detachable mounts are very cool (and the good ones return to zero well) the hazards are great, and the cost can be significant. The temptation to show off: "Hey, my scope comes off and goes right back on again" is more likely to be, "Hey, my scope comes off and . . . oops!" Before changing to the purchase only of flat-top rifles and carbines, the Armed Forces invested in a great many gooseneck mounts. Those may be available surplus, if you search the internet and gun shows, and if you wish to put optics on rifles or carbines with regular carry handles.



The knobs are OK, but nothing beats a quick-detach system. Here, we're going to swap out the one base for a LaRue.

This Insight optic is mounted just forward of the BUIS, so the irons can be flipped up when needed.


DANGER
RESTRICTED MILITARY/
GOV'T/LAW ENFORCEMENT
/EXPORT USE ONLY

Here's the Trijicon with the LaRue base attached, ready to go on a flat-top rifle.

Can you mount too much stuff? How about a magnifying optic, a thermal imager, and a video panel display?

A non-magnifying optic is plenty good to 300 meters, as this NG trooper is demonstrating. However, it doesn't help much in target ID.

The GG&G Accu-cam quick mount makes it a snap to put optics on or off your rifle.

Checking zero at 100 yards, with a Leupold C/QT. Which zero you use is less important than knowing what the one you have will do.

Easy-On, Easy-Off

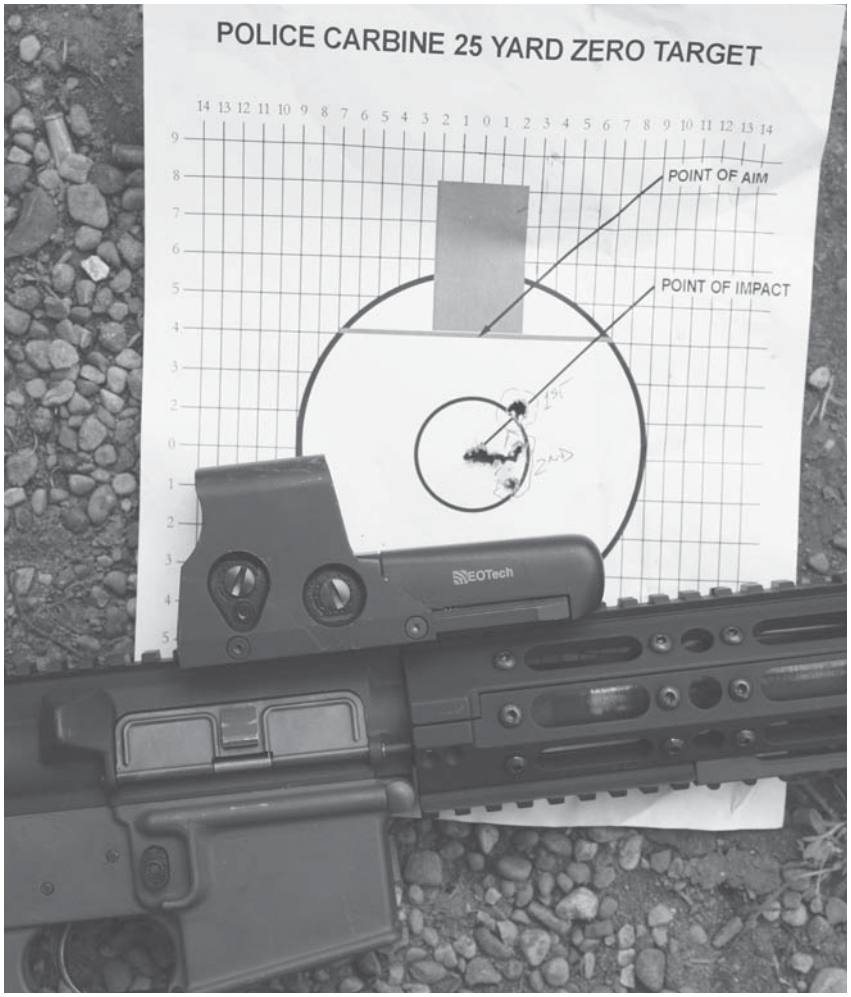
Having a scope or other optic that can be quickly removed is nice. It can even be useful. Some come that way. Those that don't, you get mounts for. A.R.M.S. makes a mount for the Aimpoint, as do Midwest Industries, GG&G and LaRue. When you mount it, make sure the mounted scope does not interfere with the folding BUIS you've installed. (You do have back-up iron sights on your rifle, don't you?) That way, if your batteries die, you can flip up the irons and keep going, If the optics block the rear sight, you first have to pry the optics off before you can use the irons.

GG&G makes their Accu-cam, a single-lever mount. It works the same for all optics: once you have a location, you test-fit the mount. If it is loose (you want it to take some force, but not too much to clamp on and off) you adjust the fit. One thing to note: the EOTech uses a rather small-diameter bolt to clamp the sight on. The Accu-cam replaces that bolt with the bolt of the Accu-cam. If the bolt breaks, your sight falls off. We've done some experimenting to make the shaft bigger, but it requires drilling and re-tapping the hole, a definite non-warranty task that could mean you have an expensive paperweight. This is not to indict EOTech, as their optics are otherwise bomb-proof (almost literally) and many shooters, myself included, are very happy with them.

Co-Witness

The big advantage to red-dot sights and a folding BUIS is that the optics are handy, and if they quit, the iron sights are but a moment away. Plus, they can be used to verify zero. The zero method is the same for both, and must be

This Trijicon ACOG will let you see your target and place shots precisely out to 300 yards. But you still have to zero it, and know your trajectory.



Here is a last-step 100-yard zero target, fired at 25 yards. Two clicks left and this shooter is finished with his zeroing task.

done with both. But once done, it can easily be checked, one against the other. In almost all instances, the red dot, on a properly-zeroed rifle, will coincide with the irons. To check, turn on the dot. Flip up the irons, and aim the iron sights as if you were dry-firing. (Need we remind you again the rifle must be unloaded when you do this?) With the irons properly aimed, the dot should appear to be perched on the top-center of the front sight blade. Once a proper zero of both is done, the sights can be checked any time. If, in checking the co-witness, the irons and dot no longer coincide, then one of them has changed. Granted, knowing that one of them is wrong, but not knowing which, can be frustrating. But not knowing at all that the single sighting system on other rifles (optics without BUIS, or irons without optics) is correctly zeroed and undamaged is worse.

If the BUIS and the optics do not agree, find out what happened. If your rifle just fell, and there's a big crease in your scope, you've got what those in law enforcement call a "clue."

The M-guns Ballisticker gives you a quick reference to recall bullet drop. Know the range, have a zeroed rifle, you can get hits quickly.

The Leupold Prismatic gives you a 1X, with a lighted reticle. Very fast, very solid, and with its own base included.

If you do your job properly, the zero will not change between 1X and 3X (this magnifier added to the Aimpoint). If it does, the problem is usually the shooter.

A scope is an aid, not a replacement for good technique. You still have to do the work of zeroing.

M-guns also makes a sticker to sort out your EOTech adjustments. If you have an EOTech and zeroing is a hassle, you need this.

Boresight and Zero Check

Boresighting is simple, and the modular design of the AR-15/M-16 makes it easy. Simply remove the upper from the lower. Remove the bolt/carrier group and charging handle from the upper. Now place the upper in a cradle, rest, or solidly-supported position. Look through the bore and center the bore on an object 25-50 yards away. Now look at the sights as if aiming. Are the sights close to the object you used as a bore-sighting target? If it is, then boresighting is complete. Any shots fired when zeroing the rifle will be close enough to hit paper, be observed, and can then be corrected.

If not, then the barrel might be bent, the sights adjusted far from the mechanical zero, or the front sight housing might be tilted. Inspect and correct.

You can also use a laser aiming device to boresight. The process is backwards, but the results are the same. Take the upper, minus bolt and carrier, and place it in a vise, cradle or solid rest. Insert the laser in the muzzle, and turn it on. Aim with the sights until the sights are correctly aligned on the target, then look for the dot. (Either walk downrange or use binoculars.) The dot indicates where the bore is pointed. If the dot is on paper, you're good to move on to the firing portion. If not, find out why.

A rifle must be zeroed for it to be useful. Trying to aim at a target using "Kentucky windage" is not a reliable method. But the problems can be quite involved. The bullet travels on an arc when it is fired. If it were not "pitched up" when fired, it would immediately begin dropping below the barrel. The sights of the AR-15/M-16 are 2.6 inches above the center of the bore. The bullet is directed upwards, and will cross over the line of sight at some short distance. (Known as the zero distance, or first intersection.) After that it will travel above the line of sight for quite a distance, before gravity and air drag bring it back down to the line of sight. (The second intersection.) Then it continues to pitch downwards to the ground until it comes to rest. Where should that initial Zero distance be?

Military Zero

The military, having firm ideas about engagement distances, has settled on (in the case of the A1 sight system) two "first crossing" distances: 25 and 42 meters. The latter is the short-range sight. On the "short-range" zero setting the bullet travels above the line of sight until it gets out to 250 meters. The long-range zero uses a closer initial crossing, which creates a greater upward angle of fire. The 25 meter zero has as its second line-of-sight crossing a target at 375 meters. I think we can all agree that 375 meters is beyond all normal distances for engagement in a self-defense or law enforcement setting. In fact, most incidents will be well inside of 100 yards. The problem with either military zero is that inside of 25 yards (or 42) the bullet strikes below the line of sight, while beyond 25 (or again, 42) it strikes above the line of sight. Since the large majority of defensive rifle shootings will be inside of 100 yards, the question then becomes a tricky one: is the target at a distance where the shooter needs to hold over or under the desired impact point on the target? And once you've determined if the offset is over or under, then the question is: How much?

There is an easier way.

100-Yard Zero

Despite referring to it as the 100 yard zero, the initial shooting for sight adjustment is done at 25 yards.

By sighting the rifles to impact 1.5 inches low at 25 yards, the bullet does not rise to the line of sight until it has reached 100 yards. It then rises a small amount above the line of sight, and then drops again just before it get to 200 yards. At 200 yards, the distance it drops is easy to remember: 2.23 inches. Out at 300 yards, the bullet has dropped a foot, but treating the shooting problem as if it were a head shot accounts for that trajectory drop. So, with a rifle zeroed using the NEMRT 1.5 inches below the target, a shooter need not worry about line of sight issues. Inside of 25 yards his problem is the same as everyone else's: the sights are 2.6 inches high, so hold for a lower point of impact. At 25 yards on out to any reasonable engagement distance, the bullet will not be more than an inch or two away from the line of sight.

To aid in keeping track of the distances hold-overs with the 100-yard zero, Michiguns has produced a rifle sticker. If you sight-in rifles according to the 100-yard zero, the label will provide the offsets needed for target engagement to any reasonable distance. Across a small room, the bullet will obviously strike the target 2 to 2.5 inches below the line of sight. Some law enforcement situations are different. Entry Teams must be (and usually are) familiar with this problem. Beyond the distance of a small room, the difference between line of sight and bullet impact becomes small., At 25 yards, it is 1.5 inches (bullet low); at 50 it is 0.7 inches. At 100

yards, the difference is zero. So, at very short distances, the shooter must hold over. Entry teams are well-aware of that, spending all their time in the "10 yards and in" zone. They have all had to learn to hold over their target, as inside of 25 yards, it matters with the AR. Beyond that the difference between sight line and trajectory is not much larger than the group size the shooter can accomplish. Beyond that, the chart provides hold-overs. Adhesive-backed, simply find a location on your rifle where it will be easy to use, degrease, apply and you're done. (Except for the practicing.)

"Entry" Zero?

The thought comes up from time to time, to zero rifles at the usual engagement distance, and for entry teams that means across a room. That usually means seven yards. With a seven-yard zero, you wouldn't have the same hold-over problem. (Well, you would, but it would exist only from the range of zero to two yards, or so.) However, it won't work. The bore starts out 2.6 inches below the line of sight. If, at seven yards the bullet and sight lines meet, then simple geometry tells us that at 14 yards the bullet will be 2.6 inches high. At 28 yards, 5.1 inches high. At 100 yards, more than a foot and a half high. In balance, a bad idea, and one mechanically impossible, as the front and rear sights cannot even be moved far enough to get the rifle zeroed at seven yards.

The Zero Process

Getting rifles zeroed is a simple process to describe, and appears to be an easy task to accomplish. It typically is not. One method used by some police departments is for the armorer or one of the firearms instructors to zero each rifle before it is issued. If the department has only five to 10 rifles, they could all be zeroed in an afternoon. However, with 20 or more, it becomes real work. And the officers to whom the rifles are issued will still have to familiarize themselves with the operation and check the zero for themselves. Having the officers do the zero under supervision both familiarizes them with the rifles (and the zero process) and provides a quick function test as well. You, the guy who isn't in a department, has to do it for himself. (And ladies, I'm not being sexist here. You own a rifle, you'll have to zero it yourself, even if it is pink.)

However, despite that we all consider ourselves competent, not all officers have an initial skill level up to the task of zeroing a rifle quickly. It may take several iterations of the process: Shoot from a solid rest, unload and show clear, walk down to the target, determine the group center and the adjustments needed, walk back, make the adjustments, re-load and fire again. As each cycle can take five minutes or more, range time quickly gets consumed just with zeroing rifles.

I've zeroed rifles using just six rounds (not bragging, I didn't have any time to do it except quickly) firing two three-shot groups. But that is the exception, not the norm.

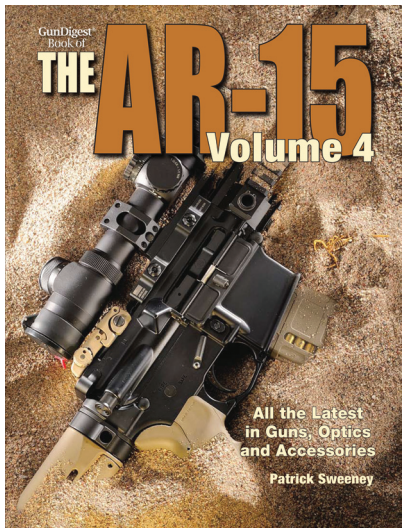
If when you go to zero you shoot a group more than an inch in size at 25 yards, locating the group center becomes problematic. Even an average rifle should be capable of shooting a group at 25 yards that has two or three of the five shots touching. A good shooter, with an above-average rifle and good ammunition, should be able to put all five shots in a group through one ragged hole at 25 yards, time and again.

The smaller the group, the easier it is to determine the actual zero of the rifle, and the smaller the group the easier it is to calculate and crank in the corrections needed.

The good news is, once your rifle is zeroed it is zeroed. You don't have to go and re-do it every time you change ammunition. Now, theoretically, each batch, brand or production lot of ammo you use would call for a re-zero. And if you were shooting across-the-course, head to head with someone like David Tubb, yes you'd want to re-zero if you made any change in ammo. But realistically, you don't. As an example, I took one of my rifles and bolted a 3.5-10 Leupold scope on it. At 10X, using several different brands of ammo loaded with the same bullet weight on 100-yard targets, I had changes in the point of impact that came to over half an inch.

A half-inch change in zero, to a sniper, is cause for an attack of the vapors. For the rest of us, it doesn't matter, especially as such a shift could have as easily been due to me as to any other cause.

You do not, however, want to be changing bullet weights without checking zero. The point of impact of a 55 grain bullet and a 77 grain bullet may not coincide at 100 yards. Best to check, and be sure.



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