

SMALL ARMS

DEFENSE

JOURNAL

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ADVANCED WEAPON TECHNOLOGIES

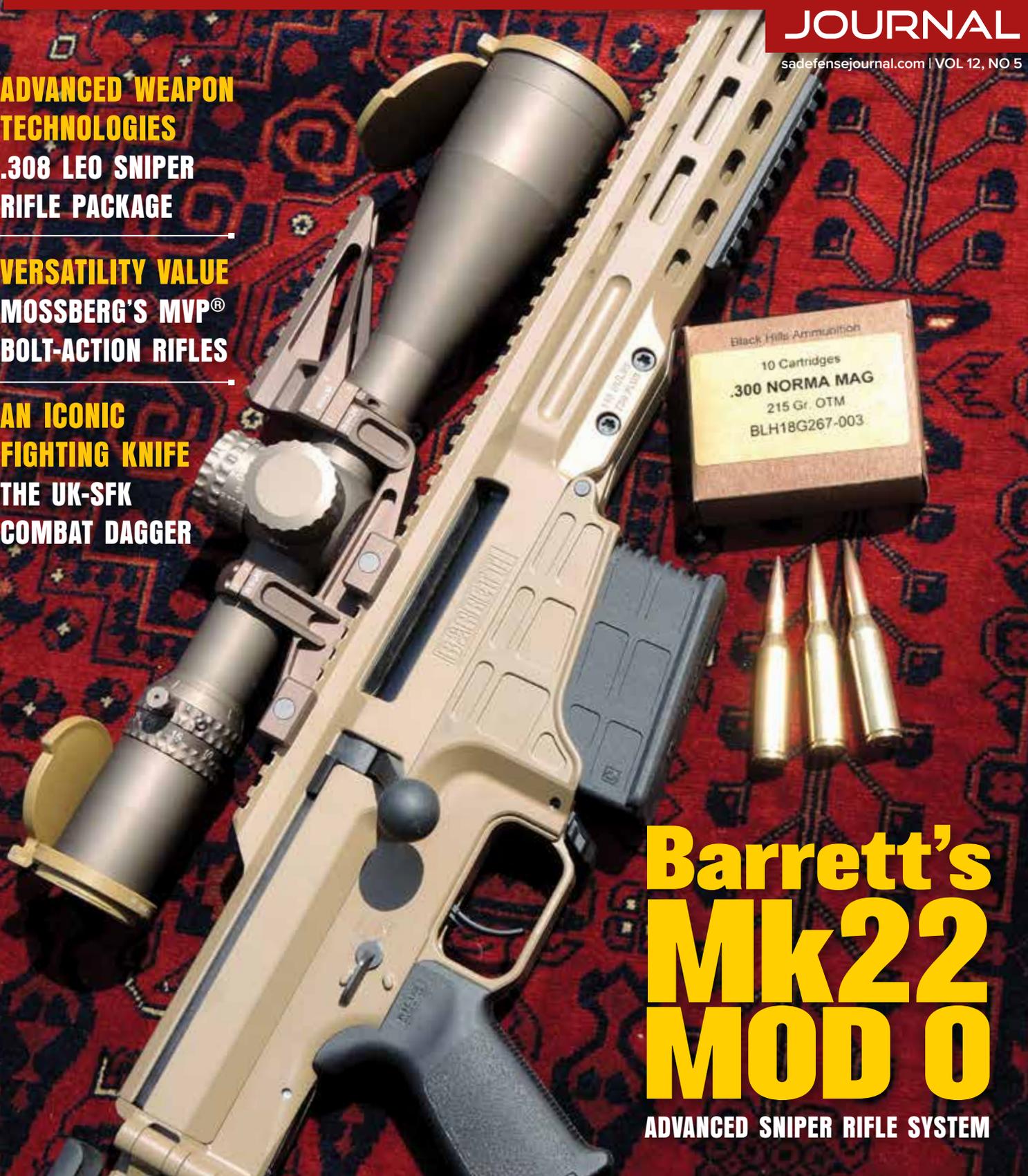
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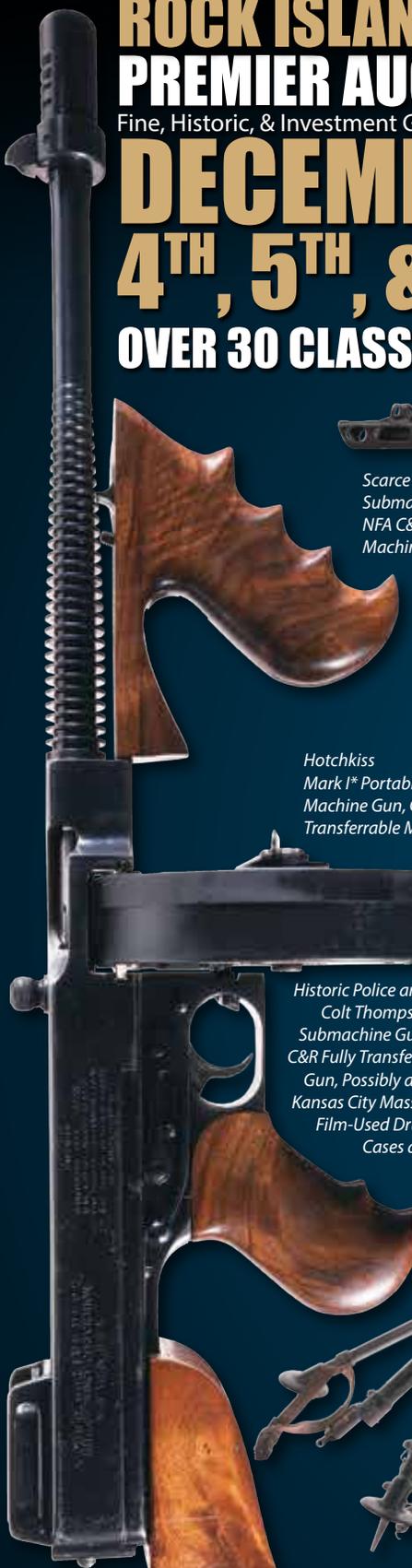


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ON THE COVER

Barrett's Mk22 Mod 0 rifle, winner of the SOCOM ASR Competition with .300 Norma Magnum military issue ammo from Black Hills Ammunition, and a Nightforce ATACR™ 7-35x56 ASR Optic on an Afghan Khal Mohammadi rug from the Turkmen region of Afghanistan.

PHOTO: DAN SHEA

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accuracyinternational.com

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IRV 600 A1

The thermal sight attachment **IRV 600 A1** is the enhancement of the well-tried IRV 600—developed for assault rifles or light machine guns. The IRV 600 A1 was developed especially for long ranges. It is characterized by its simple operating concept and its central control panel. The infrared attachment is equipped with a video connection for an external monitor. Its additional Picatinny rail offers space for optional accessories. A battery pack allows the user to easily replace the battery without having to use tools.

At a size of 640x480 pixels, the detector offers the highest geometric resolution available on uncooled devices. The IRV 600 A1 can be either used as a clip-on system with 1x magnification or as a stand-alone targeting optic with digital zoom.

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HELO Premium Defense Hollow Point

National Police Ammunition (NPA), a leader in lead-free ammunition, is pleased to announce the development and the release of their **HELO Premium Defense 9mm 115 grain + P solid copper hollow point** with proprietary interior skives. Unlike bonded jacketed bullets, the HELO (High Expansion, Law Enforcement, Ordinance) is formed from a solid piece of high-grade virgin copper. At that point, a proprietary cavity is formed with interior skives, the copper bullet is heat-treated to the ideal hardness to allow the projectile to achieve maximum penetration and

expansion while retaining 100% of its grain weight through ballistic gel and does not break apart like many copper hollow points on the market. The HELO has a black oxide coating that reduces copper fouling in a firearms barrel. The HELO will penetrate the minimum length of 12 inches into bare gel from a GLOCK 43 sub-compact pocket pistol and will penetrate an average of 15 inches of gel from a full-size defense pistol averaging 1,150 FPS from a 4-inch barrel.

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metal blue aluminum handle comes with black rubber inlay, a safety lock, glass breaking tool and a pocket clip. store.smith-wesson.com

FOXFURY LIGHTING SOLUTIONS

D3060 Drone Light

Foxfury Lighting Solutions announced the arrival of the **D3060**, the newest addition to its family of drone lights. The D3060 is a small format drone and utility light. Dual LEDs give the D3060 360-degree lighting. There is 30-degree light on the front and a 60-degree light on the top of the unit. Each one has three modes: low, high and strobe. These lights can operate independently or simultaneously depending on the user's needs. The D3060 weighs 1.3 ounces, so it has a minimal impact on flight time. The D3060 comes with dual lock fasteners as well as a strap insert in the base plate, so you can mount it to most drones in addition to wearing on helmets, clothing, bags, etc. Various mounting options can make the D3060 into a utility, anti-collision or navigation light. The strobe mode meets FAA and global regulations for UAV night flight and anti-collision drone lighting. The D3060's base plate swivels 360-degrees, allowing it to point in any direction necessary.

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Dennis Powell lining up a target 1,000 yards away at the Boulder Rifle & Pistol Club.

SOCOM's Mk22 Mod 0 System

“Solving the Riddle of Steel”

“The secret of steel has always carried with it a mystery. You must learn its riddle, Conan. You must learn its discipline. For no one—no one in this world can you trust. Not men, not women, not beasts. But steel; this you can trust.”

—Conan the Barbarian's father as he points to a sword he'd made.

Story & Photography by Dan Shea

It's probable that most English-speaking readers of *SADJ* have seen John Milius' adaptation of the Robert E. Howard stories in “Conan the Barbarian.” Entrenched in our modern martial culture, many of us jokingly quote the movie's lines, because on an ele-

mental level, it speaks truths to fighting men. The Riddle of Steel—it calls us; we philosophize around it, perhaps jokingly, but there is always a truth hidden in the words. At the core, the various answers appear to be contradictory: First, steel is strong and flesh is weak;

Second, the opposite—flesh that wields the steel is strong, and steel is nothing without that; Third and perhaps most important, that the will and determination to use the steel in righteous endeavor is the true strength.

In fact, the Riddle of Steel is solved if all



Each steel barrel has an identical chamber end in outer diameter and length. That “barrel extension” area is approximately 3.5 inches in length and just under 1.5 inches in diameter. It slides into the monolithic-milled 7075 T6 aluminum receiver and matches up perfectly to the cylindrical receptor area, indexing perfectly into location with the half-moon pin in the receiver. Once seated, the two T30 PLUS Torx head screws are tightened to 140 in-lb. (Remember, T30 PLUS, not plain T30, or you’ll strip the star grip areas, and you’ll be contemplating failure from the Tree of Woe.) The 3.5-inch by 1/8-inch (approximately) cut through the bottom of the receiver section is not a full-length cut; there is supporting on both ends, so the sides of the cut area “bow” in to tighten the collet.



three of those are blended into one truth.

In the United States military, we have a group called SOCOM (USSOCOM)—it is comprised of warriors, working for warriors, to enhance their fighting capabilities. At the risk of being trite, this brotherhood is dedicated to using steel in righteous endeavor, and they train hard to have the physical capabilities to wield the steel, and, of course, their weapons are almost always the best that can be found. Started in 1987 to create a unified command for US Army, Navy, Marine and Air Force special operations groups, a significant part of the mission is new equipment.

In the modern fighting arena, in that hardened place that is called “downrange,” increasing distances of engagement as well as armoring of targets are challenging the warriors. There have been many attempts to address this—not all failed, but few are chosen by the warrior leadership. Barrett Firearms has been chosen more than once ...

One item of “steel” that has been chosen by SOCOM to be at the forefront for these warriors, is the newly adopted Mk22 Mod 0 “ASR” Advanced Sniper Rifle—the next evolution of Barrett Firearms Manufacturing’s MRAD rifle

system. For SOCOM, where the physical strength and the righteous will are, the Mk22 very nicely completes the triad of the Riddle of Steel.

Barrett’s MRAD Concept

To understand the Barrett MRAD (Multi-Role Adaptive Design) rifle requires some background information. You can get the spec sheet story by searching “MRAD” online; our job at **SADJ** is to help the readers really understand the Mk22 system. Creating an accurate rifle that can interchange calibers is a unique challenge. Easy enough to change out a barrel and bolt, but to do so and maintain true precision accuracy, that is an entirely different matter. There have been many systems with interchangeable barrels, especially in machine guns; but those are area weapons, not point weapons. This has to be made in a man-portable manner as well, so steel is too heavy a choice for the chassis.

“The Riddle of Aluminum” doesn’t sound quite so interesting, but in fact that is where Barrett’s engineers went to create the MRAD/Mk22. There are eight “Thousand” series of aluminum alloys and some oddities; each has a commonality within its group. Pure alumi-



The manufacturing process is the same on the “lower” group. There is a buttstock, trigger group, pistol grip, magazine well and a front pivot pin, with rear-locking lever to attach to the upper. The ergonomics are virtually perfect for this type of rifle; stability on the bench was excellent.



The trigger is a single-stage, non-adjustable module, removable and replaceable. The factory setting is at 2.5 +/- 0.5 pounds. Testing with both a Wheeler® Trigger Pull and Lyman® Electronic Digital Trigger Pull showed a consistent 2.5-pound pull. All of us thought the trigger was perfect, smooth and crisp. Enough said. The selector is reversible for the shooter’s preference on right or left.

num is a very soft metal and requires additives (alloy) and treatments to gain strength. What are called the 7000 series aluminums are aluminum/zinc alloys with percentages of other metals that dictate the actual number. When searching for a material to CNC mill the MRAD monolithic receiver, the light weight of alloys and reasonable cost are a quick draw; but out of the hundreds of potential alloys, which one?

Starting after World War II, an alloy used by many in the aircraft industry is 7075 (a Japanese mix). It is an alloy of 90% Aluminum, 5.6% Zinc, 2.5% Magnesium, 1.6% Copper and 0.23% Chromium; some various tiny amounts of other metals are used as well. This lightweight, easily tempered and machined 7075 is ideal for use in firearms, and 6061 (6xxx—Silicon as main additive, not Zinc) and 7075 are alloys favored in the “AR” industry. Almost every written description of an AR will say “7075 T6 Aluminum” as if it was magical transition of knowledge to a reader. Actually, in the 5.56mm AR platforms, the real benefits of 7075 don’t fully show up. However, Barrett’s engineers are smart enough to know those other attributes solve almost every issue the MRAD faced, and in particular, the split collet nature



The stock is a side-folding (to the right) skeletonized unit made of 7075 T6. The cheek piece is adjustable for height, with positive stops the operator locks the knob into. The recoil pad can be adjusted for length of pull with added spacers (supplied with the Mk22 kit with various length screws) as well as for height for how it seats in the shooter's shoulder. When folded, it closes over the bolt handle in the down position. It is possible to fire a chambered round from this closed stock position; you won't be able to eject or reload unless you open the stock, and you should NOT be carrying the weapon in this position. (I'm judging you if I see that.) There is a monopod Picatinny rail on the bottom of the rear stock, and leaves the manufacturer with a "Rail Cover," so-called in their manual. It's a bag rider for using a sand bag or shooting bag under the stock. You can use any rear monopod with a Picatinny attachment (Barrett sells a commercial one) or adjust the support for the off-hand on the lower stock-against-shoulder-style of shooting. The monopod is not issued with MRAD, nor is it in the Mk22 Mod 0 TO&E. DoD MRADs do have one.

of the barrel clamping. More on that later.

After cold rolling (adding about 4–6 times the strength) we get to the second part of the magical "7075 T6" invocation, the T6, which is the tempering. In the case of Temper 6 the 7075 is heated to 840°F (450°C) for approximately 2 hours, solution quenched, and an artificial "ageing" is physically done by resting at 250°F (120°C) for 24 hours (yes, this is a heat treatment). Of the many treatments that can be done, this method (called precipitation strengthening) ensures that the precipitates (tiny particles less than 0.001mm in diameter composed of aluminum and the added alloy metals) forming inside grains and on the grain boundaries produce excellent mechanical strength all through the material and add excellent surface-wear resistance. This is where the phenomenal elongation tolerance of 7075 T6 comes in. But that's not the best thing ...

"OK, Dan, so what is this about the split collet and Barrett engineers?" 7075 with a T6 temper has excellent tensile strength (74,000–78,000 psi) and yield strength of 63,000–69,000 psi. This is all great news for the 5.56mm, 6.5mm and 7.62mm AR builds, but it is the elongation tolerance before breaking of up to 11% that caught the Barrett engineers' eyes. This is the

exact right material tolerance (and heat tolerance) for heavier calibers like the Lapua and Norma Magnums.

The icing on that cake is that with changing calibers, using a split-collet-style clamp built into the upper receiver, the material must elongate and clamp, over and over, maintaining its original form on each return. 7075 T6 is ideal for this.

There are many parts to the MRAD as presented by Barrett, but the most critical is maintaining the accuracy in different barrels that are field changeable. The split collet is the key.

Why tighten to exactly 140 inch-pounds (in-lb)? We go back to the Riddle of Aluminum and that 11% maximum flex before breakage on 7075 T6. We don't want to flex anywhere near that much, but seating a barrel in an accurate rifle must be done precisely in order to lessen barrel harmonics. Accuracy comes from tightly repeatable events in the physics of the rifle. Get rid of variables in barrel harmonics; tighten them up; shoot a tighter group. In discussion with Barrett, they indicated that when tightening up over 90 in-lb on these screws the group stabilized, and at 140 in-lb, the barrel was supported perfectly, the aluminum sides of the collet area were not overstressed, and the steel screws

didn't distort the threads in the aluminum. Thus, 3.5 inches of 360-degree-supported barrel clamped properly to rigidify it with the monolithic receiver results in the ability to have extreme accuracy from a field changeable rifle. This is the real heart of the rifle.

"The MRAD itself is a manually operated bolt-action rifle fed from a 10-round detachable magazine. It is designed to be a rugged, configurable, precision rifle system; the MRAD can quickly be converted to multiple calibers or barrel lengths. With M-LO[K] mounting slots at 3, 6, and 9 o'clock, its handguard offers a rigid, highly adaptable interface for attachment of rails, electro-optics and other accessories."—Barrett manual description

Magazines

Longtime readers know this author is a magazine fanatic. Feeding the weapons is often one of the hardest parts of weapon design, particularly in semi- or fully automatic firearms. In the case of a bolt action, it's not as complex, but it still must be perfect, or you will experience misfeeds. The 10-round MRAD magazine is perfectly designed for presentation and in four basic flavors to properly present cartridges of different length/shoulder location. A properly treated flat spring is used to keep even presen-



Inside view of the Mk22 magazine release; it is located to the rear of the magazine well and is a convenient "Flapper" type of release.



MRAD (Mk22) magazines and the markings of C and D. Note the ribs on the front, giving a tactile check so the operator can tell which magazine it is, even in the dark or reaching into a pouch.

tation of the follower, ensuring the cartridge ramps into the chamber without cant.

The first MRAD (now called the Large Breech gun) was in .338 Lapua Magnum, and the magazine has no identification letter and zero ribs on it. After the MRAD was fully developed in different calibers, a system was needed for visual and tactile identification. The Mk22 comes with C- and D-type magazines:

A: .338 Lapua Magnum 6 ribs

B: .300 Win Mag/7mm Rem Mag 4 ribs/.300 PRC

C: .308/6.5 Creedmoor/.260 Rem 3 ribs

D: .338 Norma Magnum and .300 Norma Magnum 6 ribs

The obvious question to end users is whether A and D magazines are interchangeable—no, not reliably. The D magazine is specifically designed to accommodate the shorter shoulder location of the .338 Norma Magnum

and .300 Norma Magnum cartridges; you could feed them in the A magazine but probably lose some reliability in feeding. Vice versa, if you had the .338 Lapua Magnum conversion kit for the Mk22, which is after all an MRAD, the A magazine would be needed.

Mk22 Mod 0: The Changes from Other Programs

In the first place, the Mk22 does not need the large breech to small breech conversion unit—that was only on the early MRADs in .338 Lapua Magnum to smaller calibers when Barrett added them, and the Mk22 is purpose-designed from the current MRAD, using one homogenous breech for all calibers. The calibers in the Mk22 Mod 0 are the following and no others. There are other USG and DoD groups that add the .300 PRC or 6.5mm Creedmoor kit, but not for ASR. Could you add them? Yes, but it's not cur-

The ASR Award

Date: 03/11/2019

Issued From: HQ USSOCOM (Tampa, FL)

Contract #: H9240319D0002

System: Barrett MRAD Rifle System

This is a 5-year Indefinite Delivery/Indefinite Quantity (IDIQ) contract for the Advanced Sniper Rifle and various components identified herein including three barrels in the calibers listed below, spare parts and Barrett AML338 suppressors. No optics are included.

The maximum quantity that shall be purchased is a total of 2,675 units.

The maximum contract value for all orders issued shall not exceed \$49,936,299.50.

Calibers: .338 Norma Mag; .300 Norma Mag; 7.62x51mm



In addition to the MRAD and manufacturer markings, the Mk22 Mod 0 has US markings on it for issue model, etc.

Caliber	Barrel Length	Barrel Profile	Twist Rate	Overall Length	Weight
.338 NM	27in	Fluted 1in	9.4in	50.625in	15.2lb
.300 NM	26in	Fluted 1in	8in	49.625in	15.1lb
7.62x51	20in	Fluted 1in	8in	43.625in	13.9lb

rently authorized in the Mk22.

The Mk22 rifle uses an M-LOK system as opposed to Barrett's proprietary system on the MRAD. The Mk22 has the toggle bolt disassembly and a captive bolt pin.

The Mk22 Mod 0 is in the above calibers only, uses the Harris 6- to 9-inch bipod with a cant dial lock and is Coyote in color. The US Navy MRAD is Flat Dark Earth in .300 PRC and also uses the Harris bipod. The Mk22 does not use a monopod, but the bag rider is included. DoD MRAD issues the Accu-Shot monopod and no bag rider.

Regarding the cheek piece, the Mk22 has the positive lock with increments, and the DoD MRAD has a friction lock with free adjustment. Several other differences are that the Mk22 safety has pictograms, and the DoD MRAD is S/F red and white; the trigger for Mk22 is fixed as I mentioned, but the DoD MRAD has a fully adjustable trigger that bottoms out at 1.75 pounds; and the Mk22 barrels are fluted stainless steel, DoD MRAD barrels are not fluted and are carbon fiber constructs. There are a lot of small changes and variations

between the Mk22 and the DoD MRAD, but that's not really our subject here.

USSOCOM Advanced Sniper Rifle Requirements

- Must be convertible to fire 7.62mm NATO, .300 Norma Magnum and .338 Norma Magnum cartridges.
- Must not exceed 17 pounds with an empty magazine but is ideally 13 pounds or less.
- Must not exceed 52 inches when fully extended, but is ideally 40 inches.
- Must not exceed 40 inches when collapsed for transport, but is ideally 36 inches.
- Must perform with at least 1 MOA accuracy for the 7.62 NATO and .300 Norma Magnum at 300 yards. Ideally .5 MOA.
- Must perform with at least 2.5 MOA accuracy for the .338 Norma Magnum at 300 yards. Ideally 1.5 MOA.
- Must have a modular flash or sound suppressor.

Ammunition



ASR initially selected ammo.



.300 Norma Magnum rounds we tested.

Calibers

Recently, the SOF community has tried a variety of calibers. The list is dizzying, and if you imagine the testing that has been done, it has occupied a lot of procurement people and design engineers, as well as end users. Here are just a few.

- 6mm Creedmoor
- 6.5mm Creedmoor
- 6.5mm Grendel
- .260 Remington
- .264 USA
- 6.8mm SPC
- .300 PRC
- .300 Norma Magnum
- .338 Norma Magnum
- .338 Lapua Magnum
- And now, 6mm ARC

Jimmie Sloan—Changing the Course

As the rest of the military/LE community (and this author) were variously adopting .338 Lapua Magnum and .300 Win Mag and finding some issues with these calibers in field use (not reliability, other issues), a parallel development had been going on in Willis, Texas. A very devoted long-range shooter named Mr. Jimmie Sloan was working on some new long-range loads, starting about 2005.

To some, Jimmie comes off more than “a little bit country,” and his down-home euphemisms might camouflage the brilliant mind inside there. Frequently, the most interesting leaps forward in technology come from a genius working in his garage—John Browning’s barn/workshop, Gene Stoner’s designs started in his garage, and heck, Carbine Williams did the M1 Carbine in jail!

Rumor has it, a room full of school-taught mechanical engineers tried to have a bit of fun at Jimmie’s expense, and it didn’t work out the way they expected. I asked Jimmie about it; he said, “I told them I didn’t have the schooling they did, but I had 50 years of experience

designing, studying and shooting every day, and that over 8 years I hand-made brass and over 190,000 rounds of what became .338 Norma Magnum and made sure of every level of performance. I then asked them how many of their college degrees concentrated on ballistics, ammunition and firearms design. You could hear the crickets.”

The hard fact is, getting a degree in mechanical engineering is not a key to being able to design firearms—many graduating students find out very quickly that the firearms world is basically OJT. You might have training in metals, materials, even heat engines (that’s what firearms basically are) and ME101, but you need to apprentice all over again to be in firearms/ammunition design. The US education system simply doesn’t have firearms design in the curriculum. You can hope to work with someone who has 50 years’ experience and is willing to share it. You have to get your hands dirty. Besides, as the late Jim Schatz used to say, “Any day at the range beats a day at the office!”

Jimmie’s original designs used 240-grain (gr) MatchKing and 230-gr Berger bullets in the .300 Norma Magnum and 230-gr Berger bullets in the .338 Norma Magnum. The performance was superb, with barrel life in the 3,000-plus rounds. These are all excellent projectiles, and Jimmie designed the cartridges for the performance he wanted. Jimmie worked with General Dynamics on their Medium Machine Gun in .338 Norma Magnum, helping get that program moving.

Rumor also has it that one of the government arsenals changed the .300 projectile to a 215-grain and opened up the chamber, with resulting loss of performance and knocking barrel life down to 700 rounds or so. Jimmie’s reply is the eternal designer’s lament: “I gave you a balanced system; you changed something and then complained about the symptoms.”

In any event, the .300 Norma Magnum adopted now has a 215-grain OTM projectile, but Barrett ensured the chamber is “right,” and they’re getting 3,000-plus rounds life. The Barrett engineers worked with JGS Precision for chamber reamers on the MRAD and Mk22 programs (jgsprecision.com).

We should note here that Jimmie worked with Dave Kiff at Pacific Tool & Gauge (PTG) for much of his chamber design/reamers during the design project (pacifictoolandgauge.com). The headspace gauges this author used in the testing were PTG also. We checked headspace after barrel changes of course, as we got used to the system.

Ammo, Ammo, Ammo!

One of the most helpful ammunition companies in the US regarding law enforcement and special operations cartridges is Black Hills Ammunition (BH ammo) (black-hills.com). Started in 1981, Black Hills is synonymous with quality and reliability. This author has known Black Hills founder Jeff Hoffman for decades and has supplied numerous government contracts with BH ammo. Jeff was an active end user, is still a shooter, knows the needs and has the commitment to the end users. The BH ammo is solid, reliable and extremely accurate, and Jeff’s company worked very hard to come up with the loads needed for many other SOCOM projects as well as the Mk22 system. (Jeff was the 2010 recipient of the GySgt. Carlos Hathcock Award from NDIA Small Arms Committee.)

Jeff was kind enough to send us a variety of the 7.62x51mm, .300 Norma Magnum and .338 Norma Magnum rounds exactly as used for the ASR program, and that is what we used in our testing. The Black Hills 7.62x51mm is legendary, a superbly accurate 175-grain projectile that is considered even with, if not better than, the military issue M118LR cartridge. In fact, many military and OGA groups use the Black Hills ammo.



7.62 rounds we tested.

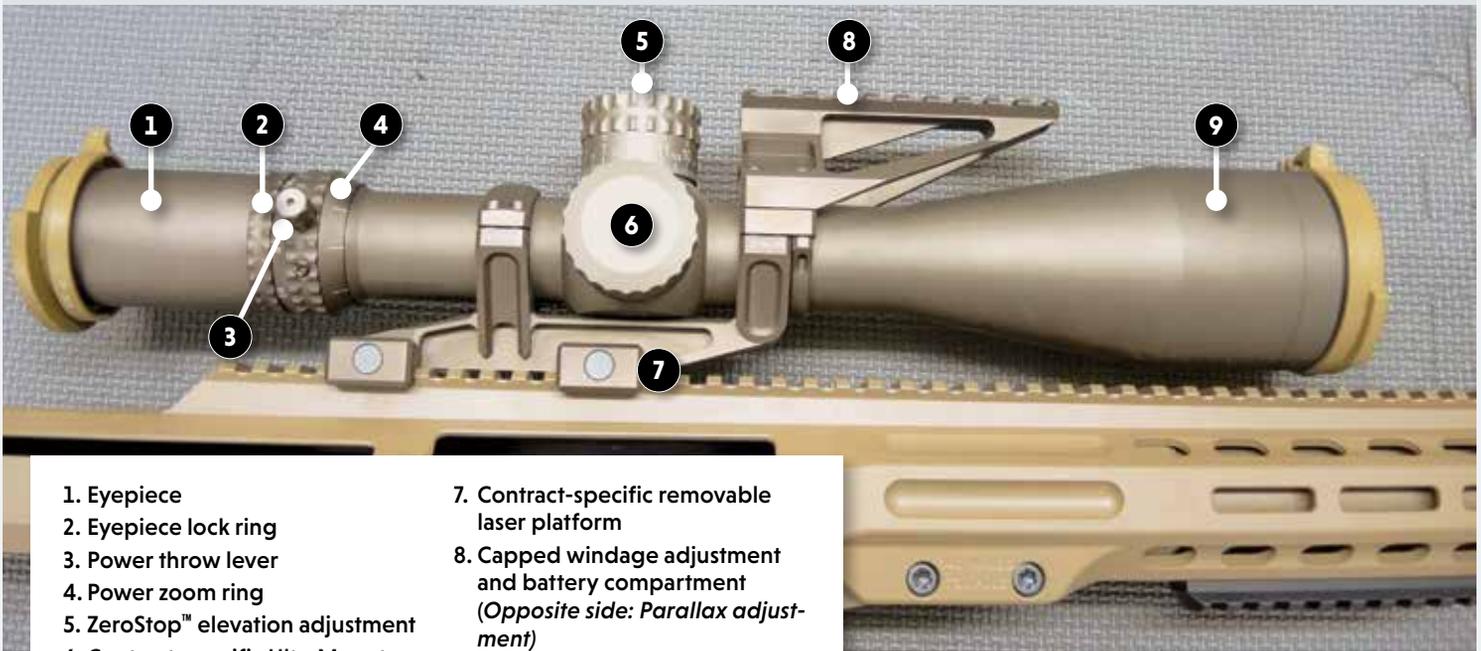


ASR Rounds—Black Hills 7.62, .300 NM and .338 NM.



.338 Norma Magnum rounds we tested.

Nightforce MIL-SPEC ATACR™



1. Eyepiece
2. Eyepiece lock ring
3. Power throw lever
4. Power zoom ring
5. ZeroStop™ elevation adjustment
6. Contract-specific UltraMount
7. Contract-specific removable laser platform
8. Capped windage adjustment and battery compartment (Opposite side: Parallax adjustment)
9. Objective/Objective lens

The .300 Norma Magnum and .338 Norma Magnum supplied to us show the clear results of what SOCOM was looking for during development—see the target section of this article. During development of the Mk22 system, the government awarded a sole-source contract to load reference ammunition to Black Hills. Part of that ammunition contract included a “surrogate” cartridge in .338 Norma loaded with the Sierra 300-grain OTM MatchKing that rifle manufacturers could use in development of the .338 Norma barrel for the system. This was done because of the expense of the AP-loaded

cartridge and the close ballistic match between the 300-grain Sierra and the Lapua AP529 projectile. So, in short, there are two different projectiles that have been loaded in .338 Norma: the AP529 and the Sierra 300-grain OTM MatchKing. Only the AP529 is designated as the projectile in XM1162 (.338 Norma Magnum cartridge for the ASR). Many end users want the non-AP round to be adopted also, for use on ranges that can’t accept the AP round.

We also used some of the RUAG 7.62x52mm SWISS P Precision ammunition; longtime readers of **SADJ** will remember that in 2019 this author

tested their palette of 7.62 offerings—seven various tactical rounds that have different jobs, but match point of impact; a truly desirable attribute. Unfortunately, RUAG was not in the competition, but it performed as well as expected.

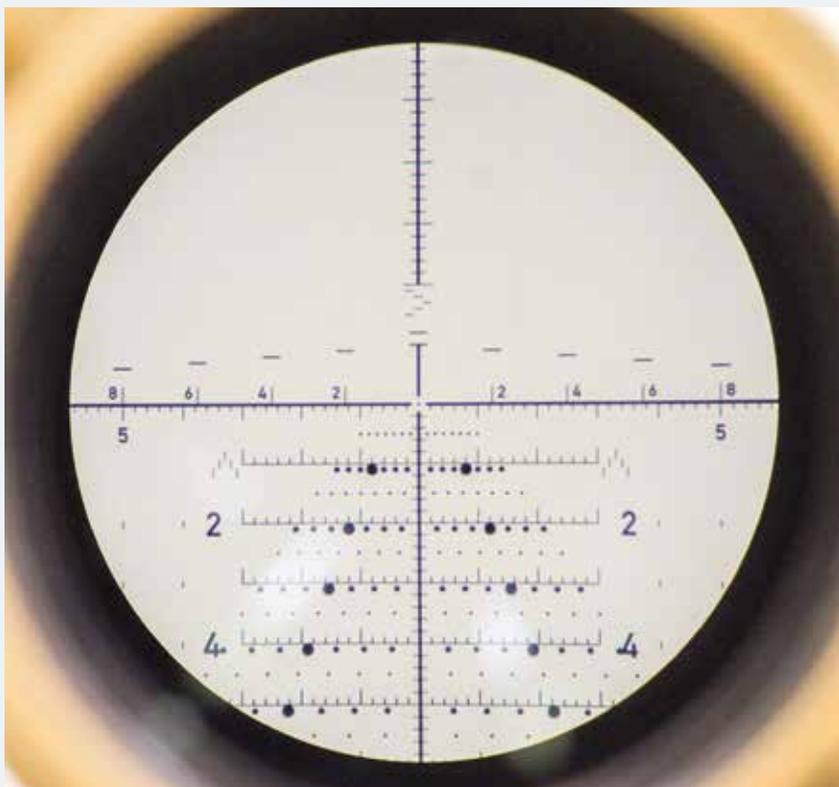
The ammunition contract to supply the Mk22 Mod 0 “ASR” program did not go to Black Hills; earlier this year it was awarded to Ultra Defense Corp. Ultra Defense, as contract holder, has awarded a subcontract to Capstone Precision Group for manufacturing the cartridges. Capstone will be assembling the cartridges from sub-contracted components—Capstone is the US sole distributor for Berger, Lapua, SK and Vihtavuori, among others. The single-year SOCOM agreement is for approximately 1 million rounds of ammunition: 800,000 rounds of .300 Norma Magnum with 215-grain OTM Hybrid Berger projectiles and Lapua-made cases. There will be 200,000 rounds of .338 Norma Magnum and 300-grain AP529 projectiles—both projectiles and cases are from Lapua, a NAMMO company, the AP529 is a NAMMO product and is NOT an OTMHC (Open Tip Match with a Hardened Core) as in numerous publications; it is an Armor Piercing Full Metal Jacket round with Tungsten Carbide Core. Excellent choice, in this author’s opinion, and more importantly the choice of the experts at SOCOM who exhaustively studied and fired tens of thousands of rounds. You can see the results on the targets later in this article. (Ultra Defense is sending **SADJ** some of the issue ammo for a separate test.)

Mechanically, the ATACR is precisely machined at every level. The turrets provide positive stops, very tactile. One excellent advantage is the ZeroStop™ feature. Once the operator has sighted in at a chosen range, the top (elevation) turret cover is removed, and the clutch system is bottomed out and locked at that sight-in, then the cover is replaced with the zero mark aligned. From then on, the operator can adjust elevation up and back down but not pass the ZeroStop, so it always bottoms out at the original chosen zero. This solves the “Where the heck was my Zero?” problem. Windage is not something that can have the ZeroStop, just the elevation.



Optically Speaking

The days of putting rounds on target with open sights are long in the past. I’m not saying that no one shoots open sights; most shooters



The TREMOR3 reticle came from Todd Hodnett's kitchen, where TREMOR5 is baking now. Todd was the 2017 GySgt. Carlos Hathcock Awardee from National Defense Industrial Association's Small Arms Committee. The award was for many things that helped the modern Sniper, and the TREMOR3 reticle tied to Horus was one of them. SOCOM snipers are highly trained and spend a lot of time learning ballistics, use of the reticle and shooting in diverse environments. This system is worthy of a full book and beyond this writer's capability. Honestly, we couldn't utilize its features except on a minor level. In the photo you see a magnified view at 35x on the FFP Nightforce, and the gradients stop at 5—on the full view, they go to 18. The wind dots are critical to faster shooting. We suggest a course with Todd at Accuracy 1st in Texas (accuracy1st.com).



Nightforce ATACR 7-35x56 F1

Magnification Range: 7-35x
Focal Plane: First Focal Plane (F1/FFP)
Body Tube Diameter: 34mm
Overall Length: 16.0in/406mm
Mounting Length: 6.6in/167mm
Weight: 39.3oz/1113g
Click Value: .1 MRAD (or on MOA, .250 MOA)
Internal Adjustment Range:
Elevation: 29 MRAD (100 MOA)
Windage: 17 MRAD (60 MOA)
Parallax Adjustment: 11yds-∞
Eye Relief: 3.6 in/91mm
Field of View:
7x: 15.0ft/5.0m
35x: 3.4ft/1.1m
Finish: Tan; hardcoat anodize
Exit Pupil: 7x: 6.0mm; 35x: 1.6mm
Illumination: N/A
Elevation Feature: ZeroStop™
Power Throw Lever: Standard



have favorite Garands or '03s they can ring a gong or cut an impressive group with. The fact is that in military and LE scenarios, accuracy is king, lives are on the line, and high grade optical sights, opto-electronics and the training to use them are the way to get there. The operator pulling the trigger and the chain of command up-hill have to answer for the accuracy of the shot and where the projectile lands, among other issues in this very complicated world.

The optic for the Mk22 PVPS (Precision Variable Power Scope) was not contracted with Barrett; but this is a system, and the chosen optic is a critical part of it. The Mk22 Optic contract was awarded to Nightforce® (nightforceoptics.com).

I should mention at first, that the Mk22 Mod 0 has a top rail slope of 10 Mil (ECP), and the DoD MRAD has a 20 MOA slope.

In that separate contract, SOCOM chose the Nightforce MIL-SPEC ATACR™ (Advanced TACTical Rifle) in two flavors, both with 34mm tubes and Horus Vision TREMOR3™ reticles in MRADs. The example sent to us for testing was the MIL-SPEC ATACR 7-35x56 F1 with custom mount. The other option SOCOM

chose is the MIL-SPEC ATACR 5-25x56 F1. "MIL-SPEC" indicates these scopes are not the commercial version of the ATACR; they must meet the MIL-SPEC.

While this author found shooting at 1,000 meters with the 35x was very helpful, the real end users generally only use the 25x level for engaging and having more field of view; the 35x end is used for observation.

Nightforce is well-known for the rock solid scopes they build—they're made to go in the field. The reticles chosen for the ASR are First Focal

Plane and of course etched on glass; as magnification is used the reticle will also be magnified. (The Second Focal Plane is behind the magnification lenses and stays at one grid size no matter the magnification—useful in some scenarios, but this author prefers FFP, target adjustments at range seem much more precise.) Nightforce optics are also well-known for their light transmission capability. Looking through a Nightforce optic is almost breathtaking in clarity; clearly this was a factor in SOCOM's choice of the optic. One bit of lore from the end users—highly trained snipers—many have told this author that at extended ranges the Nightforce scopes are decidedly better at seeing deeper "into" shadow areas compared to other scopes, a function of the NF lens treatment. This is very hard to quantify, but many end users swear by this.

The mount chosen is the Nightforce MIL-SPEC UltraMount with the RAP-I Laser Range-finder attachment bridge; a soft case is supplied. Nightforce supplies a tool kit for the Optic system, with some additional tools not in the ASR kit supplied by Barrett: Torque tools of 100 in-lb and 25 in-lb, as well as a T15 Torx head bit.



AML338 Suppressor

Caliber: .338 and less
Length: 9.90in (252mm)
Diameter: 1.75in (50mm)
Weight: 1.29lb (0.65kg)
Sound Reduction: -23-28 dB
Mount: Barrett® Muzzle Brake Adaptor



Note: The Nightforce MIL-SPEC ATACR described here was also selected for the US DoD MRAD in .300 PRC caliber.

The optic selected for the US Army PSR version of the MRAD was the Leupold Mark 5HD 5-25x56 with MIL Grid 4 Reticle.

Suppression

There are many considerations regarding suppressors for rifles; suppression of noise is not the only one. From the outset, SOCOM knew there would be a compromise on sound reduction for the 7.62 and .300 Norma Magnum calibers if they wanted one suppressor to use on all the calibers and barrels in the Mk22 Mod 0 system. Barrett's engineers knew this as well; the bore had to accommodate the largest diameter projectile. The alternative would be to carry two suppressors, but for the small decibel reduction gained, the weight gain to the system



The suppressor is supplied with an Armageddon™ Gear cover. This is very handy for removing suppressors that have been fired, but much more importantly the cover is to fight heat "mirage" above the suppressor. Suppressors are a heat sink by nature and produce shimmering distortion as they rise above the suppressor, in front of the scope. This distortion will absolutely interfere with your accuracy, and the Armageddon Gear Suppressor Mirage Cover will distinctly help to control that (armageddongear.com).



Barrett® Muzzle Brake Adaptor

would not be worth it. Thus, SOCOM chose one suppressor—the AML338. Barrett makes excellent suppressors, the AM series thread onto the outer section of the patented muzzle brake with the DC series being threaded directly to the barrel. Obviously, the AM series won out. The AML338 suppressor is on the Mk22. The DoD MRAD has the AM338. The main difference is that the AML338 has a secondary lock and of course the color; AML338 is Coyote, AM338 is FDE.

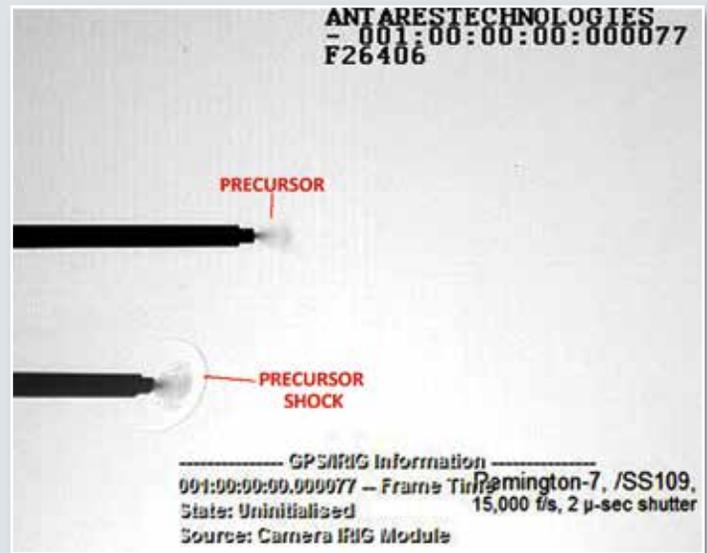
Each of the Mk22 barrel muzzle brakes has an identical diameter threaded outer section, and the muzzle brake is actually designed with being part of the entry chamber of the

suppressor in mind.

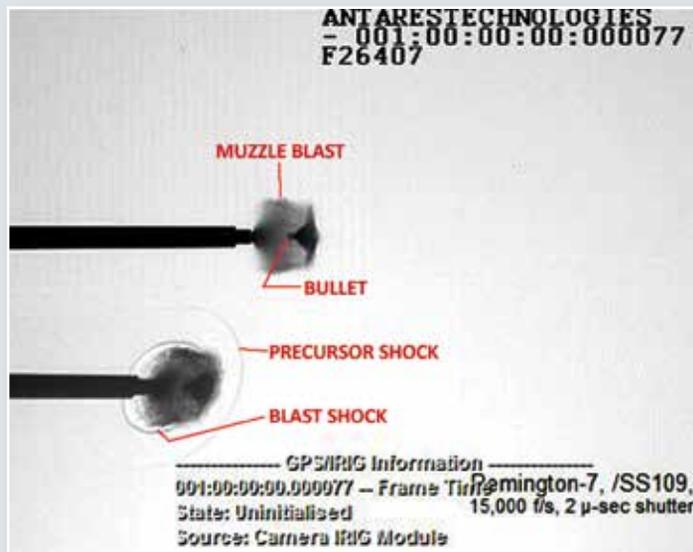
Where some loss of suppression occurs is that the AML338 has its bore diameter keyed to the .338-inch projectiles, and when the .308- or .300-inch (.300 Norma Magnum projectiles are actually a .308 diameter) projectiles are fired through, there is some blow-by that raises the decibel level. Honestly, to the ear it wasn't very noticeable when we changed calibers. Then again, all of us who were shooting have high frequency hearing loss so the only way to really quantify it was using a proper meter like a Larson Davis 800B, which we did not have, and Dr. Philip H. "Doc" Dater wasn't with us.

The Flash Study

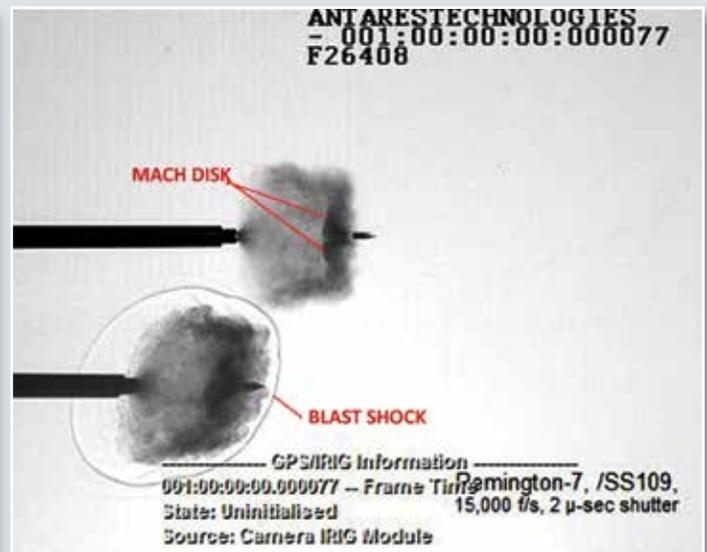
Per Doc Dater: "These were consecutive frames taken at 15,000 fps. The sun was just right so the lower image is a shadowgraph of the direct image above and better shows the shock waves. This series is used in my talk (with about eight other frames) as part of a flash study. The Mach disk is a high pressure, high temperature shock wave that actually ignites the carbon monoxide to make the fireball."



The precursor wave.



The blast that has outrun the bullet.



The bullet is now outrunning the rapidly slowing gas front.



Barrett manufactures the AML338 suppressor out of a high-strength Titanium alloy. They use modern CNC machining and orbital welders to keep the hoop strength with the lowest amount of material. Precision bore alignment maintains accuracy, reduces point of impact shift and aids in flash reduction.

During our firing, we found that almost all of the groups tightened up when we fired suppressed. This phenomena is frequently

observed in well-made, well-matched rifle systems. Doc Dater covers this in the Suppressor Class he teaches at Phoenix Defence, so I'm deferring to him on this:

This tightening up of a group happens the majority of the time as long as there is no misalignment. You also get a 20-50 ft/s velocity increase, not germane to this discussion. There are two factors in play. First is a change in barrel harmonics from the mass of the suppressor (and how tightly it is

screwed on). Second (and probably a greater effect) is that on uncorking, the gas has approximately twice the velocity of the projectile and rushes around the bullet which then has to traverse the various shock waves that can cause a little instability. The can shears off this gas in the entrance chamber much in the way muzzle brakes do. The gas loses velocity quickly as it interacts with the air. Look at the three high-speed photos from a 20-inch barreled .223 gun.



Our first day at the range was learning the rifle. Before we started, we knew the rifle was coming in from another tester, so we had to bring it all back to zero and learn it from the start. By the end of the morning, we were hitting not-so-impressive groups at 100 yards (left) and ringing the gong at 1,100 yards (right). Not time for serious shooting yet, time to study.

Range Day 1: Intro to the Mk22

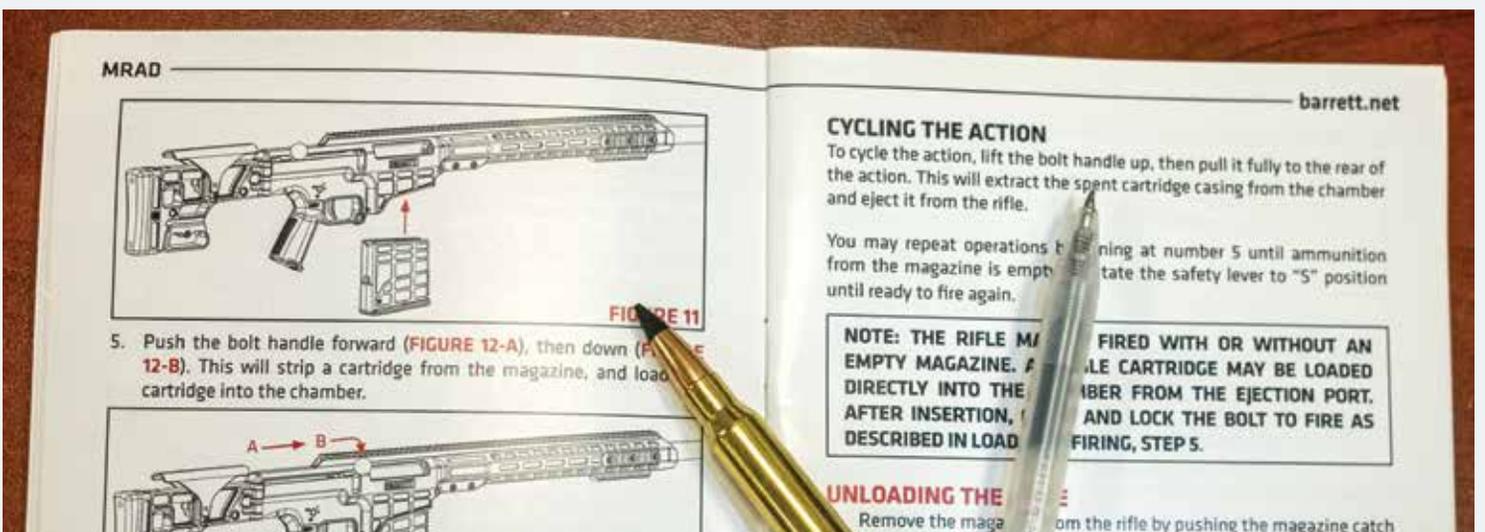
I've heard that government users have regularly seen groups in the sub-half minute range. Obviously, no one discusses the specifics of accuracy requirements or testing results other than what is put out publicly. Even if I knew, I would self-censor; we're talking about national defense. I will say, that our testing confirmed the rumors.

SADJ is a firearms magazine—our writers and almost all of the staff are shooters of

various levels and experience. Long-range shooting is a specific skill, and testing a rifle system like the Mk22 Mod 0 requires the person on the trigger to have the skill, not just be a "good shot." Dennis Powell, a well-known civilian accurate shooter, joined us at the range for 3 of our days, along with long-range shooter Harry Bovie, Chuck Bolding, who is highly respected in training circles, Damon Bolding, a gunsmith at Phoenix

Defence, and this author. Dennis was chosen by me to do the record shooting so I could hide my own deficiencies. We fired from bench; I did not want to get down and fire from "Rocking Horse Prone."

Our chosen range? Boulder Rifle & Pistol Club in the high desert near Boulder City, Nevada. Excellent ranges, good people (brpc1.org).



Range Day 2: Learning the Lessons

We went back to the shop at Phoenix Defence. We got out the manuals and filled in the blanks. This is a rifle, not a complex

space station or mega-computer; it is a rifle system, however, and it takes study, trial and error to learn to make all the compo-

ponents perform at top level. This was a very boring day with Lessons Learned and studied out.



7.62 BH 100 yards.



7.62 BH suppressed 100 yards.



7.62 RUAG AP 100 yards.



.300 NM BH 100 yards.



.300 NM BH suppressed 100 yards.



.300 NM Berger 100 yards.



.338 NM BH 100 yards.



.338 NM BH suppressed 100 yards.



.338 NM suppressed 100 yards.

Range Day 3: Printing Paper 100

After digesting the information for another week, it was back to the range. There were many sub-half-minute-of-an-

gle groups, the best being a .300 Norma Magnum Berger 215-grain from a suppressed rifle—this was center to center

under 0.3 inches. Very respectable group for Dennis. We now felt ready to take on the longer ranges.



Range Day 4: Long-Range Day

18 August 2020: Today was the day we'd been waiting for—we'd learned the system, and we were reaching out to 1,000-plus yards, for the record.

Conditions Day 4

Shooting times: 07:30–11:30

Pressure Hg: 27.66–27.71

Humidity: 22% down to 14% at 11:30

Wind: 5–8 MPH cross-range R-L

Temp: 96–110° F

Elevation: 2,450ft



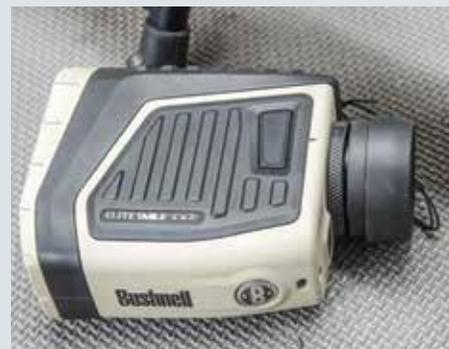
First, we started by painting the steel to ensure we weren't counting older hits on our groups.



From the targets at 980 yards looking toward the firing line. The small line of dots under the center cliff wall is the firing line.



Looking the other way—downrange at 980 yards.



Range measurements came from a Bushnell Elite 1 Mile ARC laser rangefinder.



By the end of the morning, we were feeling dialed in. Dennis fired this group at under 4 inches, two on top of each other, at 980 yards. This was with .300 Norma Magnum 215-grain, Black Hills ammunition. Firing was suppressed.



Damon Bolding spots for Dennis Powell and the Mk22 Mod 0 using the Vortex Razor HD 27-60x85mm spotting scope.

Vortex Razor Spotting Scope

Just as difficult as it is to be a sniper in the field without a spotter, it is the same at the range. Two sets of eyes work together and make the task quicker, and the feedback helps.

Vortex Optics has an excellent reputation; they gather light and give clarity that is at a top level. I'd honestly never looked through a spotting scope compared to this, too often the spotting scope is an afterthought on range day. Once you use the Razor® HD, and if you're a serious shooter or end user, there's no question of skimping on this essential tool again.

We had the availability of the Vortex Razor HD 27-60x85mm angled spotting scope with an MRAD reticle eyepiece. The reticle on the Vortex is MRAD, matching the MRAD system in the Mk22 optic. The Vortex has the ability to change to straight spotting with no reticle or to a reticle matching MOA if the optic being used is MOA. This is accomplished with an interchangeable eyepiece. Range can also be calculated easily with either reticle if there is an object of known dimensions in the field of view (vortexoptics.com).



Vortex Razor HD 27-60x85mm spotting scope with an MRAD reticle eyepiece.

MRAD vs. MOA? Without getting into a street fight like “9mm vs. .45ACP,” let’s keep it simple. SOCOM called for MRAD, and that’s what everyone is using. MOA is “Minute of Angle,” and old guys like your faithful correspondent usually use that. MOA is an angle measurement; in effect, 1 MOA at 100 yards is one inch. Take that to 1,000 yards, 1 MOA is 10 inches. MRAD stands for “Milliradians,” also a unit of measurement of angle. Lord help you if you have a scope in MRAD and other devices in MOA, you’ll be doing lots of unnecessary math in an already complex program such as long-range shooting. Both are based on the 360 degrees of a circle, and the discussed measurement is an arc that is a very small part of that circle when discussing accuracy in shooting. Without doing all the long division, at 1,000 meters, a one MOA click on your scope is 3.5 inches of adjustment on a target; and a one MRAD click on your scope is 3.9 inches. It makes a difference. Thus, if you’re using an MOA optic, make sure you have the MOA reticle eyepiece for your Razor HD spotting scope, and vice versa if you had the MRAD like we did in this test.

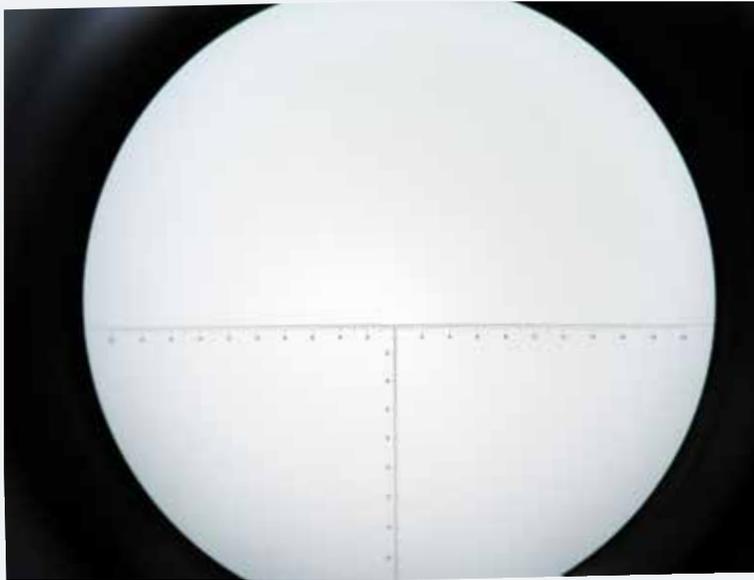
Vortex describes the Razor HD as having a “sophisticated triplet apochromatic lens system” and honestly, that’s a bunch of twenty-dollar words that don’t mean much to most people. Here’s basically what is being said: *Triplet* means there are three pieces of glass lined up; *apochromatic* means there isn’t any false color, shifting red and blue light to a different plane. Multiple lenses tend to shift colors and that has to be designed out. Thus, Vortex has the “sophisticated” job of getting three lenses to line up perfectly and stay there in long-term, rugged use, while keeping true color to the viewer’s eye—no small task with lens finish and refraction. This costs money, and the Razor HD is an expensive spotting scope, listing out at around \$1,900. If you’re a professional, this is short money for what you are getting. Color can make all the difference in identifying targets and non-targets.

We used the Vortex PRO GT tripod to mount the spotting scope. It has a balance weight hook to the center, strong, lightweight legs and a very steady panning head.

The Vortex Razor HD 27-60x85mm spotting scope is under testing with many special operations groups, and we know it is currently with the Scout Sniper Section of Panther Team JMRC Operations Group in Germany.

Tools and Changing Calibers

As all men-at-arms know, you need the kit for your weapons. Tools, cleaning kit, gauges, and in a soldier’s kit, what is there has to be carefully considered regarding need, bulk and, of course, weight. SOCOM specifies the TO&E (Table of Organization & Equipment) it wants. The Fix It Sticks Torque Limiters (store.fixitsticks.com) are gaining in popularity, and SOCOM as well as Barrett and Nightforce call for this product in



In the case of spotting scopes like the Razor HD, the reticle does not magnify and stays the same for any range. This is the MRAD reticle.



The Mk22 Mod 0 Tool Kit

- 140-in-lb miniature torque limiter
- 65-in-lb miniature torque limiter
- 45-in-lb miniature torque limiter
- 25-in-lb miniature torque limiter
- 15-in-lb miniature torque limiter
- T-Way T-Handle Wrench
- 8 different bits (IP30 Torx, IP27 Torx, IP25 Torx, 5/32-inch hex, 1/8-inch hex, 5/64-

- inch hex, 1/16-inch hex) **NOTE: The “IP” Torx are Torx PLUS!**
- ½-inch socket and ¼-inch bit adapter set
- Deluxe zippered pouch with 3x5-inch Velcro® and MOLLE rigging on reverse
- 3 long Tekton® punches (1/16 inch, 3/32 inch, 1/8 inch) replacement parts 66061, 66063 and 66064

the inch-pound (in-lb) requirements. With this system, there is no need for carrying a torque wrench, each needed setting has its own torque limiter, preset and marked. These fit into any standard ¼-inch driver, including the Fix It Sticks T-Way T-Handle that is supplied, and any standard ¼-inch bit fits into the receptor end. The torque limiter will spin once the correct

torque has been reached (within +/- 6%)—no over-torquing. Torque measurement is not required in removal, so no kit is needed for that (this is a measurement-only tool and not relevant here). I have not seen the Nightforce tool kit, but the Nightforce mount requires at least two things SOCOM did not dictate for Barrett’s contract: 100 in-lb torque limiter and a T15 Torx



bit—I’ve no idea if Torx or Torx PLUS. I do know there was room in the Barrett supplied kit, so I added them for our field work.

Speaking of the Torx head screws and bits in the Barrett-issue kit, these are not regular Torx bits; they are Torx PLUS, denoted by the “IP” in front of the size, “IP30” instead of “T30” on a regular Torx. You can strip the star heads out of the bolts if you don’t use the PLUS bits. The lobes of the star points are more square on the PLUS heads, stronger than standard Torx and can handle more torque IF you use the correct bit. As noted by your faithful correspondent over the decades, nothing ruins quality firearms like a large hammer and a small mind.

The only deficiency this writer saw in the kit was no “Snap Caps.” I like to train trigger release, and it’s not the healthiest thing for the firing pin to undergo unsupported release. If SOCOM wanted it, they would have specified and Barrett certainly could have provided. However, .300 and .338 Norma Magnum are not cartridges with COTS (Commercial Off-the-Shelf) snap cap availability. I used my standard A-Zone 7.62x51mm, but the .300 and .338 Norma Magnum cartridges have significantly shorter cases than .338 Lapua Magnum, and the bullets are seated deeper as well. The Norma cartridges have less taper, a slightly sharper shoulder and a slightly longer neck—once again, no COTS availability. I contacted the originator of the high-grade snap caps, Eric Kennard, from Harbour Arms. (harbourarms.com), and we discussed at length. I sent him some of the live rounds to work from, and within a few weeks he produced two of



Differences between the Torx family bits—for the MRAD/Mk22, you must use Torx PLUS “IP” bits, not regular Torx. *Left:* T25 Torx bit; *Right:* IP25 Torx PLUS bit.

each for our use. Perfect. The custom work cost more than the COTS products he sells for almost every sniper/precision caliber, but it’s worth it. As a side note, Harbour Arms is a Disabled-First-Responder-owned company. I forwarded his contact to Barrett and SOCOM; hopefully there’s some support there—it would be nice to see Eric and Cindy get a shot at supplying.

Headspace Gauges

There were no headspace gauges supplied. They’re not needed at the operator level according to doctrine, even with all the barrel changing inherent to the system. I used my Pacific Tool & Gauge headspace gauges, PTG worked with Jimmie Sloan on the chambers, and Barrett used JGS Precision chamber ream-



Snap Caps

ers and gauges. It became clear early on that the Barrett MRAD system is virtually perfect. Our confidence in properly installing barrels and bolt heads went up immediately; this is a very reliable system.

Cleaning: The Right Way



Top: Bolt, complete; Middle: Rear bolt guide (note the slot for charging handle rotation); Bottom: bolt guide.

Once the firearm is cleared, the upper receiver can be opened upward by pressing the release lever on the lower (note the silver lug). The bolt can then be removed to the rear, and the rear bolt guide and front bolt guide can be removed.



Two cleaning bore guides are supplied with O-rings for the chamber end; .30 and .338 caliber. These are inserted from the breech end after the bolt and bolt guides are removed. This allows the cleaning rod to be guided into the bore without damage, cleaning from the chamber end to the muzzle as it should be.

J. Dewey one-piece cleaning rod inserted into the bore guide during cleaning.



The Mk22 Mod 0 is supplied with an Otis-made cleaning kit, including various "ropes" and a multi-section brass rod.

Without doubt, the Otis system rules much of the military and LE cleaning products field. It's a good system; most are familiar with it. In the case of the Mk22, there are some additional items in the kit that facilitate the proper cleaning method for such a highly accurate sniper system.

Bolt Disassembly



Bolt properly assembled and in the cocked position (see arrow), taken from receiver, preparing for disassembly.



Rotate the cocking piece lever (see arrow) forward. Do not decock when apart!



Rotate the cocking piece shroud counterclockwise 120 degrees; it will click free and withdraw from the bolt body.



Bolt tube with bolt and firing pin assembly.



The bolt pin is pushed through—it can only go one way, *left*, and it is captured so it won't come out. When you reach the proper position, the bolt will come out forward, *right*. Reassembly is the reverse.





This is what the proper bolt assembly will look like before installing.



When returning the bolt into the bolt guide, it should look like this, smoothly sliding into position.



If you have the cocking piece shroud improperly positioned (as in decocked), it will look like this; and if you try to put it in more than once like this, look around to make sure no one is watching and mocking you, then fix it.

Changing Calibers



Changing calibers is a simple yet precise operation. The barrels and bolt heads will be engraved with their caliber—match them up. Remove the magazine then the bolt as above, and change out the bolt head to the new caliber.



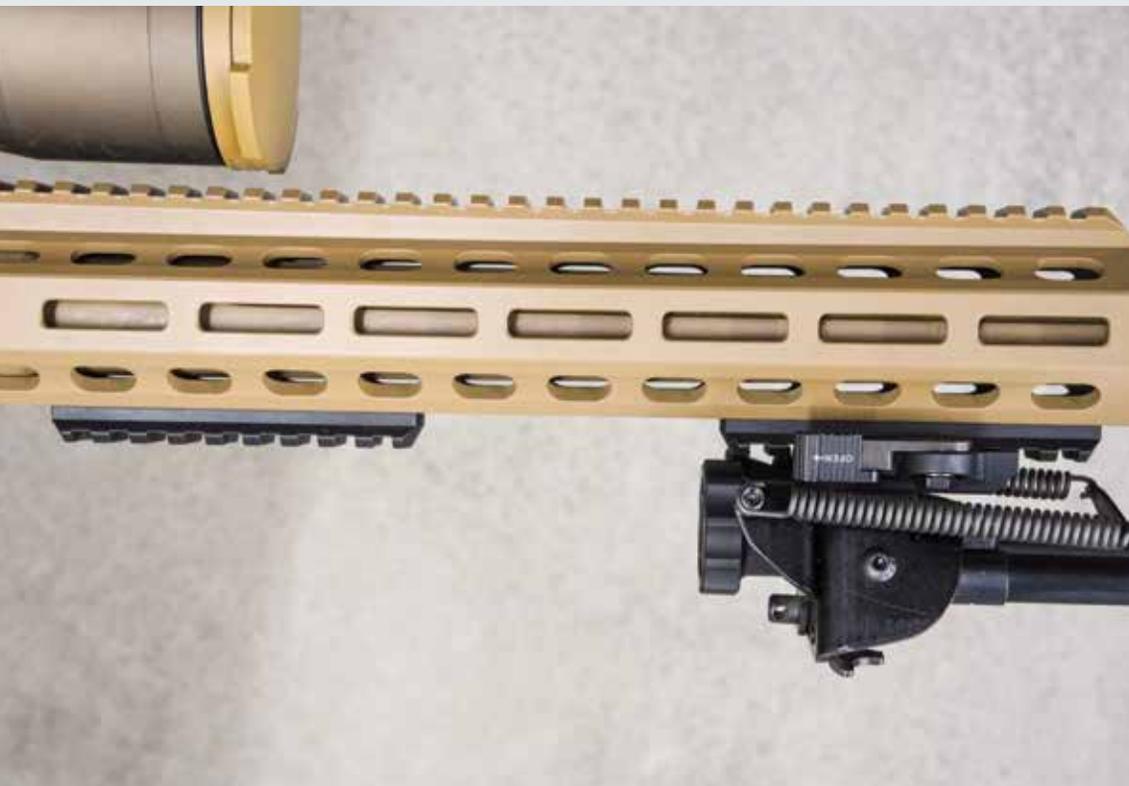
Unscrew the two barrel screws, but not completely. Remove the old barrel to the front and then slide in the new caliber barrel into the receiver; make sure the index pin at the top seats all the way. Starting with the rear screw, tighten the two barrel screws to 140 in-lb using the torque limiter marked for that and the T30 PLUS (IP30) bits. Be careful not to strip the screw heads. Assemble the firearm and ensure the bolt is properly rotating into position.

Changing Safety

The Mk22 Mod 0 has the same feature as the MRAD regarding the reversible safety selector. This is operator preference regarding safety manipulation. It's a quick change.



With the upper and lower opened, the selector, in this case on the right, is moved to the halfway position between "safe" and "fire." It will drop into a detent, enough to be felt. It is then pushed out to the selector side. Place it at the halfway position on the other side of the receiver and insert, then rotate to "safe."



Forward Handguard

The Mk22 features the same M-LOK systems as the MRAD at 3, 6, and 9 o'clock positions, and some short Picatinny-style rails are supplied. In this case, the Harris 6-9 inch bipod can be seen with the LaRue Tactical® adapter and the rotating cant knob (not lever).



Case & Carry Bag

I'm not sure if the system hard case was chosen by Barrett or SOCOM. In any event, the Pelican™ 1770 is perfect. The system is laid out where all parts can be easily gotten to—this is a full system “Overseas Case” for deploying. Pelican paved the way on heavy-duty rolling hard cases and wasn't afraid to work with the military. It's heavy, but it's not supposed to be dragged around in the field; it's supposed to protect the equipment and nest it so it's easy to visually ID a full system and choose needed components. The hard case is for the base camp (sorry, that's old-speak—for the FOB). The soft case is for the field.

Armageddon™ Gear was chosen for the soft case for the Mk22 Mod 0 as well as the

suppressor mirage cover. The stitching and bar-tack work are flawless. This is a very well-made case, and it is thought out for the end user, clearly by end users. The company's advertising has some braggadocio, and I was skeptical, then I looked this case over carefully. Damn. Will Sonnett (Walter Brennan in “The Guns of Will Sonnet”) used to say “... and I'm better than both of 'em—**no brag, just fact,**” referring to his sons and gunfighting. It's pretty clear that the Mk22 case is based off of Armageddon Gear's CSASS precision rifle case. To start with, that would be 1000D (Denier) CORDURA® fabric. Denier is the thickness of the textured nylon filaments used in the fabric. 1000D is very,

very durable, for heavy duty uses—most soft cases use 500D or less. Armageddon uses a fabric that is solution-dyed which guarantees a homogenous color, and since this is a low-IR signature finish, that will be homogenous also. I spent a couple hours exploring all the ways to use the case, what I could put where, set it up for backpack with the straps and tried it as a drag bag. I carried it slung and used it rocking horse prone to keep the sharp desert pebbles from causing my delicate constitution discomfort. Seriously, this is long-time gear, versatile and well thought out. Excellent choice by SOCOM and Barrett, Armageddon Gear: “No brag, just fact” (armageddongear.com).

In Conclusion

I'll keep it short and sweet. Barrett's MRAD as the Mk22 Mod 0 is absolutely deserving of the award they received. We fired a significant amount of ammunition, suppressed and unsupported; changed calibers out numerous times and went between 100 and 1,100 yards. All of us were impressed. I don't remember a discour-

aging comment, and as all shooters know, put a bunch of us together with a new system, and there will be grumping and carping. None at all with Mk22. SOCOM's due diligence in testing is clearly optimum; without seeing the inside of their thought process, it's clear the end results have paid off. From this humble correspondent's view, the end users and procurement testing

personnel at SOCOM have hit a clear home run with the Mk22 Mod 0 selection. I would bet that Barrett Firearms staff are proud of this (Nightforce as well!), and I would expect to see many follow-on contracts for this system by US end users, and especially the overseas SOF community taking advantage of the exhaustive testing done to adopt the Mk22. Bravo! **SADJ**

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The Mossberg® 1

A Bolt-Action
Variant for Every
Use and Taste

Story & Photography by Oleg Volk

The Mossberg MVP line of rifles was introduced in 2012. As of 2020, this innovative design has become available in .223 Remington, .224 Valkyrie, 6.5mm Creedmoor and .308 Winchester for a total of 17 variants. Available in light configurations for hunting, rugged and railed for defense, and

on a chassis for long-range precision, all these rifles have one thing in common: they feed from commonly available and easily loaded detachable double-stack, double-row feed box magazines. The .223 version uses AR-15-compatible magazines, while the 6.5 and .308 versions can use both AR-10 and M1A magazines.



The .223 MVP Thunder Ranch model, even suppressed and equipped with a LUCID Optics 4-16x scope, remains light enough for effective, unsupported firing.

MVP® Rifle Line

M1A magazines even latch with the same motion as AR-10 mags. This approach makes MVP rifles significantly easier to support than brands using proprietary feeding devices. The Mossberg rifles ship with compact 10-rounders, but the availability of larger magazines up to 150-round capacity (in .556) makes clip loading unnecessary. For practical field use,

20-rounders are most handy in all four calibers. AR magazines are helpfully affordable and lightweight. Feeding reliability has been 100% across all three Mossberg MVP rifles I've used, and no special effort is required to keep it that way. Running the bolt slower or faster made no difference. The mag release latch and the indentation for it are a bit on the

small side for thumbs or gloved fingers but not to the point of being a serious issue. Extended aftermarket release levers are available from Crosshair Precision.

MVP Bolt and Trigger

The bolt is a conventional two-lug design with fluting to resist fouling and environmental dirt. The bolt feels loose once unlocked,



An MVP LR with an AMTAC reflex suppressor add up to a very accurate and easy-to-shoot rig.

but that subjective perception doesn't affect accuracy. Practical accuracy with a moderate power scope and an average shooter like me hover around 1MOA with 168- and 175-grain match ammunition, around 2MOA with 150-grain hunting soft points and a little looser with various ball cartridges. At least with match ammunition, the marksman was the obvious limiting factor. A very nice 2.8-pound trigger helps to make the most of the theoretical precision available. The trigger may be adjusted more heavily up to 7 pounds by turning an internal screw for use with gloves. The safety is also conventional—a right-side push-lever with the forward position being



A fluted two-lug bolt is very tolerant of sand and dirt.



FIRE and back position being SAFE. The bolt can be cycled with the safety applied.

The MVP bolt has only moderate lateral support when at the rear-most point of its travel, so it wobbles a bit and makes the cycling less smooth than ideal. That and the generally bulky, rounded forms of the stocks make the rifles look and feel unrefined, but that feeling goes away as soon as range time begins. In actual use, MVP ergonomics proved superior to most other bolt actions. The stock shape combines with the thick recoil pad, making recoil very controllable even in the short Thunder Ranch model. The rifles are easy to shoot well, and I found myself going through a lot more ammunition than expected on every range trip.

MVP Barrels

MVP actions come pre-bedded on the same block that holds the magazine well. Barrels are free-floated. All models come with threaded muzzles: 1/2x28 in .223 and .224; 5/8x24 in 6.5 and .308. The stocks have separate studs for the front sling swivels and for bipods. This rifle series basically took all the items from my “must-have” list for modern bolt action and checked them.

The .223 Thunder Ranch model uses a medium, fluted 20-inch barrel. The model set up, which had a LUCID Optics 4-16x scope and a sound suppressor, proved not only accurate in experienced hands but was an effective teaching tool for a brand new shooter. After stepping up from rimfire, our Australian visitor was able to hit pop cans at 75 yards ... that’s no small feat for the first day behind the gun. By mere chance, 77-grain match ammunition and 55-grain ball trajectories match up almost exactly at 100 yards, so they can be used for training and range demonstrations fairly inexpensively. True to its Thunder Ranch heritage, the gun is light enough for off-hand deployment and is accurate enough while supported for precision at long range. Thanks to free-floating, the barrel wasn’t deflected by a tight hasty sling. The 75- to 77-grain match ammunition from SIG SAUER and PRIME shot slightly under an inch, and the 69-grain Federal Premium® Gold Match shot around 1.1 inches consistently.

The .308 Thunder Ranch model mounts a shorter, 16-inch fluted barrel equipped with open sights. Meant for such uses as brush hunting and short-range sniping, this rifle handles well at speed and settled down comfortably on a bipod or sandbags. Recoil, while more pronounced than with the .223, is far from distracting. I have not tested this rifle for accuracy quite as extensively, mainly because the other .308, the 20-inch Long Range (LR) model, got all of my attention. The Thunder Ranch gun is amazing inside of 100 yards and is handy and easy to use even with the open sights. The extra 4 inches of barrel length combined with the AMTAC reflex sound suppressor

Box magazines are easier to handle with gloved hands than individual cartridges.



The MVP Long Range .308 model with a Meopta 6-24x scope and HPS 175-grain match ammunition—an MOA combination.



made the longer variant much easier to shoot, with less blast and recoil. While the rifle looks very compact, the full-length barrel and the all-steel sound suppressor add up to a hefty package; though not as easily hand-holdable with my strength level. For distances beyond 100 yards, the LR rifle is a clear win, being both steadier and possessing an adjustable cheek rest for centering the eye behind large-diameter scopes. Inside of 100, which, incidentally, includes the overwhelming majority of police sniping and defensive uses, the Thunder Ranch variant with a low-power scope would be superior.

Testing

The 175-grain High Precision Range (HPR), SIG SAUER, PRIME and Federal Premium match ammunition printed around an inch at 100 yards: my variations from string to string revealed no clear superiority of any one load over the others. The 168-grain Magtech® and 175-grain PPU Match, as well as the 165-grain Federal Fusion® printed in the 1.75MOA to 2MOA. Between the hefty barrel and the braking effect of the sound suppressor, the recoil could be described as mild, to the point where even an inexperienced shooter could try the gun without risk of bruising.

While Mossberg MVPs come in a bewildering variety of configurations, only one of them puzzled me: the .308 Scout. Equipped with a long eye relief scope mounted on an extended rail, it still cannot be loaded with stripper clips due to the Picatinny rail being in the way. It's also entirely unnecessary with the removable box magazine. The Scout's extended rail,



M1A magazines fit well and lock in with straight insertion. The magazine latch relief is a bit shallow for gloved hands.



however, would work very well with a thermal or night vision optic mounted in tandem with a daylight scope.

Value

Depending on the configuration, Mossberg MVP rifles retail from the mid-\$500s to about twice that amount. In my experience, their con-

sistent performance as multi-role arms makes them a good value. At range events, they are among the most popular rifles with people who have tried everything on the table. **SADJ**

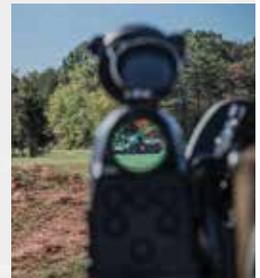


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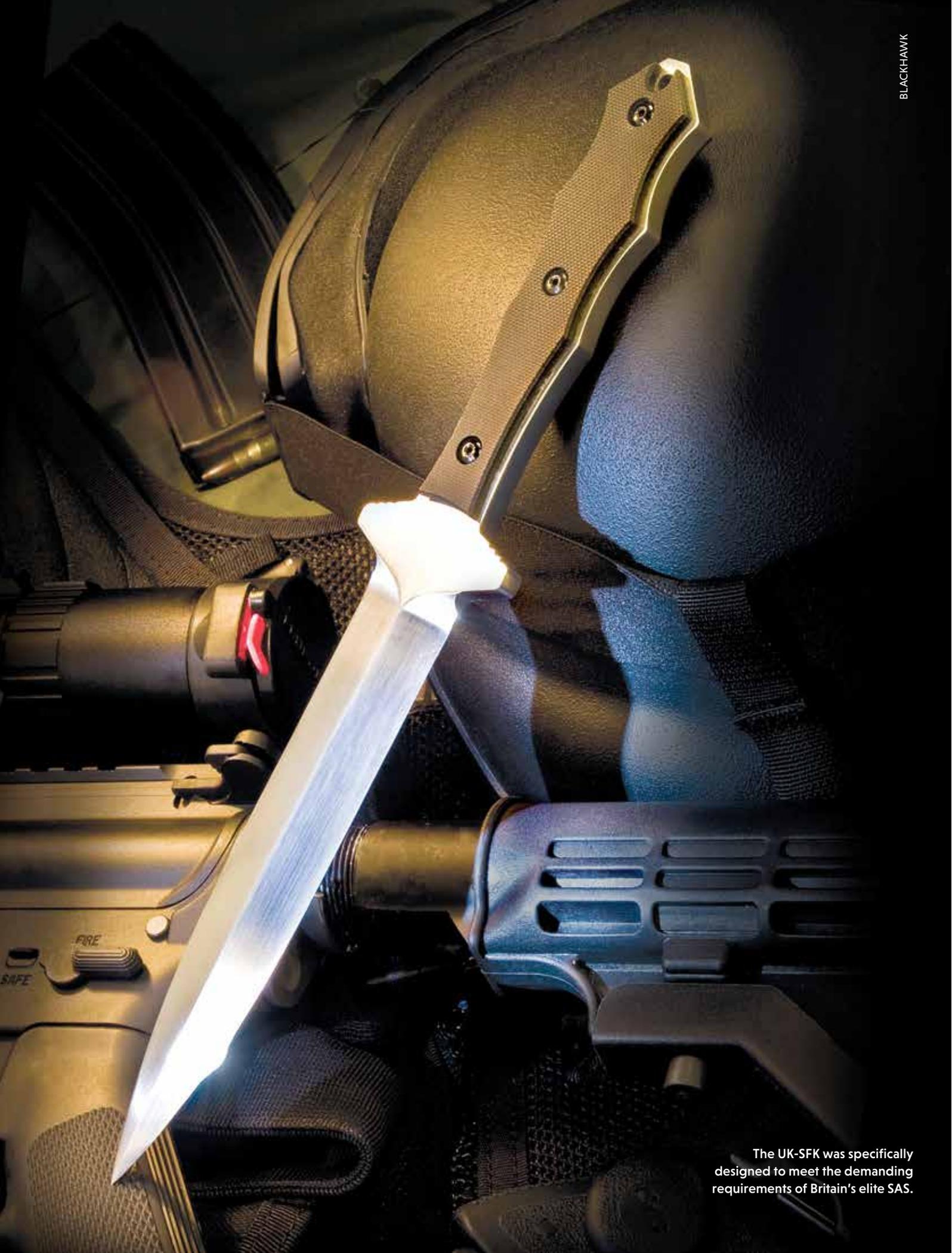
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The UK-SFK was specifically designed to meet the demanding requirements of Britain's elite SAS.



The SAS Combat Dagger

The Untold Story

of the UK-SFK

By Michael Janich

The Fairbairn-Sykes Commando dagger is one of the most iconic fighting knives ever created.

Co-designed by British close-combat pioneers W.E. Fairbairn and E.A. Sykes for issue to England's elite Commando forces during World War II, the "F-S" was also the inspiration for the signature daggers of the Office of Strategic Services (OSS), the U.S. Marine Corps Raiders and, to a degree, the V-42 Stiletto of the First Special Service Force (FSSF), aka the "Devil's Brigade."

Despite its legendary status, as a functional weapon, the F-S left a lot to be desired.

Even before the end of World War II, its faults were well-known, prompting Fairbairn to collaborate on an improved, combat dagger

design with American close-combat authority Col. Rex Applegate. Ultimately, the War ended before that design could be produced, and the F-S remained in service with many units for decades afterward.

Perhaps the most significant unit to continue its loyalty to the F-S design was the storied British Special Air Service (SAS). Although they honored the tradition of the F-S dagger for half a century after WWII, by the mid-2000s, they began looking for a more combat-worthy replacement.

The SAS began their quest by contacting Edgar Brothers, a UK-based distributor with strong ties in the tactical community. Edgar Brothers, in turn, contacted this author. At that time, I was the brand manager, Subject

Matter Expert and product designer for BlackHawk Products Group's knife brands. I was also teaching my own system of knife tactics, Martial Blade Concepts (MBC), as a side business. The Edgar Brothers representatives explained what their client was looking for and asked if any of BlackHawk's off-the-shelf products satisfied those needs. I responded by walking them through features of the two knives that came closest—the XSF-1 dagger, designed by Canadian knifemaker and Special Forces veteran Brent Beshara, and the Nightwing, designed by renowned custom knife maker Allen Elishewitz. I also provided them with several T&E samples of each to take back to the SAS for testing.

Several months later, the Edgar Brothers

Two versions of the UK-SFK were made: a satin-finished presentation model and a field model with a non-reflective, black, epoxy powder coat finish. Both were beautifully crafted from D2 tool steel.



ers reps visited again. They explained that, although the SAS testers were impressed with both designs, neither was exactly what they wanted. What they *really* wanted was for me to design—and BlackHawk to manufacture—a

completely new knife that outperformed the F-S dagger in every way but still had the historical depth to be a worthy symbol for such an elite unit. Needless to say, that was a daunting but exciting challenge.

The Design Process

Based on the feedback Edgar Brothers received from the SAS T&E, they liked the handle ergonomics, integral double guard, extreme strength and overall balance of the BESH XSF-1.



A closer look at the laser-engraved SAS logo on the presentation prototype. This version was made only for the unit and was not commercially available.

Although they respected the strength of its triple-edged BESH Wedge® blade geometry, they wanted better cutting performance and the classic double-edged symmetry of the F-S-style dagger, but without any of its inherent weaknesses. They also expressed a dislike of edge serrations, as they could not be easily sharpened easily in the field.

The SAS also wanted the new design to serve as both a true close-combat weapon and cutting tool, and as a unit icon. To that end, they wanted two versions: one with a non-reflective finish and a satin- or mirror-finished presentation version. They did not specify a blade steel but emphasized that it should be tough enough to withstand the rigors of close combat and capable of taking and holding an excellent edge.

In addition to the parameters of the knife itself, the SAS also identified specific requirements for the sheath. First on that list was a positive retention function that operated with the same motion as BlackHawk's SERPA pistol holster, which was one of their preferred pieces of kit at the time. They typically mounted their holsters high on the chest, attached to MOLLE-style body armor, and did not want to sacrifice real estate that could be used for more important items like mag pouches. Ideally, the SAS wanted the knife's draw to be analogous to that of the pistol, yet still allow the sheath to be mounted in more conventional carry



The UK-SFK compared to its traditional predecessor, the revered Fairbairn-Sykes Commando dagger. The F-S version shown here is a late-pattern presentation model made for the 22nd SAS. It is shown with a special original prototype of the UK-SFK presentation model, laser-engraved with the SAS unit badge. The serial number "B22" was a "sample" number used for placement only. The "B" represents "BlackHawk" and "22" the 22nd SAS.

positions as well.

Design Logic

With the SAS-defined parameters in mind, the author started with the handle and integral guard of Brent Beshara's XSF-1 design. Its full-tang construction gives it exceptional strength and provides better ergonomics and

tactile orientation than the round cross section of the F-S. It also had the right "pedigree." In addition to his knifemaking prowess, Brent Beshara (aka "Besh") is a distinguished Canadian military veteran who served as a Clearance Diver, a bomb disposal operator and instructor, and a member of Canada's elite Joint Task Force 2 (JTF-2). He and other



The handle of the UK-SFK was taken directly from the XSF-1—a unique combat dagger designed by Canadian Special Forces veteran and custom knifemaker Brent Beshara. Shown here is Beshara's handmade XSF-1 prototype that served as the basis for the BlackHawk/Masters of Defense production knife.

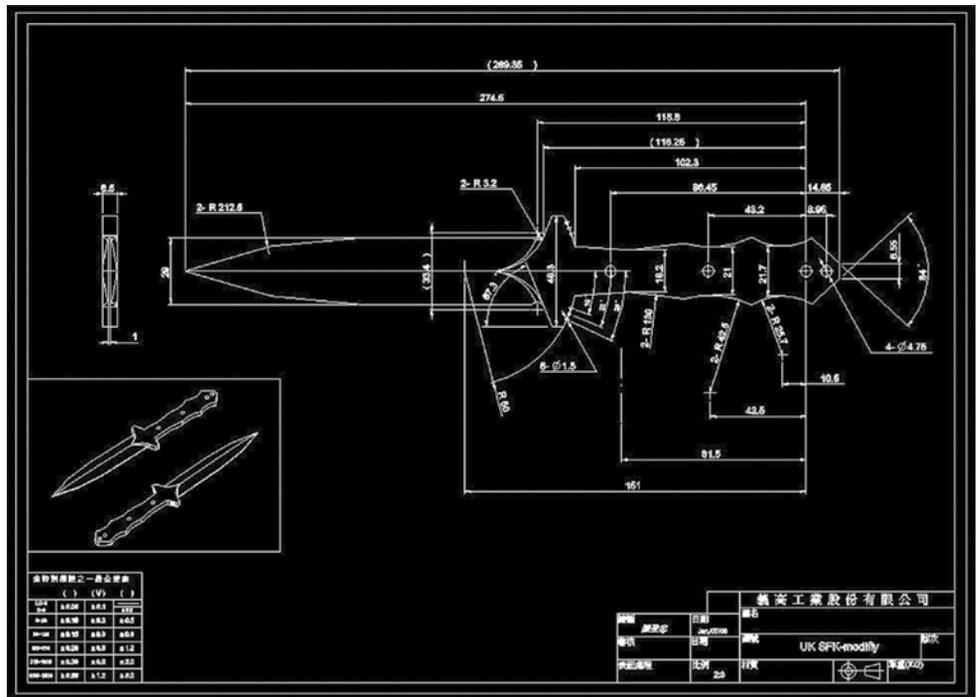
members of JTF-2 also carried custom-made XSF-1 daggers during multiple deployments in Afghanistan.

For the dagger's blade design, I revisited the work that Fairbairn and Col. Rex Applegate (one of my mentors) did near the end of WWII. Their design, which Col. Applegate later released as the Applegate-Fairbairn dagger, has a broader, more robust blade with excellent edge geometry for a dagger. As far as pedigree goes, it couldn't possibly get any better.

After a few preliminary sketches, I produced a full-scale machinist's drawing of my design and modeled it in oak to fine-tune its ergonomics. As soon as Edgar Brothers' SAS contacts put that model in their hands, it was approved and BlackHawk's manufacturer in Taiwan began working on prototypes while I tackled the sheath design. Starting with a collection of BlackHawk's various MOLLE and drop-leg platforms and a stack of Kydex®, I gradually dialed in a sheath design that met all the defined criteria. A simple integral "tab" that springs up behind the knife's guard solved the passive retention and SERPA-like draw questions. Two sets of mounting plates attached with Chicago screws allowed both vertical and horizontal mounting on MOLLE and included holes carefully spaced to accommodate all of BlackHawk's off-the-shelf belt and drop-leg hardware.

Finished Product

Officially christened the "UK-SFK" (United Kingdom Special Forces Knife), the dagger was crafted from tough D2 tool steel with beautifully "zero-ground" flat bevels for outstanding edge geometry. The presentation version featured a handsome satin finish,



The original mechanical drawing of the UK-SFK.

while the "field" version boasted a stealthy black epoxy powder coat finish. The handle scales were peel-ply-textured G-10, a fiberglass/epoxy laminate.

The first production run of the UK-SFK was made exclusively for the British Ministry of Defense and shipped to the UK directly from Taiwan. Those knives did not include a country-of-origin marking on the blade. The second production run for BlackHawk's sale into the commercial market was shipped to the U.S. and included a "Taiwan" marking on the blade.

To my knowledge, the UK-SFK was issued, as planned, to the SAS and Special Boat Service (SBS) and is still in active service. Sadly, BlackHawk later lost interest in the knife market, and the design has been discontinued. Nevertheless, I am extremely proud of the part I played in creating this remarkable knife for some of the world's most elite warriors. **SADJ**

• • •

Editor's Note: We spoke with Mike Newman who was the PM at Edgar Brothers, and he verified that, indeed, the SAS and SBS had these as issued, and all parties are very pleased.



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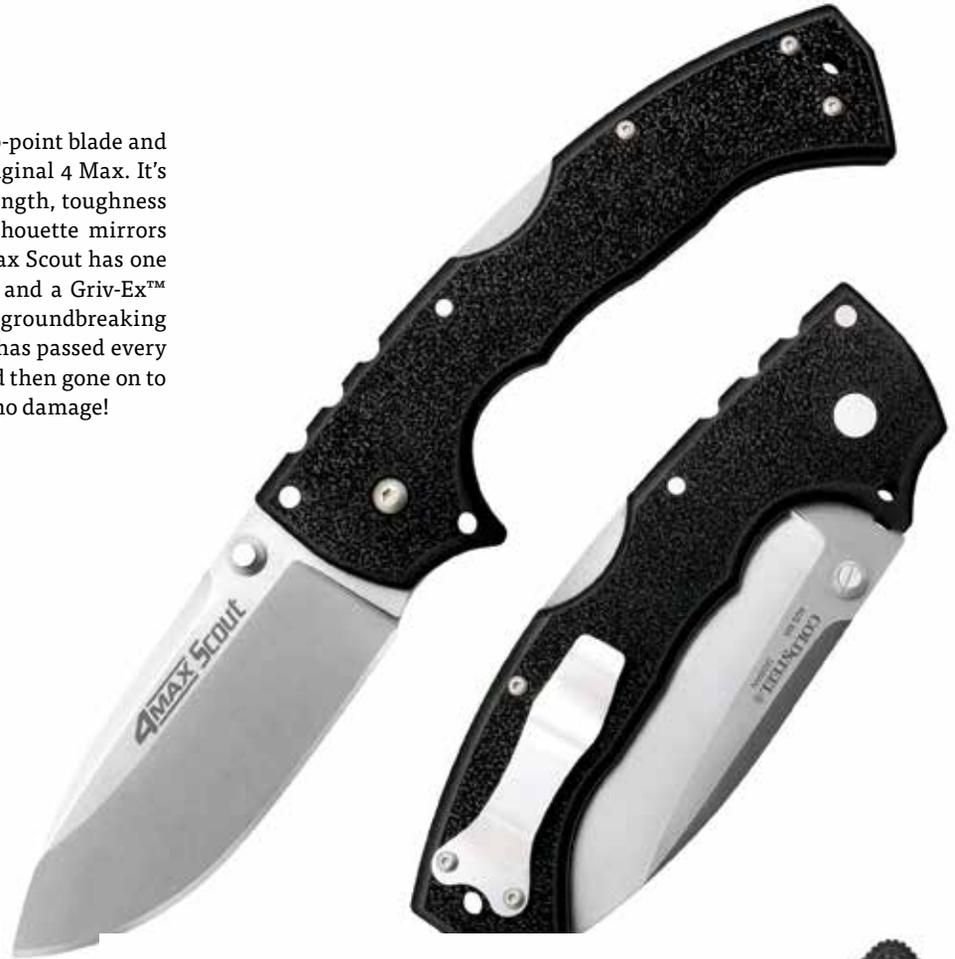
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4 MAX Scout

The **4 Max Scout** features an extra wide, drop-point blade and stonewash finish, which is identical to the original 4 Max. It's crafted from 5mm thick AUS10A steel for strength, toughness and edge holding potential. The handle's silhouette mirrors the original. Instead of a G10 handle, the 4 Max Scout has one made of Griv-Ex™ with stainless steel liners and a Griv-Ex™ back spacer. Equipped with Andrew Demko's groundbreaking Tri-Ad® locking mechanism, the 4 Max Scout has passed every one of our grueling shock and impact tests and then gone on to hold 600 pounds of free-hanging weight with no damage!

coldsteel.com

OVERALL LENGTH: 10in
 CLOSED LENGTH: 6in
 BLADE THICKNESS: 4.8mm
 BLADE LENGTH: 4in
 EDGE LENGTH: 4in
 EDGE CONFIGURATION: Plain
 HANDLE: Griv-Ex™
 STEEL: Japanese AUS10A
 WEIGHT: 10.2oz
 CLIP POSITION: Ambidextrous
 GRIND: Flat
 LOCK TYPE: Tri-Ad® lock
 BLADE STYLE: Drop point



COLD STEEL, INC.

SRK®

The **SRK®** in San Mai® features a tremendously strong clip point blade that's fine enough for delicate work, yet possesses enough belly for efficient cutting, slashing and skinning strokes as well. At 3/16 of an inch thick, the SRK offers the sturdiest possible point and edge configuration, without sacrificing sharpness. The SRK's handle sports a single quillon finger guard and a deeply checkered Kray-Ex® grip. If you want a reasonably priced, reliable knife, check out Cold Steel's SRK.

coldsteel.com

OVERALL LENGTH: 10.75in
 BLADE THICKNESS: 5mm
 BLADE LENGTH: 6in
 EDGE LENGTH: 6in
 EDGE CONFIGURATION: Plain
 HANDLE: Kray-Ex™
 STEEL: Japanese VG10 San Mai®
 WEIGHT: 7.8oz
 CLIP POSITION: N/A
 GRIND: Hollow
 BLADE STYLE: Clip point
 SHEATH MATERIAL: Secure-Ex™
 MOUNTING HARDWARE: N/A
 TOTAL WEIGHT OF KNIFE AND SHEATH: 11.1oz





DOUBLESTAR BLADES

Ahab-X

Inspired by the epic characters written in Herman Melville's novel, *Moby Dick*, the **Ahab-X** was built to empower law enforcement officers to hunt down wickedness with all the tenacity of the Captain himself. This everyday carry was designed to be discrete and compact without sacrificing relevance. Elements like the oversized ring and precision

thumb break provide the best amount of retention for quick deployment. The Ahab-X's strong, lightweight construction makes it a great duty belt utility that will be there when you need it.

doublestarusa.com

OVERALL LENGTH: 5.5in
BLADE THICKNESS: .175in
BLADE LENGTH: 3.33in
EDGE LENGTH: 3.20in
EDGE CONFIGURATION: Plain

HANDLE: .125in Medium-textured G10
STEEL: SK5
WEIGHT: 3.8oz
CLIP POSITION: Dynamic and modular clip options
GRIND: Flat

BLADE STYLE: Traditional Tanto
SHEATH MATERIAL: Injection-molded
MOUNTING HARDWARE: Button head screw/rubber washers/T-nuts
TOTAL WEIGHT OF KNIFE AND SHEATH: 4.7oz



DOUBLESTAR BLADES

Lite-Fighter-X

Born from the theater of war and designed by an experienced soldier, Darrin Sirois, the **Lite-Fighter-X** is a "tactical fighter" ready to take on any mission. A 10-inch Flat grind leads the knife's edge with a harpoon-style upper spine wedged and optimized for entrance and exit

wounds. The deep thumb grooves are precisely placed for a positive, friction-free grip when it matters. The handle is skeletonized to create a well-balanced knife.

doublestarusa.com

OVERALL LENGTH: 9.5in
BLADE THICKNESS: .194in
BLADE LENGTH: 4.56in
EDGE LENGTH: 4.88in
EDGE CONFIGURATION: Plain

HANDLE: .125in course-textured G10
STEEL: Nitro-V
WEIGHT: 8.9oz
CLIP POSITION: Dynamic and modular clip options
GRIND: Flat

BLADE STYLE: Straight back with medium belly
SHEATH MATERIAL: Thermoplastic
MOUNTING HARDWARE: Button head screw/rubber washers/T-nuts
TOTAL WEIGHT OF KNIFE AND SHEATH: 10.6oz

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EMERSON KNIVES, INC.

Mini CQC-7BW Flipper

Emerson Knives has now given the flipper treatment to the pocket-friendly version of the acclaimed Emerson CQC-7. Now featuring a flipper tab and a ball-bearing pivot system, the **Mini CQC-7BW Flipper** glides open with ease and locks with a satisfying click.

emersonknives.com

OVERALL LENGTH: 7.2in
 CLOSED LENGTH: 4.2in
 BLADE THICKNESS: .125in
 BLADE LENGTH: 2.9in
 EDGE LENGTH: 2.9in
 EDGE CONFIGURATION: Plain/serrated, Stone-wash/Black finish

HANDLE: G10
 STEEL: 154CM
 WEIGHT: 4oz
 CLIP POSITION: Tip-up carry
 GRIND: Chisel
 LOCK TYPE: Liner lock
 BLADE STYLE: Tanto



EMERSON KNIVES, INC.

Mini Sheepdog

A knife is a guardian and protector. When a knife is the tool you need, the **Mini Sheepdog** will never let you down. For work, for adventure, for

emergencies and for protection, the Mini Sheepdog is man's best friend. emersonknives.com

OVERALL LENGTH: 7.1in
 CLOSED LENGTH: 4.1in
 BLADE THICKNESS: .125in
 BLADE LENGTH: 3.0in
 EDGE LENGTH: 3.0in

EDGE CONFIGURATION: Plain/serrated, Stone-wash/Black finish
 HANDLE: G10
 STEEL: 154CM
 WEIGHT: 4.8oz

CLIP POSITION: Tip-up carry
 GRIND: Conventional V
 LOCK TYPE: Liner lock
 BLADE STYLE: Spear point or Bowie



GERBER

Propel Downrange AO

Developed to serve military and law enforcement, the **Propel Downrange AO** is a tactical addition you can rely on. Gerber's premium design offers a stealth black oxide S30V steel blade, a grippy G10 han-

dle and an innovative blade deployment keeping safety front of mind. gerbergear.com

OVERALL LENGTH: 8.5in
CLOSED LENGTH: 5in
BLADE THICKNESS: 0.12in
BLADE LENGTH: 3.5in
EDGE LENGTH: 3.25in/SE

EDGE CONFIGURATION: Combination—partially serrated
HANDLE: Black G10
STEEL: Premium S30V
WEIGHT: 5oz
CLIP POSITION: Adjustable three-position

GRIND: Flat
LOCK TYPE: Plunge lock and safety switch
BLADE STYLE: Full-size Tanto



GERBER

StrongArm

With a full tang, 420HC steel blade and rubberized diamond-texture grip, the **StrongArm** is a knife you can rely on. The MOLLE-compatible, multi-mount sheath system offers optimal customization, keeping your knife ever at the ready in combat situations. gerbergear.com

OVERALL LENGTH: 9.8in
BLADE THICKNESS: 0.19in
BLADE LENGTH: 4.8in
EDGE LENGTH: 4.25in/FE; 4.50in/SE
EDGE CONFIGURATION: Combo edge
HANDLE: Rubberized diamond-texture grip; glass-filled nylon with rubber overmold
STEEL: 420HC
WEIGHT: 7.2oz

CLIP POSITION: None
GRIND: Flat
BLADE STYLE: Full tang
SHEATH MATERIAL: Versatile modular sheath system, MOLLE
MOUNTING HARDWARE: Detachable belt hoops for horizontal belt carry
TOTAL WEIGHT OF KNIFE AND SHEATH: 10.9oz

EDITORIAL SPECIAL: SPECIAL OPS FIXED & FOLDING KNIVES



MEDFORD KNIFE & TOOL

Gentleman Jack Slip Joint

The **Gentleman Jack Slip Joint** is another first for Medford Knife & Tool and is a new breed of the ubiquitous gentleman's folder. It's a titanium slip joint with all the usefulness, elegance and build quality you

OVERALL LENGTH: 7in

CLOSED LENGTH: 4in

BLADE THICKNESS: .125in

BLADE WIDTH: 3/4in

HANDLE THICKNESS: .125in

BLADE LENGTH: 3.1in

EDGE LENGTH: 2.9in

EDGE CONFIGURATION: Most acute hand-polished for a face razor sharp keenness

have come to expect. Launching exclusively in three configurations. medfordknife.com

HANDLE: Titanium

STEEL: CPM S35VN

WEIGHT: 2.9oz

CLIP POSITION: N/A

GRIND: Drop point

LOCK TYPE: Slip joint

BLADE STYLE: Waterfall nail nick



MEDFORD KNIFE & TOOL

Praetorian Swift FL

The **Praetorian Swift FL** has a hybrid aluminum handle, titanium spring and MKTech™ SS dual race, 18-bearing pivot frame lock.

medfordknife.com

OVERALL LENGTH: 7 11/16in

CLOSED LENGTH: 4 3/8in

BLADE THICKNESS: .150in

BLADE WIDTH: 3/4in

HANDLE THICKNESS: .190in

BLADE LENGTH: 3 3/8in

EDGE LENGTH: 3 1/4in

EDGE CONFIGURATION: Acute hand-polished

HANDLE: Aluminum and titanium

STEEL: CPM S35VN

WEIGHT: 4.5oz

CLIP POSITION: Spring top tip-up

GRIND: Tanto or drop point

LOCK TYPE: Frame lock

BLADE STYLE: Fuller groove



SPARTAN BLADES

Damysus

In Greek mythology, Damysus was the fastest of all the giants. This hefty same-named blade is designed to perform as an all-around combat/utility knife. Its straight edge and strong point combined with a full tang and Canvas Micarta® scales ensure the **Damysus**

will perform the most demanding tasks. If tip strength is what you are looking for, consider this knife. Made in collaboration with KA-BAR® Knives. **spartanbladesusa.com**

OVERALL LENGTH: 10 3/4in
BLADE THICKNESS: 3/16in
BLADE LENGTH: 6in
EDGE LENGTH: 5 1/2in
EDGE CONFIGURATION: Plain

HANDLE: Black or green CE Canvas Micarta®
STEEL: 1095 CRO-VAN
WEIGHT: 9oz
GRIND: Flat saber
BLADE STYLE: Drop point

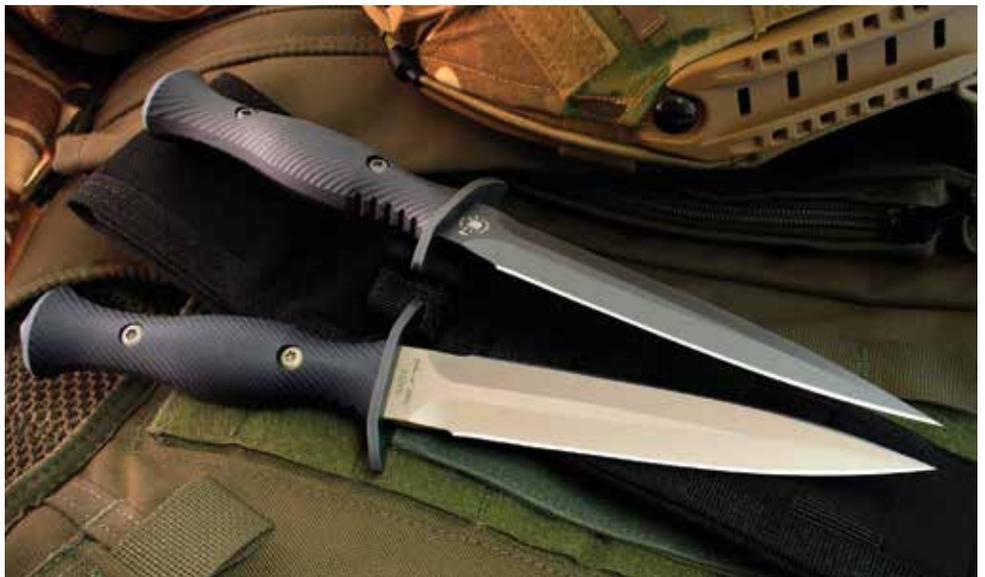
SHEATH MATERIAL: Injection-molded sheath with active retention thumb lever
MOUNTING HARDWARE: MOLLE and TECH-LOK-compatible
TOTAL WEIGHT OF KNIFE AND SHEATH: 14.7oz

SPARTAN BLADES

Spartan-Harsey Dagger

Designed by prolific knife designer William W. Harsey, Jr., the **Spartan-Harsey Dagger** was designed to be a combat dagger. Its timeless design is matched only by the use of premium U.S. materials which include: S35VN with excellent vacuum heat treatment with double-deep cryogenic treatment and pressure tempering; full tang construction; and a 3D-contoured Canvas Micarta® handle, textured for excellent grip. These features combined with its beautiful design makes for a knife that will most assuredly become an American classic.

spartanbladesusa.com



OVERALL LENGTH: 10 3/4in
BLADE THICKNESS: 3/16in
BLADE LENGTH: 6in
EDGE LENGTH: 5 1/4in
EDGE CONFIGURATION: Plain

HANDLE: 3D-contoured double Black CE Canvas Micarta®
STEEL: CPM S35VN (double deep cryogenic treatment)
WEIGHT: 6.72oz
GRIND: Hollow
BLADE STYLE: Double-edged dagger

SHEATH MATERIAL: Kydex® or leather
MOUNTING HARDWARE: MOLLE and TECH-LOK-compatible
TOTAL WEIGHT OF KNIFE AND SHEATH: 11.456oz

EDITORIAL SPECIAL: SPECIAL OPS FIXED & FOLDING KNIVES

SPYDERCO

Canis™

Designed by special operations veteran and close-combat expert Kelly McCann, the **Canis** is a no-nonsense folding knife optimized for personal protection. Its dramatic blade profile maximizes cutting power and tip strength and is paired with a high-strength Compression Lock®, carbon fiber/G10 scales and a fully configurable four-position pocket clip.

spyderco.com

OVERALL LENGTH: 8.12in
CLOSED LENGTH: 4.73in
BLADE THICKNESS: 0.118in
BLADE LENGTH: 3.43in
EDGE LENGTH: 3.43in
EDGE CONFIGURATION: Plain
HANDLE: Carbon fiber/G10 laminate
STEEL: CPM® S30V®
WEIGHT: 4.1oz
CLIP POSITION: Ambidextrous
 4-position
GRIND: Hollow
LOCK TYPE: Compression lock
BLADE STYLE: Wharncliffe



SPYDERCO

YoJumbo™

A supersized expression of Michael Janich's acclaimed Yojimbo™ 2, the **YoJumbo** features a 4-inch, hollow-ground Wharncliffe blade crafted from CPM® S30V® stainless steel. Designed to fit all hand sizes, its ergonomic handle boasts coarse-textured G10 scales, nested stainless steel liners, Spyderco's patented Compression Lock® and a versatile four-position pocket clip.

spyderco.com

OVERALL LENGTH: 9.29in
CLOSED LENGTH: 5.37in
BLADE THICKNESS: 0.145in
BLADE LENGTH: 3.98in
EDGE LENGTH: 3.98in
EDGE CONFIGURATION: Plain
HANDLE: G10
STEEL: CPM® S30V®
WEIGHT: 5.3oz
CLIP POSITION: Ambidextrous
 4-position
GRIND: Hollow
LOCK TYPE: Compression lock
BLADE STYLE: Wharncliffe



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EDITORIAL SPECIAL: MACHINE GUNS

Small Arms Defense Journal would like to present a quick look at the machine guns on the market in the free world today, concentrating on some of the newer offerings.



ARSENAL® JSCO, BULGARIA

MG-1M

The **7.62x54mm ARSENAL MG-1M machine guns** are powerful automatic weapons, used as armament against enemy troops and firing points. The MG-1M design is specially intended and allows operation of the weapon in heavy climatic conditions, which are typical for the regions of the Middle East, Southeast Asia and Africa.

arsenal-bg.com

CALIBER/BORE: 7.62x54mm

BARREL LENGTH: 605mm

FFL STATUS: For American manufacturer

TYPE OF LINKS: Integrated via joint springs

RATE OF FIRE: 650 RPM



ARSENAL® JSCO, BULGARIA

MG-M2

The **7.62x51mm ARSENAL MG-M2 machine gun** is a powerful individual automatic weapon designed to be used against enemy troops, light armoured targets and aerial targets by firing in single and automatic fire mode.

arsenal-bg.com

CALIBER/BORE: 7.62x51mm

BARREL LENGTH: 545mm

FFL STATUS: For American manufacturer

TYPE OF LINKS: Disintegrating metal belt, M13 type

RATE OF FIRE: 650 RPM



DILLON AERO

M134D 7.62x51 Minigun

The Dillon Aero **M134D 7.62x51 Minigun** is renowned worldwide for its reliability, speed and accuracy. With low recoil forces, a firing rate of 3,000 rounds per minute (RPM) and an effective range of 1,200m, the M134D's offensive and defensive capabilities are unmatched in air, land and sea applications.

dillonaero.com

CALIBER/BORE: 7.62x51mm

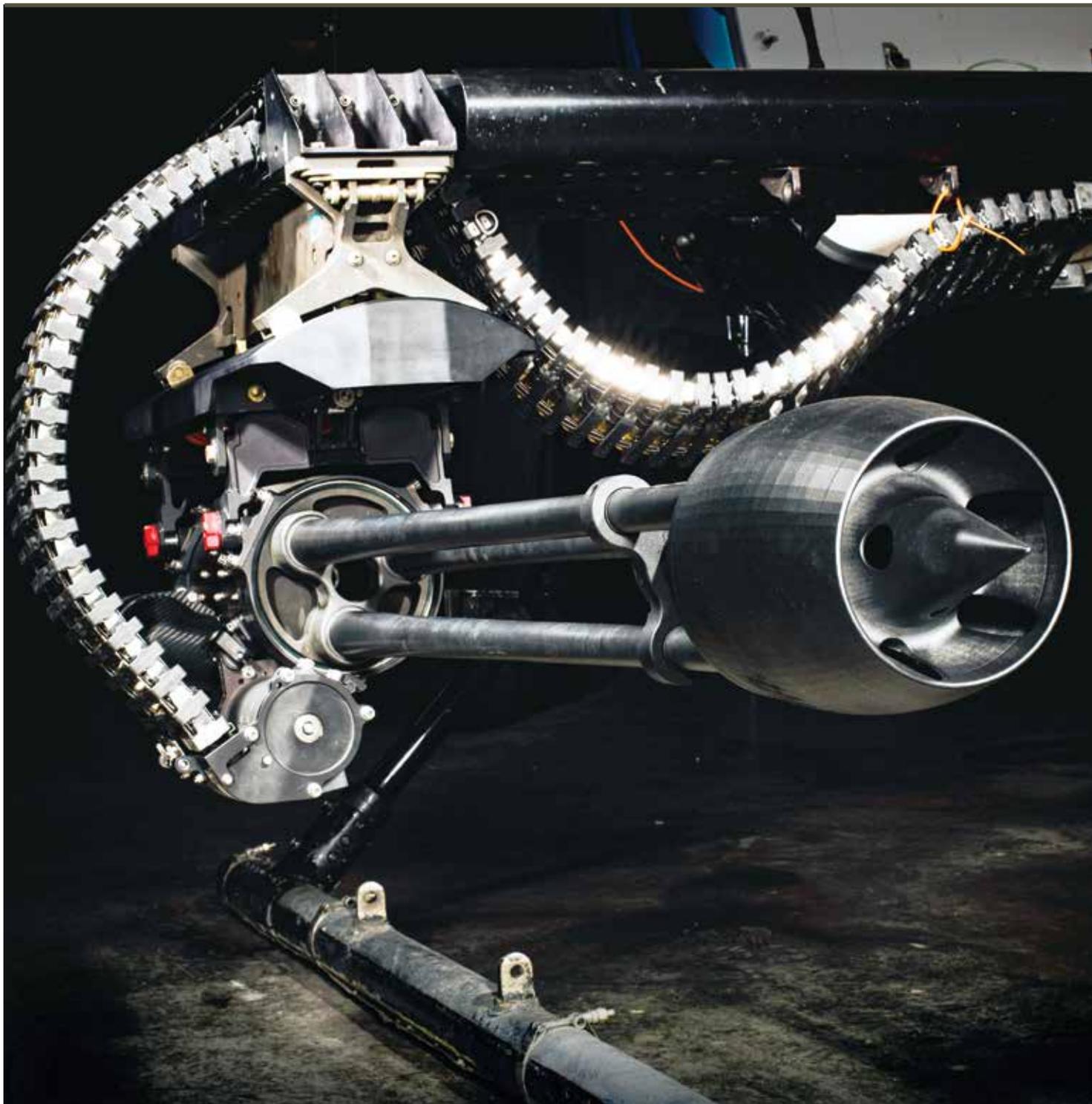
BARREL LENGTH: 18in to 22in

FFL STATUS: Importer/Exporter

TYPE OF LINKS: M13

RATE OF FIRE: Up to 4,000 RPM

EDITORIAL SPECIAL: MACHINE GUNS



DILLON AERO

503D

Dillon Aero introduced the **503D**, our new .50-caliber Gatling gun. Weighing 84 pounds, firing 1,500 rounds per minute (RPM) with increased resistance to internal component damage, the 503D has applications on air, sea and land platforms. The 503D is lighter, faster and smarter than other .50-caliber Gatling guns.

dillonaero.com

CALIBER/BORE: .50 BMG

BARREL LENGTH:

FFL STATUS: Importer/Exporter

TYPE OF LINKS: M9

RATE OF FIRE: Up to 1,500 RPM



FIGHTLITE INDUSTRIES

MCR® Dual Feed Upper M-LOK® (MCR-060)

The **MCR® (Mission Configurable Rifle)** belt-fed, upper receiver assembly is designed to interchange with standard AR/M4-type uppers and readily fits any MIL-SPEC lower receiver without permanent modification to the host lower and is rearward-compatible to AR-15/M16 models produced as early as 1963. Once installed, the patented MCR® upper receiver system can be user-configured in seconds without tools to adapt to virtually any mission profile. Standard features include: gas-piston operation for extreme reliability in adverse conditions; a 16.25-inch quick-change (3 seconds) barrel system; and a MIL-STD-1913 co-planar handguard with a rail-in-interface system for the mounting of optics and modern accessories. Spanning the capability range from the optic-ready carbine to a lightweight support rifle, the MCR® accepts standard box-type AR-15/M16 magazines or M27 linked ammunition.

fightlite.com

CALIBER/BORE: 5.56x45mm NATO
BARREL LENGTH: 16.25in quick-change barrel
FFL STATUS: N/A
TYPE OF LINKS: M27 linked ammunition
RATE OF FIRE: N/A



FN AMERICA

FN® MK 48 MOD 1

The **FN® MK 48 MOD 1** brings the extended range and greater penetration of the hard-hitting 7.62x51mm round in a lighter, more compact platform. The light and compact MK 48 MOD 1 incorporates improved receiver pins, a new gas block and a vented handguard with improved heat shield and three MIL-STD-1913 rails. The MK 48 MOD 1's cold hammer-forged MIL-SPEC barrel has a hard-chromed bore for longer life and improved accuracy and serves as the mounting point for the carry handle. The receiver is formed steel and is equipped with a top-mounted MIL-STD-1913 optical rail. A hydraulic buffer greatly reduces recoil, helping the operator keep more rounds on target. The crossbolt safety and curved trigger help enhance operator control. Includes one spare barrel.

fnamerica.com

CALIBER/BORE: 7.62x51 NATO
BARREL LENGTH: 19.75in
FFL STATUS: N/A
TYPE OF LINKS: NATO standard disintegrating link belt-fed
RATE OF FIRE: 730 RPM

EDITORIAL SPECIAL: MACHINE GUNS



FN HERSTAL

FN MINIMI® 7.62 MK3

The **FN MINIMI® 7.62** Light Machine Gun is now of 3rd generation and ensures improved ergonomics and improved mobility.
fnherstal.com

CALIBER/BORE: 7.62
 BARREL LENGTH: 16.61in
 FFL STATUS: N/A
 TYPE OF LINKS: N/A
 RATE OF FIRE: 800 RPM



GENERAL DYNAMICS

Lightweight Medium Machine Gun (LWMMG)

The next generation **Lightweight Medium Machine Gun (LWMMG)** gives warfighters a distinct advantage in both extended and close-in fighting. Eliminating the gap between 7.62mm and .50 caliber weapons, the LWMMG utilizes the highly efficient .338 Norma Magnum cartridge to offer increased accuracy and lethality while extending the battlespace out to an impressive 1,700m. At 1,000m, the LWMMG is capable of defeating Level III body armor and incapacitating soft-skinned vehicles by delivering over 1,900 foot pounds of energy to the target—more than four times the terminal effect of the 7.62mm NATO cartridge.

gd-ots.com

CALIBER/BORE: .338
 BARREL LENGTH: 24in
 FFL STATUS: N/A
 TYPE OF LINKS: N/A
 RATE OF FIRE: 500 RPM



HECKLER & KOCH

MG4

The **MG4** is a lightweight, compact machine gun of high firepower, with a goal of being carried by one soldier and guarantee full mobility in difficult terrain and also in the urban environment. The MG4 offers the latest technological advances and provides unmatched performance characteristics: Due to its low recoil, the shot is readily controllable, giving high-target precision. Its great combat effectiveness and range, optimal rate of fire and simple handling makes it a weapon unlike any other.

heckler-koch.com

CALIBER/BORE: 5.56mmx45

BARREL LENGTH: 450mm

FFL STATUS: N/A

TYPE OF LINKS: N/A

RATE OF FIRE: 830+120 RPM



HECKLER & KOCH

MG5

As the successor of the MG3, the **MG5** opens a new era of universal belt-fed 7.62mmx51 machine guns. The gas-operated MG5 offers an intelligent and contemporary build standard, with numerous technical and ergonomic innovations. The mounting interface of the MG5 is compatible with MG3 mounts and tripods already in service. The universal MG5 can be used by dismounted infantry in the ground role, as well as for air defence or as a vehicle mounted/co axial machine gun.

heckler-koch.com

CALIBER/BORE: 7.62mmx51 NATO

BARREL LENGTH: 550mm

FFL STATUS: N/A

TYPE OF LINKS: N/A

RATE OF FIRE: 680 / 740 / 800 RPM

EDITORIAL SPECIAL: MACHINE GUNS



IWI—ISRAEL WEAPON INDUSTRIES **NEGEV 5.56 LMG**

The **5.56x45mm NEGEV** is a robust and reliable Light Machine Gun (LMG), deployed by the IDF in Israel and by military entities worldwide. The NEGEV has a powerful target acquisition and accurate performance for the modern battlefield. It is exceptionally lightweight (less than 8kg) and can be operated safely under adverse and extreme environmental conditions.

iwi.net

CALIBER/BORE: 5.56x45mm

BARREL LENGTH: 460mm (18in) or 330mm (13in)

FFL STATUS: N/A

TYPE OF LINKS: Fed by belt, assault drum or by NATO magazine

RATE OF FIRE: 850–1,050 RPM (magazine/belt) / 950–1,050 RPM (belt)—extreme conditions

IWI—ISRAEL WEAPON INDUSTRIES **NEGEV NG-7 LMG**

The **NEGEV NG-7** is the only 7.62x51mm LMG weighing less than 8kg with a semiautomatic mode enabling its safe use in Close Quarter Battle (CQB). The NG-7 is a powerful LMG with superior features such as precision, accuracy, reliability and enhanced human ergonomics and is battle-proven under adverse and extreme environmental conditions.

iwi.net

CALIBER/BORE: 7.62x51mm

BARREL LENGTH: 508mm (20in) or 420mm (16.5in)

FFL STATUS: N/A

TYPE OF LINKS: Fed by belt, assault drum or by NATO magazine

RATE OF FIRE: 600–750 RPM (position 1 & 2)





OHIO ORDNANCE WORKS, INC. (OOW)

OOW240P (Patrol)

OOW manufactures light (249), medium (240) and heavy (M2) machine guns for customers in 43 countries worldwide. Our newest “Patrol” models of our “240” product line feature reduced weight while allowing more operator customization and greatly increasing the ability to accurately fire these weapons from the shoulder.

oowinc.com

CALIBER/BORE: 7.62mm

BARREL LENGTH: 19.5in

FFL STATUS: Type 10/11 Manufacturer/Importer/Exporter

TYPE OF LINKS: M13

RATE OF FIRE: 650–750 RPM



OHIO ORDNANCE WORKS, INC. (OOW)

OOW249P (Patrol)

OOW manufactures light (249), medium (240) and heavy (M2) machine guns and has customers in 43 countries worldwide. Our newest “Patrol” models of our “249” product line feature reduced weight while allowing more operator customization and greatly increasing the ability to accurately fire these weapons from the shoulder.

oowinc.com

CALIBER/BORE: 5.56mm

BARREL LENGTH: 13in

FFL STATUS: Type 10/11 Manufacturer/Importer/Exporter

TYPE OF LINKS: M27

RATE OF FIRE: 750–1,000 RPM

EDITORIAL SPECIAL: MACHINE GUNS



SIG SAUER, INC.

MG 338

The SIG SAUER **MG 338 machine gun** is a belt-fed, lightweight medium machine gun weighing under 20 pounds, chambered in .338 Norma Mag. The MG 338 features a short-stroke, gas-piston system and a proprietary recoil mitigation system, with a free-floating, quick-change barrel; ambidextrous controls; switchable feed tray; charging handle that can be alternated to either side depending on operator preference; and as a modern, multi-caliber, modular system, the new SIG MG 338 is easily convertible to 7.62x51 caliber.

sigsauer.com

CALIBER/BORE: .338 Norma Magnum
BARREL LENGTH: 20in
FFL STATUS: N/A
TYPE OF LINKS: Disintegrating metal links
RATE OF FIRE: N/A



SIG SAUER, INC.

NGSW-AR MG 6.8

The primary objectives set forth by the U.S. Army for the NGSW-AR was a weapon with the firepower and range of a machine gun, coupled with the precision and ergonomics of a rifle. The SIG SAUER **NGSW-AR 6.8mm** submission is an ultra-light, medium-caliber machine gun with AR ergonomics and is chambered in 6.8mm hybrid ammunition. Features include quick-detach magazines, side opening feed tray, increased available 1913 rail space for night vision and enablers, folding buttstock and a suppressor.

sigsauer.com

CALIBER/BORE: 6.8x51mm Hybrid, 7.62x51 NATO
BARREL LENGTH: 16in
FFL STATUS: N/A
TYPE OF LINKS: M13 disintegrating link
RATE OF FIRE: N/A



ST KINETICS

STK 50

The **STK 50** machine gun fires from an open bolt, eliminating “cook-off” of ammunition. It has semi- and fully automatic firing modes, selectable from a push-type selector at the trigger module. Left or right feeding allows quick change-over of ammunition type, and the quick-change barrel with fixed headspace allows the barrel to be changed within seconds without adjustment of headspace. The STK 50 is designed for easy maintenance without the need for special tools. stengg.com

CALIBER/BORE: 12.7mm
BARREL LENGTH: 1,141mm
FFL STATUS: N/A
TYPE OF LINKS: Disintegrating M15A2 link belt
RATE OF FIRE: 400–600 RPM

EDITORIAL SPECIAL: MACHINE GUNS



S&T MOTIV

K12

S&T Motiv's **K12 7.62mm** machine gun is easily converted from aircraft mode to infantry mode. It uses an open-bolt operation, is belt-fed with a quick change barrel and has a gas-operated and rotating bolt locking system for greater reliability. The K12 can be mounted to a bipod, tripod or aircraft. The machine gun has multiple integrated MIL-STD-1913 mounting rails for optics, lights and laser devices and is fully automatic only.

sntmotiv.com/eng

CALIBER/BORE: 7.62mmx51 NATO

BARREL LENGTH: 22in

FFL STATUS: N/A

TYPE OF LINKS: N/A

RATE OF FIRE: 650–950 RPM



U.S. ORDNANCE

M2A2

The U.S. Ordnance **M2A2** machine gun is an air-cooled, belt-fed machine gun that fires from a closed bolt and operates on the short recoil principle with fixed headspace and timing. It is capable of both sustained automatic and accurate single-shot fire. It can be mounted on a vehicle, boat, helicopter or other aircraft. Ammunition may be fed from either the left or right side of the gun, making it suitable for use by both infantry and in armored vehicles. The M2A2 weapon system has been tested to well over 50,000 rounds. Its single-breech lock system allows for field rebuild, eliminating the need for depot-level maintenance during its lifetime and thereby greatly reducing logistical support.

usord.com

CALIBER/BORE: 12.7mm

BARREL LENGTH: N/A

FFL STATUS: N/A

TYPE OF LINKS: N/A

RATE OF FIRE: N/A



ZID (OPEN JOINT STOCK COMPANY "V.A.DEGTYAREV PLANT")

Pecheneg 6P41

The **7.62mm 6P41 Pecheneg** machine gun is intended to engage hostile manpower, fire means and aerial targets. The whole range of rifle cartridges is used to fire from the machine gun. The gas regulator ensures the reliable operation of machine gun automatics in various operating conditions. The high degree of commonality with the PKM machine gun and similar layout of its automatics action ensure the reliability of the Pecheneg machine gun in any operating conditions. The 6P41 Pecheneg incorporates some design novelties aimed to increase the effectiveness of barrel cooling, which has allowed a spare barrel to be eliminated from the machine gun set.

zid.ru/eng

CALIBER/BORE: 7.62mm
 BARREL LENGTH: N/A
 FFL STATUS: N/A
 TYPE OF LINKS: N/A
 RATE OF FIRE: 600-800 RPM

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A .300 Norma Magnum cartridge case.

PETERSEN CARTRIDGE

A .338 Lapua Magnum cartridge case.

PETERSEN CARTRIDGE

.338 Lapua Magnum

The Next Greatest Caliber that Never Was

By Jay Bell

The .338 Lapua Magnum (LM) has been the next greatest “mainstream” sniper caliber for the last 30-plus years. It was designed to be the ideal “in-between” round. That is, in between 7.62x51 and .50 caliber. It was supposed to be a versatile sniper caliber or a lightweight machine gun back in the 1980s. It has had its successes and favor in certain communities around the world for almost 40 years. Some might say that it has had more success overseas than in the United States.

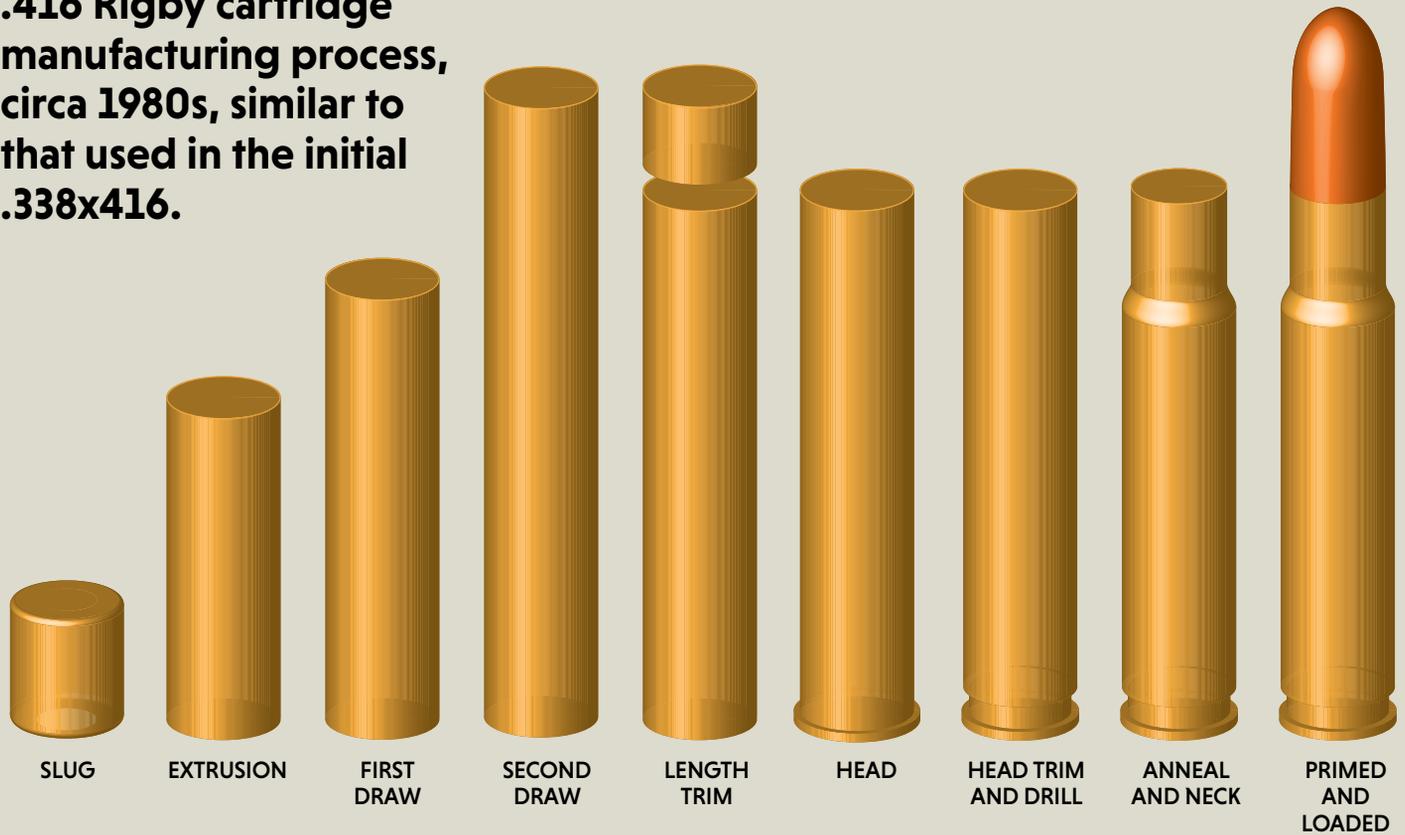
However, the recent adaptation of the .338 Norma Magnum by the U.S. Army for the new Precision Sniper Rifle program (PSR) and SOCOM/USMC with the Multi-Role Adap-

tive Design Rifle (MRAD) as Mk22 Mod 0 ASR Advanced Precision Rifle is a true paradigm shift for the industry. The change means the .338 LM is no longer up and coming; it is perceived as old and outdated. The punches keep coming with the upcoming SOCOM .338 Norma Magnum for the Lightweight Medium Machine Gun (LWMMG) program. The use in a machine gun will dramatically increase the amount of ammunition being built, and it will reduce the cost of the ammunition for all takers. All of these combined factors seem to be the final nail in the coffin for .338 LM.

The .338 LM will not now or ever be adopted by the U.S. Army or SOCOM—period. It will

never be the clear winner as the sniper or precision long-range caliber of choice. It came close to being the “great caliber” many times. This author would say the ship has now officially sailed. After the U.S. Army and SOCOM have used the .338 Norma Magnum for a while, then other countries will follow suit. The commercial market also will shift away from .338 LM and towards the .338 Norma Magnum. This will mean more bullet offerings, more custom weapons, more machine guns and the like in .338 Norma Magnum. The popularity of the .338 Norma Magnum is pretty intense, as it has come a very long way since its introduction around 2008.

.416 Rigby cartridge manufacturing process, circa 1980s, similar to that used in the initial .338x416.



ADAM BUCCI/SMALL ARMS DEFENSE JOURNAL

These new “systems” (ASR, MRAD, PSR, LW MMG) come on the heels of a major systems failure. The Modular Sniper Rifle (MSR) was awarded to Remington in 2013 after the original Precision Sniper Rifle (PSR) competitions. This nearly \$80 million contract for over 5,000 rifles and over 4.6 million rounds of ammo seems to have died. There were numerous issues, and it is not clear what happened. The MSR was chambered in 7.62x51 NATO, .300 Winchester Magnum and .338 Lapua Magnum. The program has not been officially canceled, though it appears to be dead for all intent and purposes. Some are saying the MSR (Remington) has been completely swapped for the ASR (Barrett’s MRAD) and the .338 LM for the .338 Norma Magnum.

History

Ironically, Lapua is a Finnish company for the round with U.S. origins. The .338 LM caliber owes its origin to the U.S. Army. Back in the 1980s, the Army awarded a contract to Research Armaments Industries (RAI) to develop a new sniper weapon and caliber. RAI Enterprises got the contract. They were working with barrel legend Boots Obermeyer (Obermeyer Rifled Barrels) and Jim Bell (Brass Extrusion Labs Ltd.). These two characters created the .338x416, based on the .416 Rigby cartridge case. My father, Jim, fondly describes why they did what they did on a bar napkin at a Wisconsin restaurant/tavern:

1. That .580 base diameter cartridge would



INTERNATIONAL CARTRIDGE COLLECTORS FORUM
A .416 Rigby cartridge case headstamp, circa 1980s, similar to that used in the initial .338x416.

2. The large base diameter would allow all the powder you would need for any ballistic solution.
 3. The heavy taper would be ideal for future potential machine gun use and easy extraction.
 4. .338 diameter was the largest caliber with a wide range of projectile types and enough payload for armor-piercing applications.
- We based the original prototype cases on the .416 Rigby low-pressure African caliber.

There was no science behind the choice of this base diameter. It was a common diameter, and it was on the shelf. Back in that day, new calibers were not being developed and released a couple of times a year. This caliber was originally designed in 1911 by John Rigby & Company. Since it was for an African caliber, it was not designed for high pressure. Therefore, the original samples were too soft in the case head and were difficult to extract from when shot for a high-performance load. The cases needed to be headed with more force and/or with slight tooling changes to get the diamond point hardness (DPH) in the head so they would still easily extract from the rifle. Since time was of the essence and Bell Labs was not able to move fast enough on these changes, the circus moved on, and the RAI program did not go anywhere; however, the .338x416 lived on.

The .338x416 was later picked up by Lapua in Finland, adjusted slightly and renamed the .338 Lapua Magnum. It has had better success in Europe than in the U.S. Lapua and Nammo have offered up to a dozen different bullet loads to include multiple armor-piercing varieties. The most current version (2018) of the Nammo Handbook has six different flavored categories for a total of 10 types:

1. Lock Base: 250-grain FMJ
2. Scenar: 250- and 300-grain OTM
3. Solid: 231-grain
4. Armor Piercing: 248- and 300-grain tung-



SIG SAUER

The bold SIG SAUER .338 machine gun contender in the LWMMG competition.

- sten carbide core
- 5. Armor Piercing Incendiary: 253-grain
- 6. Proof, Drill & Blank

In the late 1990s, the U.S. manufacture of chambers in .338 was a common trend. I can fondly remember the SHOT Show in the early 2000s when Savage finally chambered in it. I was sure the price under \$1,500 would be a rocket seller and quickly make .338 LM mainstream. It did not. Today at least a dozen U.S. manufacturers offer a standard off-the-shelf version of .338 Lapua Magnum.

In a recent conversation with a long-time industry expert, we joked about how a typical 5-million round RFQ (request for quotation) for .338 Lapua Magnum really means 5,000 rounds will be procured. My days as a brass manufacturer of .338 Lapua Magnum caliber involved many multi-million-round RFQs that ended in an order of maybe 30,000 rounds, at best. This number has been echoed by other producers as the typical “large” run for .338 LM brass here in the U.S. The typical assumption was that the XYZ government was considering the expanded use of the caliber and wanted to know what the ammo would cost in volume. This seems to make sense as there were many RFQs, and no one was ever awarded numbers in those quantities.

The caliber has had considerable notoriety over the last decades. Of the current top 20 sniper kill shots, the .338 LM currently holds 3rd at 2,475m from 2009. It also holds positions at 10 and 11. The .50 BMG is the record holder at 3,540m and holds 10 of the top 20 spots. It is impressive that the .338 can go toe to toe with the .50 BMG when the .50 weapons weigh 26 to 30 pounds and the .338 rifles weigh +/-14 pounds. I’m not sure that the .300 or .338 Norma Magnum will ever have records of this magnitude; beating out the .50 BMG is unlikely. However, if the U.S. government is right, the future of war-



PETERSEN CARTRIDGE

A .338 Lapua Magnum cartridge case.

fare is in urban areas, not the Middle East desert, which will provide less opportunity for extreme long-range shots.

Norma vs. Lapua

Reasons why the .338 Norma Magnum has won out over the .338 Lapua Magnum:

1. Current propellants can accomplish all the velocity needed with less powder capacity; therefore the extra volume of .338 LM is overkill.
2. The shorter length of the Norma calibers is easier to manipulate in standard rifle actions and machine guns.
3. The “short magnum” craze of the early 2000s has popularized the use of and familiarity with short magnum calibers.
4. There is better powder burn uniformity to give better accuracy in shorter cases.
5. The .338 Norma Magnum has less weight—the U.S. Army is always on the hunt to save a few pounds.

Of course, the only thing for sure with the U.S. government is ... nothing. They could change their minds before this article goes to print. The ASR ammo contract was recently awarded to UDC USA; however, it is not in production yet. It does have the makings of success. The ASR is a “Program of Record.” Barrett was awarded \$50 million in rifles chambered in the .338 Norma Magnum for the ASR.

It appears that General Dynamics (GD) and SIG SAUER are the early favorites for the LWMMG contract. The GD design on the LWMMG is 10 years old or more. It’s so old that they took it out of their trade show booth because they thought it was a dead program. Then all of a sudden, the LWMMG became all the rage, and it was back in the booth.

These are exciting times in the gun and ammunition world. Things are changing quickly—faster than the U.S. government can support. In the meantime, enjoy the show. **SADJ**

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Ordnance Oddities

1990s Novelties and 21st Century Curiosities

By Robert Bruce

In the course of decades of researching various sources including military and museum archives, the author has acquired a treasure trove of photos of what might be considered “odd and unusual weapons.” Here’s another follow-on to earlier oddities that appeared in previous issues.

With apologies for some of these rough-looking images—presented as they were found—SADJ takes a look at some interesting developments as the U.S. military redoubled efforts to apply the most advanced technologies to the rapidly evolving nature of combat.



US ARMY SBCCOM GRAPHIC BY STEVEN SMITH

SCORPION Soldiers

In this artist’s dramatically realistic conception of some near-future urban engagement, the U.S. Army’s Objective Force Warriors, clad and armed with the latest SCORPION battle gear, will have the advantage of fighting alongside many robotic systems such as the wheeled “mule” and the UAV (unmanned air vehicle) flying above the battlefield to send real-time video images to a central command center and right to the OFW’s helmet visor display.

When the calendar flipped to 1990, American infantrymen had been fighting seemingly endless wars with essentially the same infantry weapons for decades. Ranging from the light and adequate (M16 series) to the superb but heavy (M2 .50 cal.), there

was much room for improvement—not just improving the hole-punching tools, but also sighting systems that would take target detection, effective engagement and “situational awareness” to new levels.

The key to this multiplayer effort was an increased interest in the often wizardly work being done by DARPA, the Defense Advanced Research Projects Agency. Since untold megabucks had been poured into such sci-fi dreams as steerable seeker projectiles and bionic limbs, it seemed Spock-ishly logical to put some of this to work toward arming and aiding American and Allied soldiers for near term and future conflicts.

Super Soldier Stuff

A series of soldier enhancement programs began in the early 1990s with SIPE (Soldier Integrated Protective Ensemble) and progressed through Land Warrior, Objective Force Warrior and Future Warrior.

From the beginning, this modernization effort was intended to rig the infantryman of tomorrow from top to bottom with tech gear to fight and win day and night, in all weather—even on nuclear, chemical and germ

warfare contaminated battlefields in a super HAZMAT suit equipped with a cooling/warming girdle and a battery-operated filter/blower.

A comprehensive test of the **SIPE** concept in the fall of 1992 got mixed results with soldier subjects reporting that the weight, awkward bulk, snagging cables and general unreliability just didn't do the intended job.

Land Warrior

The good stuff from SIPE was kept and the bad discarded in follow-on versions of the **Land Warrior** program, hitting its stride around 2000, when 100 prototype sets were used to equip a tactical test platoon in a major Army war game.



US ARMY

Military Modularity

The super soldier seen in this fanciful image has discarded the bulky chem suit, but his M4 carbine is loaded with such goodies as a thermal imaging scope connected to his helmet display with computer links for target IFF and first-shot hits. Since the power-hungry sighting/computer/commo system depletes batteries quickly, looks like the old-fashioned bayonet is an essential backup. Land Warrior made it all the way to Iraq in 2007, reportedly serving well with a Stryker Brigade.

Objective Force Warrior

Early in the new millennium, things ramped up close to the realm of science fiction with **Objective Force Warrior** (OFW), intended to dominate all potential adversaries for the next 20 years.

Although it is tempting to make fun of all the technical jargon and science-speak routinely used in official releases and presentations, acronyms like "C4ISR" (command, control, communications, computers, intelligence, reconnaissance) are useful shorthand among serious participants. Upgrades to Land Warrior's hardware and software modules into a "system of systems" would do a better job of integrating OFW squads with parallel and higher command elements on the digital battlefield, making them full partners in C4ISR. In addition, they would enjoy unprecedented survivability, agility, sustainment and, most importantly, lethality.



SARAH UNDERHILL/US ARMY
SOLDIER SYSTEMS

In this 2002 photo promoting the Army's work on OFW, a battle-ready soldier is equipped from head to toe in the latest concepts for near-future conflicts. His high-tech helmet gives protection against kinetic, blinding laser and chemical warfare threats, and its visor has a projected display of all sorts of useful data from its on-board camera and external sources. While some members of his OFW squad are expected to be carrying the 5.56/20mm XM29 Integrated Airburst Weapon, he's got a simpler, lighter carbine, made possible by use of composite materials and caseless ammo. Special note should be taken of the shoulder patch on his segmented body armor: SBCCOM is Soldier Biological Chemical Command.



SARAH UNDERHILL/US ARMY
SOLDIER SYSTEMS

Left, Army Sergeant First Class Dan Harshman, a member of the Operational Forces Interface Group, models the working version of Objective Force Warrior at a media event in 2002. His combat uniform features an interesting Urban Combat Camo design, blending in well with the battle scene behind him.

Future Warrior

Pushing the possibility envelope way deep into Hollywood sci-fi territory, in 2002 the **Future Warrior** was projected to be fully operational in about 18 years into the future. Well, that puts us

smack dab into 2020, and we're not alone in looking around for these real-life Starship Troopers. Maybe their form fitting nanofiber "cloaking" uniforms render them invisible?



U.S. ARMY SOLDIER BIOLOGICAL CHEMICAL COMMAND

Sci-Fi Soldier Skin

Will the U.S. Army soldier of the future (this was supposed to be reality in 2020) look something like this, holding a whiz-bang combo weapon and wearing a form-fitting, heating and cooling, surroundings-reactive uniform that also serves as incredibly

capable body armor and a medical diagnostic center? Who knows what wizardry is contained in his helmet (NSC is the Army's Natick Soldier Center), and that blaster pistol must certainly shoot death rays and "smart/seeker" rockets.

Weaponry

As seen in the most recent previous Ordnance Oddities installment (**SADJ** Vol. 12, No. 4), the Advanced Combat Rifle program—a golden opportunity to dump the M16—died in 1990, but the armaments

bureaucracy lived on. Flush with a newly massive infusion of cash and an insatiable lust for the "next best thing," the Holy Grail of gun science illuminated the path ahead.

Firepower Fistful

What was predicted in the Future Warrior's handgun mock-up? Perhaps they had in mind the **Metal Storm** concept—Australian regular guy genius Mike O'Dwyer's "stacked munitions" that are individually or burst-fired using computer-generated electronic pulses. Although showing great promise in a variety of configurations ranging from this "smart" handgun to a bomblet-throwing area denial weapon, the concept and the company faded away.



METAL STORM LIMITED



US ARMY ARDEC

Double Trouble

For arming Objective Force Warrior, the OICW (Objective Individual Combat Weapon) was to be a “leap ahead” the serviceable but somewhat limited combo of M16 rifles with M203 grenade launchers. Optimistic specification writers called for an assault rifle mated to a semiauto launcher with an onboard computer interfacing day/night sighting and ranging. This would provide pinpoint accuracy for 20mm “smart” grenades that would airburst over the heads of enemies behind cover. After several years of valiant trials, tribulations and millions upon millions of dollars, the XM29 combo and the M25 Individual Airburst Weapon System gave up the ghost.

Something for Everyone

The OICW’s modular design was necessary, given the exceptional complexity of its computerized sighting and semiauto grenade launching components. The modular, dual-barrel OICW combines the lethality of novel 20mm air-bursting munitions, 5.56mm NATO ammunition and a full-solution fire control system (containing an accurate laser rangefinder, ballistic computer, direct view optics, video sight, electronic compass, environmental sensors, target tracker and thermal capability) to affect decisively violent and suppressive target effects and produce a leap ahead in small arms performance. The 5.56mm “kinetic energy” module is an HK G36 inside a custom-designed housing.



ROBERT BRUCE



PROGRAM EXECUTIVE OFFICE SOLDIER VIA WIKIMEDIA

The Late, Great XM8

As the OICW was slowly dying from obesity, complexity and absurdly expensive “smart” ammo, some clear-headed, soldier-centric advocates in the Ordnance establishment and user communities sought to revive efforts to replace the marginal M16 with something better. In the course of OICW testing, its 5.56mm assault rifle component, essentially an adaptation of HK’s superlative G36, consistently performed with excellence. It got a rakish exterior makeover along with integral optical sighting and entered serious consideration by the Army and Marine Corps around 2004 as the XM8. Two are seen here in live-fire trials; the standard rifle with HK’s M320 grenade launcher and the Sharpshooter/Designated Marksman version. Then, in another sad, sad tale of gang assaults by competing gun makers, politicians and hidebound defense establishment bureaucrats, it was beaten to death and the “Sixteen” stumbled on.



Beyond the MK19

ROBERT BRUCE

On display at the NDIA's 2000 Small Arms Conference was this full-size, engineering mock-up of what was to be the Objective Crew Served Weapon (OCSW) in an Advanced Technology Demonstration of the technological maturity and operational utility of a highly lethal, lightweight, two-man portable, crew-served weapon with a full solution, day/night, target acquisition and fire control system to replace the U.S. standard 40mm MK19. Specs called for "a greater than 60% reduction in weapon system weight, and a 75%

reduction in ammunition on a lbs/kill basis with high-explosive, precision, airbursting munitions, to provide revolutionary overmatch lethality. It will defeat body-armor-protected threat personnel in defilade, out to a maximum effective range of two kilometers, defeat light and lightly armored vehicles beyond one kilometer with its armor-piercing warhead. The OCSW system will also be a fully interoperable, lethality component block upgrade to Land Warrior" (from U.S. Army Weapons Systems brochure, 1999).

Smart Slug

This cutaway of the OICW's high-velocity 25x59mm HE round shows a centrally located fuse between two chambers that hold an advanced LX-14 explosive. With an on-board computer chip that gets flight duration instructions from the fire control system at the moment of launch, it has both precision range airbursting and point detonating capability for use against personnel and lightly armored targets out to 2,000m.



ROBERT BRUCE



PROGRAM EXECUTIVE OFFICE SOLDIER

Real and Right Here

The XM307 Advanced Crew Served Weapon from General Dynamics (GD) emerged from the OICW effort as the fulfillment of most of the program's optimistic goals. Here we see the real thing on the range around 2002, sporting an impressive, full-solution, day/night, ranging/aiming system with computerized aimpoint adjustment for all types of 25mm rounds. Engineering alchemy of its "attenuated low recoil system" produced dramatic weight reduction to a svelte 55 pounds including a tripod. Even more head-scratching, common component engineering facilitated quick, operator-level conversion of the thing from 25mm to .50 BMG caliber.



PROGRAM EXECUTIVE OFFICE SOLDIER

Move Over Ma Deuce

Hand in hand with the 25mm version, the .50-caliber XM312 uses most of the same components, and the gun itself tips the scales at just 35 pounds (back up to around 50 pounds mounted). It's seen here with a pair of vigilant ground pounders ready to engage targets with traditional iron sights as a handy backup to the system's super computer aiming module. The Army's intention was to equip certain units (read Light Infantry/Rangers/SPECOPS) with this lighter weight, low recoiling, rapid changeover system for tactical versatility on ground, vehicle and helo mounts. Alas, this valiant effort to produce a workable, lightweight 2-in-1 HMG/GMG came to naught around 2007.

Second Chance

John Moses Browning's century old "Ma Deuce" M2HB machine gun was expected to enjoy retirement when this new .50-caliber XM806 was fielded in the not-too-distant future. Derived from the convertible XM307 25mm, the .50-caliber XM312 from General Dynamics is about half the weight of the M2, boasts reduced recoil and facilitates mounting electro-optical sights for superior accuracy.



PROGRAM EXECUTIVE OFFICE SOLDIER



PROGRAM EXECUTIVE OFFICE SOLDIER

A Question of Caliber?

General Dynamics' .50-caliber XM806 in live fire at Fort Hood, Texas, in 2008. Bottom line: Another expensive experimental machine gun murdered in broad daylight in 2012, and a QCB version of Browning's heavy but unstoppable M2 warhorse gallops on. But wait a minute—how much of the XM307/312/806 is to be found inside GD's Lightweight Medium Machine Gun (LWMMG)? "Eliminating the gap between 7.62mm and .50-caliber weapons, the LWMMG utilizes the highly efficient .338 Norma Magnum cartridge to offer unmatched accuracy and lethality while extending the battlespace out to an impressive 1,700 meters" (GD/OTS info sheet).



MASS Destruction

Not so much an “odddity” as a good idea that hasn’t gone very far, here’s a stalwart soldier modeling the slug- and pellet-pushing 12-gauge M26 Modular Accessory Shotgun System (M26-MASS), hanging awkwardly underneath the barrel of an M4 carbine. Introduced to the inventory in 2012, the M26-MASS is a straight-pull, bolt-action, magazine-fed scattergun that was intended to replace conventional pumpers like the Mossberg 500 series. That didn’t quite happen, and lots of the old reliables are still pumpin’.

PROGRAM EXECUTIVE OFFICE SOLDIER

Razzle Dazzle!

In 2005 at Kirtland AFB, New Mexico, USAF Captain Drew Goettler demonstrates the Personnel Halting and Stimulation Response, or PhaSR, a non-lethal illumination technology developed by the ScorpWorks team at Air Force Research Laboratory’s Directed Energy Directorate. “The laser light used in the weapon temporarily halts aggressors by illuminating or ‘dazzling’ individuals, removing their ability to see the laser source.” But really, whose idea was it for styling the thing’s absurdly comical housing like something out of a bad sci-fi B movie of the 1930s?



USAF

What's Ahead?

As amply demonstrated in this installment of *Oddities*, it's a fool's errand even for experts to predict with any certainty the future of man-portable weaponry. But at the same time, it's absolutely necessary for scientists and engineering visionaries to ponder what's possible and then work toward high-tech tactical tools to "outgun" adversaries of all kinds as time marches on.

While kinetic energy hole punchers—different only in projectiles,

launch platforms and guidance systems—aren't going away anytime foreseeable, the means of lethally mangling miscreants are limited only by scientific possibilities. Directed energy devices of many types, such as lasers, sonic blasters and the Lord-only-knows-what-else, are under development in labs worldwide.

Meanwhile, we offer this pithy truth, attributed to Greek philosopher Plato, among others, "Only the dead have seen the end of war."

Combat Chameleon

Many decades ago, a U.S. government artist was tasked to illustrate what a soldier of the future might look like if some sci-fi concepts of the time could become reality. Today, we marvel at how it predicts many of DARPA's dreams that are—let us hope and pray—now actually approaching reality, beginning with a sealed combat suit with camo pattern that changes to blend with the immediate surroundings. Its ultra-lightweight nanotech material is bulletproof, repels flame, laser beams and chemical weapons and is invisible to thermal and radar imaging.

His helmet is an all-purpose command center with a clear visor that displays all manner of data including target ID and remote control auto-aiming for some sort of weapon over his left shoulder.

Is it a super assault rifle with a massive magazine in the backpack? Or maybe projecting "scalable effects directed energy," powered by a super battery?



US ARMY ART COLLECTION

Next Time

In the final (for now) installment of *Ordnance Oddities*, we'll go back in time for a few "Odds and Ends" that deserve recognition but that had to be

reluctantly bypassed due to space limitations—because things like the OSS "Beano" grenade deserve some degree of recognition. **SADJ**

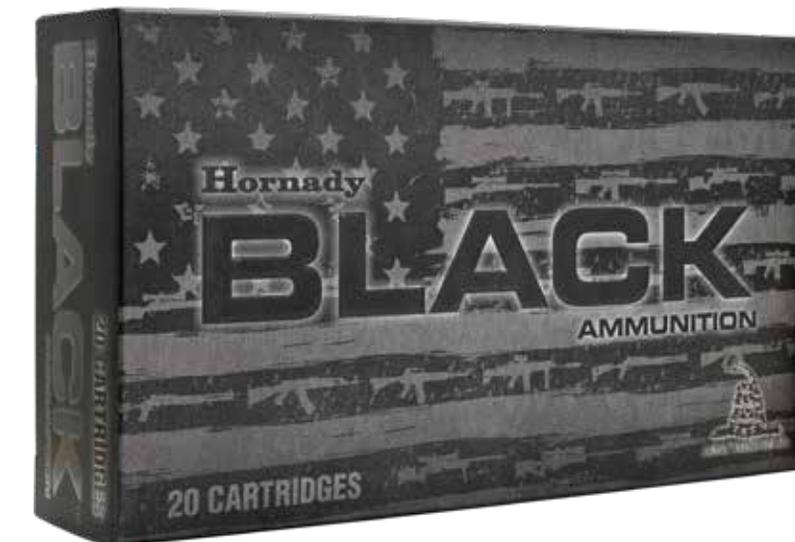
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"The 6mm ARC began with a simple question: What can we do with today's technology to maximize the performance of the AR-15 platform?" Hornady Ballistician Jayden Quinlan said. "We subsequently modeled and tested a variety of designs in different calibers until we were able to produce the most flexible cartridge possible within the limits of the AR-15 system."

This new cartridge delivers less felt recoil than larger short-action-based cartridges, yet takes full advantage of modern, heavy caliber 6mm bullets that provide excellent accuracy and ballistic performance at extended range.

The 6mm ARC delivers substantially better ballistics than the 5.56 NATO with similar recoil and yet delivers comparable ballistics to the venerable .308 Winchester with 30% less



weight on both weapons system and ammunition.

Hornady plans to have the CIP approval at the end of 2020. The 6mm ARC will be available in the following product lines: 6mm ARC 105-grain BTHP Hornady BLACK®; 6mm ARC 108-grain ELD® Match™; and 6mm ARC 103-grain ELD-X® Precision Hunter® (Available Fall 2020).

Hornady also offers everything needed to reload the 6mm ARC with a multitude of existing 6mm Hornady bullets, dies and components. Reloading data will be available on the Hornady Reloading App.

Hornady.com/6mmARC

ST Engineering Secures Over \$1.6 Billion in New Contracts

ST Engineering announced new contracts worth about \$1.6B, secured by its Aerospace and Electronics sectors in the first quarter (1Q) of 2020. These contracts are over and above a defence contract that its Land Systems arm secured.

The group's Aerospace sector secured about \$838M across its spectrum of aviation manufacturing and MRO businesses. The MRO contracts included A320 heavy maintenance contracts and CFM56-7B engine maintenance contracts from Chinese airlines and a component Maintenance-By-the-Hour (MBHTM) contract from a Southeast Asian airline to provide comprehensive component maintenance services for its entire fleet of Boeing 737 and Bombardier Q400. ST Engineering's Electronics sector secured about \$730M worth of contracts for products and solutions in smart mobility, cybersecurity, data analytics as well as training and simulation.

Defence Contract by the Land Systems Sector

In addition to the above \$1.6B new contracts, the group's Land Systems

arm secured a Phase 2 contract for the production and supply of the Hunter Armoured Fighting Vehicle (AFV) from the Singapore Ministry of Defence. Under the contract, ST Engineering will also provide integrated logistics support which includes spares, training and documentation.

Due to the COVID-19 pandemic and its evolving circumstances, ST Engineering is discussing adjustments to delivery schedules or addressing order cancellations with its customers. As at the end of 1Q, the group's order book remains robust.

The above developments are not expected to have any material impact on the consolidated net tangible assets per share and earnings per share of ST Engineering for the current financial year.

All figures are denominated in Singapore dollars unless indicated otherwise.

ST Engineering is a global technology, defence and engineering group specializing in the aerospace, electronics, land systems and marine sectors. stengg.com/en/singapore-technologies-engineering



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