

**C**apitalizing on his experience as a Distinguished Marksman and Army armorer, Glenn Nelson has made a career of . . .



# Accurizing

**T**HE arrival of the Springfield Armory M1A rifle in the middle 1970s was a vital shot in the arm for service rifle competition. Civilians, once restricted to the M1 Garand rifle, were better able to compete with military shooters and state team members armed with the M14.

Although all service rifles are ostensibly supposed to be equal, it is well known that some are "more equal than others." The M1As used by top service rifle competitors are a far cry from the standard issue-grade arms.

The man in charge of creating super-accurate service rifles is Glenn Nelson, who heads a team of rifleshooters in Columbus, Ga., that builds all of Springfield

Bob Reese to develop a match rifle program. In the beginning, he did all the accurizing work at his home in Columbus, but over the years, Nelson's Custom Guns has expanded to fill a 5,000 sq. ft. building. Inside the facility are precision machines like high-speed automatic lathes that will profile a

Glenn Nelson readies another Springfield Armory M1A match rifle.

Douglas or Hart barrel blank in six passes, to milling machines and automatic drill presses. According to Nelson, his shop is able to assemble, accurize and repair all kinds of guns, but it also is small enough to ensure excellent quality control.

To staff his facility, Nelson has assembled a team of highly qualified employees who were either match armors for the USAMU, shooters for the Army

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Match-quality M1As and M1s built by Nelson's crew are bedded in Bisonite, a two-part epoxy. Crayola modeling clay fills all action mortises from which bedding must be excluded.

Armory's National Match M1s and M1As, as well as the Ultra Match M1 and Super Match M1A. Nelson and his employees also make match-grade parts users can install on the firm's standard grade rifles, assembled in Geneseo, Ill.

Nelson joined the Army in 1954 and in 1962 became a member of the Army service rifle team. He earned his Distinguished Rifleman badge that same year. He loved shooting, but by the mid-1960s, he was getting tired of the hot Ft. Benning sun service rifle shooters must learn to endure.

In the fall of 1965, Nelson got the chance to take on a cool inside job when the foreman of the U.S. Army Marksmanship Unit (USAMU) shop at Ft. Benning invited him and a few other shooters to try their hands at gunsmithing the then-new National Match M14 rifle. After completing match armorer school at Rock Island, Ill., Nelson became one of the Army's first experts in modifying the M14 for tournament use.

After service in Vietnam, Nelson retired from the Army in 1975 and was hired by Springfield Armory's



# Service Rifles

BY JOHN R. CLARKE

## Service Rifles

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team or both during their Army careers. Nelson's employees built rifles for such Army greats as Charlie Davis, Lones Wigger and the NRA's Gary Anderson. Since retirement, they have lent their talents to Nelson, building match rifles to the same exacting standards they previously used for the Army's best.

The accurizing programs used for the match-grade M1 Garands and M1As are identical to the ones for the M14 and the Garand by U.S. armories. Nelson told me he keeps in touch with USAMU personnel about any changes to the specifications, and he would "upgrade" his procedures if there were any significant changes to these specifications.

While Nelson employees do about 90% of the assembly and 100% of the accurizing work to the finished product, some of the final assembly is left to the armorers at Geneseo.

All match-grade rifles accurized by Nelson use standard M1A or M1 Garand receivers furnished to Nelson by Springfield Armory. They are not special match-grade receivers, although during the accurizing process each is carefully inspected to ensure there are no problems that could affect accuracy or functioning.

After each is fitted with a new barrel, Nelson's employees carefully fit the various other parts of the rifle together and mark them with the last three digits of the receiver's serial number. After the accurizing program is completed and the parts have received their final finish, these numbers will be used to reassemble the rifle.

All heavy match barrels used on the M1A Super Match and M1 Garand Ultra Match rifles are fabricated by Nelson's employees from Douglas or Hart barrel blanks which have been air gauged, stress-relieved and straightened by the manufacturer, according to specifications supplied by Nelson.

These barrel blanks have been turned, splined, threaded, and had a special operating rod guide soldered in place by Nelson's employees before they are installed on the receiver. After the barrel and receiver are fitted together, they are given a dark black Parkerizing.

Nelson specifies that groove diameters for all barrel blanks be between .3079" and .3084", and all bore diameters be between .2999" and .3004". Nelson keeps barrel blanks with various standard twist rates in stock (1 turn in 10", 1-11", 1-12" being the most widely used).

National Match barrels are fabricated for Springfield Armory by suppliers and sent to Nelson for installation on these models. These barrels are built to National Match specifications for the M14,

but are not as stable as the heavier barrels used on the Super Match M1As and Ultra Match Garands. Heavy barrels produce better accuracy by better resisting harmonic vibrations, elongation from repeated firing and the effects of sling tension.

Nelson said chambers for all heavy M1A and Garand barrels are cut with standard SAAMI-dimensional chamber reamers, although NM barrels have chambers cut to M14 National Match specifications.

The chamber dimensions of 7.62 mm NATO and .308 Win. are slightly different. To assist feeding in automatic weapons, the 7.62 mm NATO chamber has slightly larger dimensions than the .308, especially in the pressure belt area. Nelson's use of SAAMI-dimensioned chambers reduces case stretching, often encountered when reloading for the 7.62 mm NATO. Dimensional differences between the .30 U.S. (Garand) and SAAMI-dimensioned .30-'06 chambers are insignificant.

Operating rods that are bent, worn or out of alignment, according to Nelson, are probably the greatest reasons for inaccuracy in either the M1A or the Garand, and the most easily overlooked. According to Nelson, the M1A's operating rod should have a "snug fit" within the operating rod guide and be parallel with the gas cylinder and the centerline of the bore.

Operating rod "play" or lack of alignment can create a condition where the operating rod's movement is at some angle to the axis of the bore, which usually causes flyers in the M1A or the M1 Garand. Nelson said many shooters will often spend a "bunch of bucks" on a new barrel, reglazing the receiver, or other accuracy work, when the real problem is the operating rod or operating rod guide.

Nelson purchases bolts manufactured by TRW for use in all Super and National Match M1As. Bolts used in the Garands are furnished by Springfield Armory. He says the manufacturer of the bolt isn't of as much importance as its fit within the receiver, squareness of the bolt face, and the headspace it gives to the rifle. Headspace of all new and rebuilt match-grade M1As is held between 1.631" and 1.632". Headspace for the Garand is held between 1.942" and 1.943".

Nelson either personally glass-beds each rifle or closely monitors this process, because this, he says, is a critical part of the accurizing procedure. Nelson uses Bisonite (a two-part epoxy) as a bedding agent, because he has found it provides the least shrinkage during setup of any bedding compound available. It is also one of the easiest bedding agents to work and clean up, is easily troweled with a putty knife and washes off hands with water.

To keep the metal parts of the rifle from sticking to the bedding agent, he uses Rand 202 silicon as a release agent. After parts are dipped in this watery-looking substance, nothing will stick to them during the bedding operation, he says. Nelson uses modeling clay to fill all places in the receiver or stock where he doesn't want the bedding agent to spread.

Many types of stocks are available from Springfield Armory as original or replacement parts. These include standard walnut, heavy oversize competition, heavy Kevlar, GI Fiberglass, and the M14E2 pistol grip version. Most Super Match M1As and Ultra Match M1 Garands are built standard with the heavy oversize competition stock, because its extra weight reduces recoil encountered in competitive shooting.

The oversize stock isn't for everyone, and many shooters find the standard NM stock fits them better than the competition stock, although the competition stock usually makes the rifle a shade more accurate.

Standard finish is several coats of raw linseed oil. Nelson says Springfield Armory requires this finish because many customers like the military look of linseed oil.

Also available is a two-part polyurethane finish with the trade name "Fiber Plas," manufactured by Fuller-O'Brien Paint Co. This high-gloss finish is touch-dry in five minutes and can be sanded in 15 minutes. It usually does not require the use of a separate filler, and five to seven coats are usually sufficient to provide a durable finish with excellent moisture protection.

The gas cylinder is modified to National Match specifications and the lower band is assembled to the gas cylinder with countersunk head screws. The tangs of the lower band are heated and bent upwards to keep the handguard off of the stock after final assembly.

The components of the trigger group are checked for proper operation, but trigger pull and sear engagement are checked by armorers at Springfield Armory during final assembly.

The last step in the production of match-grade rifles is their shipment, partially assembled (but fully accurized) to Springfield Armory's Geneseo plant. It is there the rifle will be completely assembled, proof tested with live ammunition and packaged for shipment to distributors and customers. Parts installed in Geneseo include front and rear sights, operating rods, handguards, slings, etc.

Nelson's loads for his M1As are Federal .308 Win. cases, 41.5 grs. of IMR 4895, Sierra's 168-gr. MatchKing, and Federal's 210 Match primer. This load chronographs at about 2550 f.p.s., although for full M118/M852 velocities out of an M1A, this load should be bumped

to 42.0 grs. of IMR 4895. Nelson's mid-range (300-yd.) load uses the same components, except substituting 39.5 grs. of IMR 3031 or 40.5 grs. of IMR 4895 instead of the powder specified. Although he still loves to shoot, the years and his trifocal glasses have taken a toll upon Nelson's shooting abilities.

Nelson said when reloading for M1As (M14s), never use round-nosed projectiles with exposed lead points because small pieces of the exposed lead may be shaved off by the feed cuts milled into the barrel's face. This small piece of lead can get between the case shoulder and front of the chamber. He displayed five rounds of new 180-gr. Winchester ammunition that had been hand-cycled through the magazine. The two rounds that had been on the left side of the magazine had their points completely shaved off and the three from the right showed slight beveling.

Nelson makes one guarantee—"If we build a rifle for a customer, we will do whatever is possible to make sure he is satisfied with it. That is our guarantee. An average marksman should be able to get groups of less than 5" at 300 yds., although I can't guarantee a specific size group because of the many number of variables involved in shooting."

Nelson added that he was amazed at the number of aspiring shooters who believe that a "\$1,000 rifle will make them \$1,000 shooters." He said the only thing a \$1,000 rifle will do for a poor marksman is make him a "poor marksman with a \$1,000 rifle." ■

## Custom Stock

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type of stock figure or grain patterns available range from a plain piece of flat-cut black walnut for a minimum of about \$15 up through an extra fancy piece of walnut with tight fiddleback going for a "C note" and then some.

Because crotch figure is more common, it generally is somewhat less expensive than the fiddleback. The stocks are inletted for a whole host of different rifle and shotgun actions, with bolt-action rifles being the most popular.

After having completed several 95% semi-inletted stocks, you may want to try different woods like old world walnut, maple, Oregon myrtle, etc. Or more highly figured blanks and thus more expensive wood could be selected.

This is accomplished during the final shaping process by saving some of the sanding dust and mixing it with a clear two-component epoxy adhesive to fill the defect. The defects are usually small seasoning checks or knot holes that don't affect the strength and soundness of a

gunstock. The void areas can be filled to make them almost undetectable. Often these blanks are reduced 25% or more of the original list price.

Within a given wood species used for stock blanks, each piece of wood is unique. The grain structure, color and density can vary considerably. Select a stock blank to do a specific job. For example, it would be just foolish to select a blank of hard, dense and thus heavy

Comparative Stock Blank Weights

Wood Species	Density (lbs. per cu. ft.)	Avg. Wt. Semi-Inletted Blanks (ozs.)	Sample Size
Black Walnut	38	46.5	(6)
Hard Maple (East Coast)	44	57.3	(3)
Bigleaf Maple (West Coast)	34	38.0	(2)
Black Cherry	36	42.0	(2)

black walnut (*Juglans nigra*) for a lightweight sporting rifle.

There is a variation in all wood species of approximately 10% from their average physical property strength values. Thus the weight in pounds per cubic foot (lbs./cu.ft.) can vary plus or minus 4 lbs./cu.ft. from the average value of 38 lbs./cu.ft. for black walnut. The average sporter style stock blank has less than .10 cu.ft. of wood in it.

To demonstrate actual stock weight variations, I weighed a number of semi-inletted stock blanks. The stocks were all of the same basic sporter style and inletted for the 98 Mauser action; thus, for all practical purposes, the volume of wood was the same for each blank. The comparative data are listed in the accompanying table.

The heaviest black walnut blank was 3 lbs. 3 oz. and the lightest was 2 lbs. 10 oz.—a difference of 9 oz. or a shade over a half a pound. When you consider that a lightweight sporting rifle generally tips the scale at between 6 and 6½ lbs., that "half of a pound" is around 10% of the total weight of the rifle. Thus you can cut additional weight by using a low-density stock blank.

So for your winter project of building some youngster a lightweight sporting rifle or for restocking your favorite sporting arm, whether it be that well used deer rifle or a worn 20-ga. double, pick your plain or fancy, light or heavy semi-inletted blank; then spread the elbow grease and continue to develop your wood-working skills. Enjoy! ■

The sporter weight stock design drawing illustrated on pp 20-21 is by custom gun-maker Jerry Fisher, 1244-4th Ave. West, Kalispell, Mont. 59901. Full-size copies for the pre-'64 Model 70 Winchester or 98 Mauser are available for \$10 each.

## Lanchester

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ary Force left tons of war materiel in France, including more than 65% of its small arms.

By the summer of 1940, the British High Command believed that the home island would be attacked by German paratroops operating from bases in France, plus a cross-channel naval invasion. The RAF especially saw the need for sub-machine guns for its guard personnel to defend against the potential paratroop attack on British airfields.

The Army had already gathered up most of the available Thompson sub-machine guns for its own use, a highly justified decision in view of its materiel left behind in France. Official Lend-Lease from the U.S. wouldn't be a fact until 1941, so Great Britain had to go it alone.

Keeping in mind the needs of the Royal Navy and the Air Force apart from the Army, a meeting was scheduled for Aug. 12, 1940, at the Ministry of Supply in London to "coordinate the requirements of the three services for the home production of a machine carbine." Excellent postwar research by Hobart documented that at the meeting the Army indicated it was satisfied with the supply of U.S. Thompsons, while the Navy had ordered 2,000 Smith & Wesson Model 1940 self-loading carbines. The RAF, in turn, asked for 10,000 British copies of the German MP-28II.

After later meetings concluded among the three services, the Ministry of Supply and the Ordnance Board concluded that "50,000 British Schmeissers close to the MP-28 pattern" would be produced. The production would be divided between the Navy and the Air Force. In addition, 110 million rounds of 9 mm ammunition were ordered from U.S. factories. Sterling Armament of Dagenham, an experienced maker of quality firearms, won the Munitions Supply Board contract to develop the gun.

According to Hobart: "Time was a prime factor. The invasion and paratroop threats were perceived as immediate and Sterling had to operate with a four-month deadline from contract to prototype.

"Because of this time factor, Sterling's engineers decided to copy an existing design and settled on the German Maschinepistole Model 1928, the MP-28II. It wasn't the newest model, but Sterling's people felt it offered the best workmanship along with total reliability and simplicity of both manufacture and maintenance," Hobart said.

According to Sterling records, the project was assigned to George Herbert Lanchester, a veteran company engineer. He took several specimens of the German gun for study and testing. Using an op-