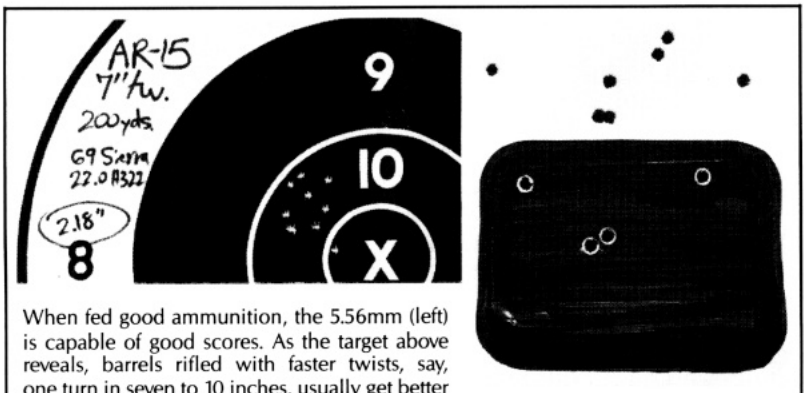
Reloading Semiauto



When fed good ammunition, the 5.56mm (left) is capable of good scores. As the target above reveals, barrels rifled with faster twists, say, one turn in seven to 10 inches, usually get better results with 68 to 69-grain bullets. Most SKS carbines, on the other hand, deliver better accuracy with cast bullets (above, right) than they do with service rounds. NEI bullet No. 155.311 groups very well when backed by 20 to 25 grains of H-322.

C.E. Harris

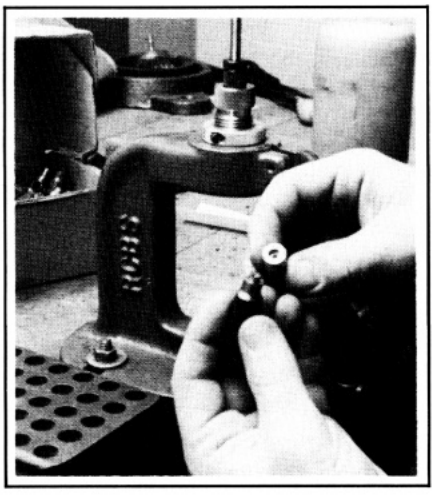
DESPITE WHAT YOU have heard to the contrary, it is entirely practical and cost-effective to reload semiautomatic rifles. It is true you must observe common sense precautions and accept certain limitations but the results are satisfying and easy to obtain. It is no trick to equal the functional reliability of factory ammunition. With some planning you can improve upon the accuracy of factory loads and save money as well.

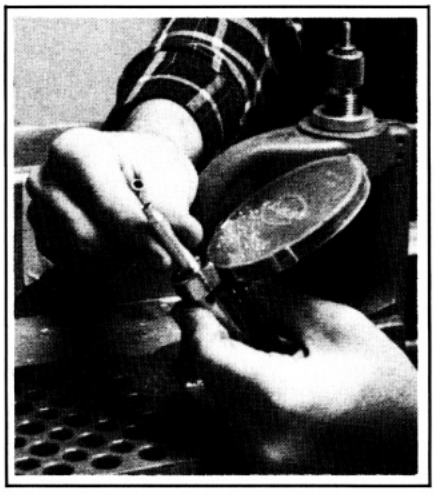
The fundamentals of reloading for a semiautomatic rifle are simple: *Reloads should be duplicates of factory or arsenal loads, wherever possible.* You have great flexibility of bullet makes, types and styles within that framework, but staying within traditional boundaries avoids lots of problems. Given some knowledge, you can deviate from that but you might have problems with feeding if you change bullet shapes, with functioning if you try much lighter loads, and you may even induce gun mechanism damage or an accident with inappropriate powders or primers. Experimentation is for the knowledgeable and cautious.

Case preparation and priming are critical for both safety and reliability. You cannot afford distractions. Full-length resizing of fired brass to be used in semiautomatic rifles should be considered routine. Resized brass must enter the chamber freely and extract without resistance.

Excessive sizing is usually caused by mismatched shellholders, improper dies or maladjusted dies and will reduce case life or cause head separations. It is popularly believed that small-based sizing dies are needed for semiautos but they are more applicable to manually operated rifles having poor extraction or chambering leverage, such as pumps or lever guns.

Small-based dies should be avoided when making ammunition for most semiautos. That is because military chambers and sporting semiautomatic rifles have greater radial body clearances to aid functioning under adverse conditions. If the case body diameter is reduced more than needed, it will expand that much more when fired, then be reduced excessively





for Rifles

again the next time through the sizing die. Overworked brass turns brittle quickly and will exceed its elastic limits and fail lamentably soon.

Setting the shoulder back too much by mismatching dies and shellholder, or using cheap, surplus brass which may have become shortened from firing in a machine gun, give similar results. The violent operation of many automatic gun mechanisms rams cartridges into chambers and drives their shoulders back, creating conditions akin to excessive headspace. I have seen M80 surplus brass separate in M1 and M14 rifles after being reloaded once — and that is why.

When using brass from Lake City M118 Match ammo fired in an M1 or M14 rifle, you can expect at least a dozen match-quality reloads even though those hulls are resized full length every time. If you trim every second firing and anneal again about the eighth reload.

I have always used standard full-length sizing dies when reloading for the M1, M14, AR-15 and M16, AK, SKS, FN-FAL and HK rifles and have experienced no problems. All popular makes of reloading dies give satisfactory results but all of us have our preferences. It is unnecessary to get the most expensive die set. I have been using Lee dies extensively, giving them a real workout in .223, .308, 7.62x39 and .30-06 for several years now. I am very favorably impressed with them. They work the brass no more than is necessary, which helps case life. I have used some brands of older dies which worked the brass too much and caused problems.

Most die makers are concerned with being sure that cases resized in their dies will work in even the tightest chamber. Lee dimensions its dies to accommodate the average chamber, which is best for most users. When one of those occasional snug chambers (which needs more aggressive sizing) is encountered, Lee is happy to replace or modify the die.

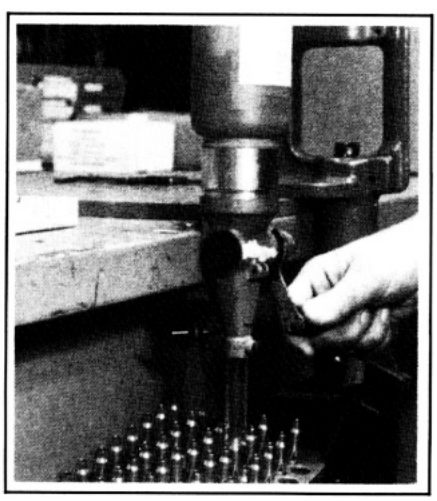
Cartridge case defects which are of no serious consequence in a manually operated rifle (such as a loose primer pocket) can cause malfunctions or accidents in a semiautomatic. Conscientious case inspection and preparation are essential. The most common defects in reloading ammunition for semiautomatic rifles are long cases which should have been trimmed (but were not), and dirty or oversized primer pockets.

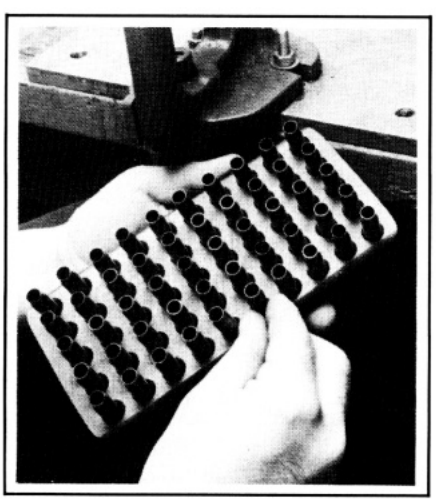
Extra-long cases affect uniformity of crimping, which can cause velocity and accuracy variations. In the extreme, it can buckle a case shoulder during crimping, impede chambering and prevent the breech from locking completely. When excessively long cases impinge against the end of the chamber, their mouths may resist expansion and delay releasing the bullet, causing a dangerous increase in pressure.

Dirty or oversized primer pockets are potentially dangerous. That is because a dirty primer pocket may leave a primer protruding slightly after seating or an oversized pocket can permit a primer to back out during the feed cycle. Either condition risks a slamfire caused by the high primer being struck by the lip of the bolt as it is stripped from the magazine, or by the bolt face itself as the round is chambered.

There are a great many myths about accidental slamfires which I would like to clarify. Rifles like the M1, M14 and Ruger Mini-14 have cam-retracted firing pins which prevent their protrusion from the boltface unless the bolt is fully locked. The rear of the firing pin has a "tail" which engages a cam cut in the receiver web. That prevents forward movement of the firing pin until the bolt has rotated fully into battery to align the firing pin tail with its clearance slot in the receiver during normal firing. There is another safety feature, the hammer retraction cam, which prevents the hammer from contacting the firing pin tab unless the bolt is fully locked. A correctly assembled M1 Garand cannot fire out of battery. Nevertheless, correctly functioning safety devices can be defeated by idiot-loaded/ammo-induced errors.

Case sizing problems can be avoided by properly adjusting dies. Most dies require a slight crush of the shellholder against the die at top dead center of the ram's stroke. If you have shellholders which aren't the same brand as your dies, or if the die body has been shortened to accommodate a tight





Far left, cleaning primer pockets with a Match Prep tool. Left, a Lee hand primer speeds production with no loss of sensitivity. Right, Ed never bothers to weigh powder charges; he measures them all. Far right, before seating bullets, the powder level in each case should be checked visually to make sure they are alike.

5.56mm NATO (.223 Remington) Semiauto Rifle Loads

Tested in an AR-15 with 7-inch twist

bullet	powder	charge (grains)	velocity (fps)	group* (inches)
52 Sierra MatchKing	H-4198	22.0	3,096	3.06
	W-748	28.0	3,161	3.89
	H-322	23.5	3,033	3.90
55 Midway FMJBT	H-4198	21.0	2,950	5.48
		22.0	3,052	5.57
	H-322	23.0	2,927	5.59
	H-335	26.0	3,126	6.57
Military loads fired for comparison				
M193 TW72 lot 2-612			3,196	5.34
SS109 (M855) FNB*83			3,143	5.78
Following loads for Government chamber only! Not for SAAMI-chambered rifles!				
69 Sierra MatchKing	H-4198	20.0	2,724	3.66
	RL-7	21.0	2,753	4.40
	H-322	23.0	2,793	4.05
	H-4895	24.0	2,837	4.03
	RL-12	24.0	2,745	4.23
	W-748	26.0	2,850	4.28
	IMR-4064	23.5	2,725	3.64
	IMR-4320	25.0	2,829	3.99

* groups are an average of five 10-round groups at ***200*** yards.

All loads used WCC cases with Remington 7½ primers; overall cartridge length was 2.26 inches. Velocities instrumental at 15 feet.

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.30-06 Loads for Semiauto Rifles

For M1 Garands and other military rifles

bullet	powder	charge (grains)	velocity (fps)	remarks
125 Sierra Spitzer	H-322	50.0	2,950	Outstanding bullet for offhand and 200-yard sitting rapid-fire National Match stages.
	AAC-2520	52.0	3,000	
	IMR-4895	52.0	2,970	
	H-4895	52.0	2,940	
150 Sierra MatchKing	IMR-4895	48.0	2,800	The 150-grain MatchKing equals the accuracy of the 168-grain MK in the Garand, and approximates M2 Ball velocity.
	W-748	52.0	2,775	
	H-322	46.0	2,740	
	IMR-4064	52.0	2,800	
	AAC-2520	49.0	2,795	
168 Sierra MatchKing	IMR-4895	46.5	2,640	Best choice for an all-around match load for use up to 600 yards, and for accuracy testing.
	H-4895	47.0	2,660	
	IMR-4064	48.0	2,700	
	H-380	49.0	2,650	
	AAC-2520	46.0	2,600	
175 M118/M72 FMJ	IMR-4895	44.5	2,600	These charges closely approximate M72 Match ammunition, working well in the Garand.
	H-4895	45.0	2,625	
	W-760	52.0	2,640	
	IMR-4064	47.0	2,620	

All loads used Lake City Match cases with Federal 210 primers; overall cartridge length is 3.32 inches. Velocities instrumental at 15 feet. These loads are proven performers in match-conditioned Garand rifles, but also group well in bolt action match and sporter rifles.

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chamber, you may set the case shoulder back too much.

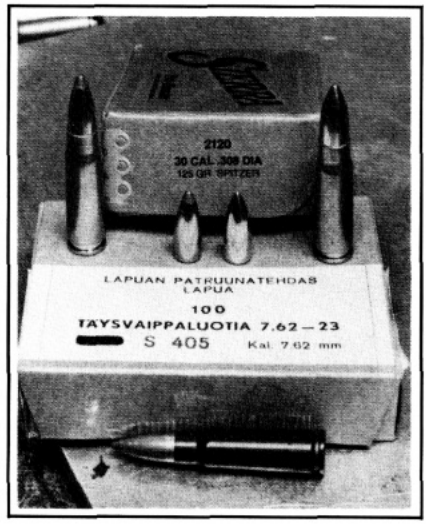
The best way to adjust dies when loading ammunition for a group of team rifles of the same caliber is to accommodate the tightest chamber. Size a group of test cases and try them in each rifle. Strip the bolts of extractor and ejector, and remove the operating rod spring. Using thumb pressure to close the bolt, the resized brass should enter the chamber freely and the bolt should close *as if on an empty chamber.*

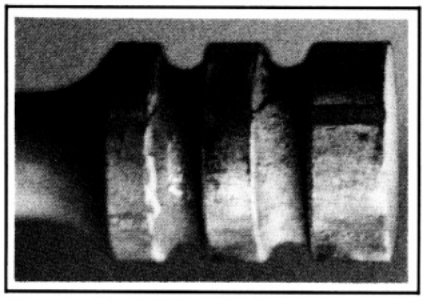
I routinely decap brass picked up on the range with a Lee decapping die prior to tumble cleaning so I can make a thorough visual inspection. If the brass is of a known batch, I postpone cleaning and inspecting until after trimming and deburring.

All cases showing cracks and deep body dents or splits are culled and hammered flat to prevent re-use. Mouth dents are easily ironed out using the point of a dummy cartridge so the expander button will not wrinkle them.

Chamber flute marks from HK rifles are unsightly but usually do not impair reloading. They are mostly carbon streaking, anyway. Instead, discard any HK-fired cases having torn or deformed rims. They indicate the powder used was too slow and generated higher residual chamber pressure during extraction. Military brass has harder heads and is better for rifles with fluted chambers.

After decapping, cleaning and visual



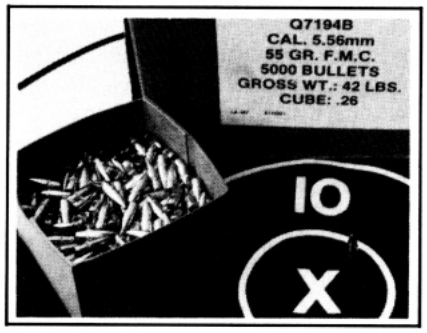


Close-up of an AK's lead-fouled gas piston after a cast-bullet session on the range.

inspection, I clean primer pockets using the Match Prep tool with integral depth stop, rotating the tool in a drill press while bumping each case against it. Using that tool avoids enlarging or deepening primer pockets and speeds production. That is important for teams having thousands of rounds to load. Cases are bulk-lubricated with a water-soluble draw wax, such as Lee Resizing Lubricant, or the similar RCBS product. Those industrial waxes perform well on clean brass when diluted with 10 parts or so of water.

I keep a diluted solution in an ammunition can and lube cases in a fryer basket, shaking off the excess liquid. Cases can be sized wet or stored in bulk and sized later. If assembling ammunition in a Lee 1000, Dillon or other progressive tool, I let the brass dry thoroughly to ensure the primer is seated in a dry, clean pocket. Otherwise, I size wet and store brass for trimming, priming and later use as needed. Residue from those lubricants won't at-

(Continued on page 56)



Left, accuracy of 7.62x39 ammunition is influenced more by bullet quality than diameter. Sierra .308-inch spitzers shot best, even in SKS and AK rifles with .312-inch bores. Right, bulk bullets attract the budget conscious and represent a good value for the tyro. Experts or Masters will want something better, though.

7.62x39mm Semiauto Rifle Loads

Tested in a Chinese SKS with 20.5-inch barrel

bullet (grains)	powder	charge (grains)	velocity (fps)	group* (inches)	remarks
123-125	W-680	23.0	2,330	4.4	Lapua FMJ bullet
	H-4198	24.5	2,264	4.3	Hornady SP bullet
	H-322	28.0**	2,220	4.2	Hornady SP bullet
	RL-7	26.5	2,325	3.9	Sierra .308 spitzer
150	H-335	28.0	2,080	5.3	Hornady .308 bullet shoots as well as .312
	H-4198	23.0	2,025	3.7	Sierra .308 MatchKing
	RL-7	24.0	2,106	4.5	Sierra .308 FMJBT
NEI 155.311 GC (50-50 wheelweights and Linotype, sized .313, Lee liquid Alox lube)					
155 cast	2400	17.0	1,770	4.1	
	AAC-1680	19.0	1,710	4.1	
	W-680	19.0	1,930	4.7	
	H-322	24.0	1,875	3.5	
	AAC-2230	28.0	2,047	4.4	
	H-4198	22.0	1,980	4.5	

*groups are an average of five 10-round groups at 100 yards.
**compressed load.
All loads used Federal cases with Federal 210 primers; overall cartridge length was 2.19 inches. Velocities instrumental at 15 feet.

Be alert — Publisher cannot accept responsibility for errors in published load data.

7.62mm NATO Semiauto Rifle Loads

These loads are competition-proven, giving fine accuracy and reliable functioning in M14 NM and M1A rifles.

bullet	powder	charge (grains)	velocity (fps)	remarks
146-148 FMJ M80	H-322	41.5	2,745	These loads approximate M80 Ball ballistics.
	H-335	43.0	2,775	
	H-4895	42.5	2,770	
	IMR-4895	42.0	2,775	
150 Sierra MatchKing	IMR-3031	41.5	2,793	These bullets are best for light recoil in the 200-yard off-hand and sitting stages of the National Match Course.
	IMR-4895	42.0	2,784	
	H-4895	42.0	2,748	
	W-748	45.5	2,731	
	H-322	41.0	2,720	
168 Sierra MatchKing	IMR-3031	39.0	2,590	These loads approximate the M852 Match load.
	IMR-4895	40.5	2,626	
	H-4895	40.0	2,575	
	IMR-4064	41.5	2,607	
	W-748	43.0	2,587	
	AAC-2520	41.0	2,590	
175 M118 FMJ	IMR-4895	39.0	2,544	These pulled M118 Match bullet loads can also be used for the .309 170-grain Lapua, approximating performance of the M118 Special Ball.
	H-4895	39.0	2,525	
	IMR-4064	41.0	2,566	
	W-748	42.5	2,608	
	AAC-2520	40.0	2,550	
180 to 185 grain	IMR-4064	41.0	2,532	Good bullets for the 600-yard National Match stages
	W-748	41.5	2,470	

All loads used Lake City Match cases with Winchester WLR primers; overall cartridge length, 2.80 inches. Velocities instrumental at 15 feet. (Ordinary GI bullets will group about two MOA, M118 Match bullets about MOA. Commercial HPBT Match bullets can group sub-MOA from match-conditioned semiautos, approaching ½ MOA in a good bolt action.)

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with an overall camo finish and a synthetic stock.

The combination of an aluminum-alloy receiver and a very heavy barrel places the point of balance about two inches forward of the receiver. When the gun is loaded, the balance point moves even farther forward. While that makes the ULTI-MAG somewhat muzzle heavy, it is definitely an asset for the pass-shooting waterfowler. Once the swing is underway, there is less chance of stopping the gun and shooting behind the target.

Since the ULTI-MAG will function with all 12-gauge loads, long or short, there can be no argument about its versatility.

Though Mossberg will most likely frown at my saying so, I see this super-magnum mainly as a special-purpose gun, not as an all-round answer. It will, of course, step in and pinch hit in a lot of different situations. As an example, I used the gun on two different occasions to knock off a brace of pheasants and found that it carried and pointed quite well. Nonetheless, I still see it primarily as a gun for waterfowling and turkey hunting. It is simply a matter of weight and weight distribution — and with that 1⅜-ounce steel-shot load, you wouldn't want it any lighter.

There are those who predict the new 3½-inch load and the guns chambered for it have little or no future. Their argument is this: If you want 10-gauge performance, go to a bona fide 10-gauge gun and be done with it. As a waterfowler who has used a variety of 10-gauge magnums for nearly a quarter century, I am not in complete agreement.

My principal reason for taking issue is that any 10-gauge magnum, whether it be a side-by-side, an over-and-under or an autoloader, is truly a ponderous gun. Because they are big, long and heavy, there are lots of shooters who simply cannot master one. It's not really an exaggeration to say that unless one has the build and strength of a Hollywood muscle man, the guns are very slow to mount and put into motion.

Asking the 3½-inch 12 to pattern a nearly equal charge of steel shot as efficiently as a true 10-gauge may be asking too much. Even if pattern performance was equally efficient, the super-long 12 would still finish a few yards behind. Even so, its ace in the hole is much more responsive handling — and that should guarantee it a place in the sun. •

Reloading for Semiauto Rifles

(Continued from page 27)

tack powder or primers. Its use eases expander passage and reduces carbon build-up in the necks.

I reload and fire once-fired brass the first time without trimming, only deburring, then trim after every other firing. That works well for me.

The easiest way to trim cases in quantity is to use the Lee case trimmer in a drill press. I grasp the cutter in the chuck, let it turn at the slowest speed and let the case gage pilot bottom against the drill press table. By taking a light routine cut every other reload, you don't have to remove much material. You can hold the cases in your fingers without using the case holder and run through 500+ per hour. I hold the deburring tool in the drill press and process cases the same way — fast!

My preferred method of loading match ammo is to store trimmed, sized, cleaned and primed cases to load as needed. In that manner, I can use the spare die station to expand case mouths, using a Lyman M-die, for better alignment during bullet seating or to taper crimp, if it is necessary. Not having to size cases greatly eases the effort required to operate the machine and speeds up the process. Most important, it allows you to pay close attention to important details like case length, deburring and primer pocket cleaning.

It disturbs me to know that many people routinely use progressive loaders for semiautos as an aid to fast production, seldom cleaning a primer pocket or trimming a case. That is inviting trouble. You can load large quantities of match-grade ammunition on a progressive machine but if you consider the production rate only, you may produce a shoddy and dangerous product.

Choosing primers is not to be taken lightly; neither is their seating. If a primer is seated in a dirty pocket, it may protrude dangerously. Even if that is not the case, some of the firing pin's energy is wasted, pushing the primer deeper into the pocket. Cushioned by the residue, the result is a mushy rather than a dead blow. That can cause erratic ignition and affect accuracy.

In any cases requiring Small Rifle primers, be sure to use those with "heavy" cups, such as the Remington 7½, Federal 205, CCI 450 or WSR. Before 1968, I saw a few slamfires upon bolt closure with AR-15s and M16s us-

ing primers with thin cups such as the older Remington 6½ or early 5.56mm military primers. The 5.56mm military primer and current commercial Small Rifle heavy-cup primers have base metal thicknesses about .024 to .0255 inch. Standard Small Rifle primers, like the Remington 6½, Federal 200 or the old .30 carbine primer have base metal thicknesses about .020 inch and are more sensitive.

Two firing pin indent fixtures are used in acceptance testing M16 rifles, which measure the depth of the indent made on a copper crusher cylinder by the firing pin. In the normal firing mode, the minimum indent is .020 inch. A second gage is used to measure the indent produced by letting the breech slam shut when loading, to ensure the rifle won't accidentally fire. The maximum indent under that test condition cannot exceed .008. While less than half the normal indent, it is about what you might obtain with a PPC revolver with a light target action in .38 Special so you can see the obvious risk of a defective sensitive primer!

In reloading .308 Winchester, .30-06 and 7.62x39mm ammunition, I have had best results with Federal 210M and Winchester WSR primers. They can be mixed in the same 600-yard group without a noticeable difference in group size or point of impact.

In NRA pressure tests in which Lake City cases were used with 168-grain bullets and IMR-4895 powder as a .308 Winchester reference load, those two primers gave the highest pressures and velocities of any tested. If you work up safe loads for those two primers, you can switch with other makes and not get into any trouble. Remington 9½ and CCI 200 and 250 Magnum primers were about 40 fps and 5,000 CUP lower, with those particular components.

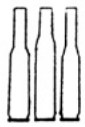
Selection of an optimum versus a merely suitable propellant often determines the difference between success and failure when handloading for a service match rifle. The exact powder and charge is seldom critical, since there are numerous alternatives, but the powder selected should be of similar burning rate to those used in arsenal ammunition. That ensures correct port pressure for reliable functioning while obtaining desired ballistic performance safely. Too slow a powder may result in higher port pressures which will operate the action more violently. I have seen several bent operating rods on good National Match M1 rifles caused by trying to drive 190-grain bullets with 4350 powder. Port pressure is a function of the powder charge weight and the volume of gas generated. Heavy bullets, per se, are not to blame for gun damage in match-conditioned rifles. It is really caused by trying to cram in a heavier dose of slower-burning powder, which operates the mechanism with more vigor than it was designed for. You can load 185 to 190-grain bullets in the 7.62 NATO using 748 or 4064 (instead of seeing how much 4350 or 760 you can cram in) and they shoot well at 600 or 1,000 yards in an M14, without damaging the gun. You can also assemble 185 to 190-grain loads for the 06 Garand with 4064.

The best propellant for semiautomatic rifles is the fastest burning one which will give the desired velocity within safe chamber pressures. The minimum charge weight is economical and provides a clean burn to reduce fouling. Powders used in factory loads may be slower than optimum because of other factors, such as availability, easy machine loading or the desire to meet specifications at lowest possible pressure to reduce risk of a lot being rejected.

Ease of measuring is a factor favoring spherical powders, such as W-748, Hodgdon's Ball C2 or H-335, Accurate Arms MR-2460, MR-2230 and MR-2520, and some finer-grained, extruded powders like H-322, Hercules RL-7 and RL-12. When loading with a progressive machine, that is quite advantageous. Although most top Eastern service rifle shooters find W-748 to be the powder of choice in the M14, I get better grouping in heavy bolt guns with IMR-3031 behind 168s, or IMR-4064 with 180s or 190s. In terms of pure accuracy, I favor longer-cut powders like IMR-4198 in 5.56, IMR-3031 in 7.62 with 150 to 168-grain bullets and IMR-4064 in 7.62 for 168 to 190-grain bullets and for all loads in the 06. Those powders give more consistent groups and appear less sensitive to charge weight or temperature extremes. Their coarser granulation is not detrimental in any way. I do not weigh charges on competition loads, I measure them all.

History bears out this observation with the longer, stick powders. General Hatcher reported in his *Notebook* that some of the best 06 Match ammunition was loaded with coarse-grained Hi-Vel powder back in the 1930s. A local dispenser of wisdom broke some of it down, determined the powder charge variations were excessive and pro-

Dealers Welcome



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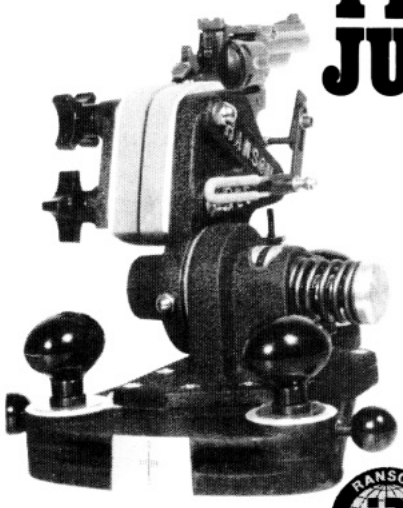

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nounced it "no good." In fact it was the most accurate the arsenal had ever produced and the scores that year proved it. Today, Federal's excellent No. 308M 168-grain match ammunition, usually loaded with 3031 or 4064, routinely outshoots the comparable Lake City product loaded with 4895.

While spherical powders give the highest velocity potential in the .308 Winchester and 5.56mm, they do not always give the best groups. The difference in accuracy is most apparent in a heavy test barrel, because a service rifle and a Mann barrel respond differently due to differences in vibrations and what is going on elsewhere in the gun while the bullet is still in the bore. There is also good reason to suspect that the harmonics of the gas-guns being different from those of a test barrel, that the loads which shoot best in an M14 or M16 may not be bell ringers in a rail gun.

There are also notable exceptions to the trend. For 200-yard shooting in almost any rifle, nothing will beat 41 grains of H-322 in the .308 behind a 150-grain MatchKing. In heavy 5.56 test barrels, 21 grains of RL-7 clearly beats anything else you can load behind a 69-grain Sierra MatchKing. Don Holmes confirmed those results in his H-Bar but in an M16A2 or "Government Model" AR-15 with the heavy-on-end-only barrel, 20 grains of H-4198 or 22 grains of H-322 shoots better. It just shows that it pays to experiment.

Generally speaking, powders slower than MR-2520, W-748, IMR-4064 and IMR-4320 should not be used in the M14, and none slower than W-760, H-380, MR-2520, IMR-4064 and IMR-4320 in the Garand .30-06. Faster powders like H-322, RL-7 and 3031 will work fine with bullets from 125 to 168 grains in the .308 or .30-06, if you are not trying for high velocity. In the 5.56mm, suitable powders are dictated by the limited case capacity. W-748 is suited for the entire range of bullets usable in the 5.56. Other powders of similar burning rate, such as H-335, MR-2460, BL-C(2), IMR or H-4895 and RL-12 will also work. Faster powders like MR-2230, H-322 and IMR or Hodgdon 4198 give good accuracy in M16 and AR-15 rifles if you stay a bit below maximum velocities. Accuracy with the 69-grain Sierra MatchKing falls off in the seven-inch twist M16 rifle over 2,750 fps because of bore finish, barrel heating and jacket limitations. You can drive them 3,200 fps in a smooth-barreled 10-inch twist .22-250, if you don't shoot rapid fire.

Bullet selection for a semiautomatic rifle boils down to economics for the casual shooter wanting the most bang for the buck. The serious competitor chooses accuracy above all other concerns, and many won't go to Perry without bullets from a green box, regardless of price. The best course for Experts and "losing Masters" is the middle ground. Less expensive bullets often do the job well and provide accuracy suitable for all but the most demanding competition. The rule in buying bullets is "if you cannot tell the difference, don't spend the money!"

Beyond economics there are practical considerations which must be met. In most military semiautos, bullets should be of spitzer shape with little or no exposed lead. Blunt softpoints invite feeding problems. Some sporting autoloaders seem to digest almost any bullet shape but it is best to use a streamlined profile.

With very few exceptions, ammunition loaded for semiautomatic rifles should use cannelured bullets so they can be crimped. That avoids the risk of the bullet telescoping into the case when it strikes the feed ramp and may avoid a dangerous "bullet in bore" obstruction if you should fire a reload in which the primer ignites and the powder doesn't or which has a light or missing powder charge. Under those conditions, a non-crimped bullet might be left in the throat upon extraction. If the shooter fails to notice the plugged bore and chambers another round, dangerous pressures can result. Crimping bullets cannot positively prevent such mishaps but will induce a jam if you attempt to chamber a round in the already-clogged throat, rather than simply telescoping the bullet. That alerts the shooter to the fact something is wrong, as should any interruption to the normal routine.

Most ordinary loading dies will assemble ammunition which is adequate for highpower service rifle competition. Many shooters go to extremes to ensure the straight seating of loaded rounds but most misalignment is caused by distortion of the case neck by the expander button during sizing rather than by improper bullet seating. For that reason, I prefer the long expander plug on the Lee dies.

I took 100 rounds of 5.56 ammunition loaded with Lee dies on a Lee turret with Auto-Index and spun them on a dial indicator. Only one round showed more than .003 inch runout. It was .004 inch, which is still good. Fifty-six percent of the rounds spun had runout of .002 or less, which is as good as anybody can do with a straightline seater and hand arbor press. Competition shooters loading match bullets do not crimp their ammunition but they are usually more experienced, observant and careful than the average blaster, so it is OK. Anybody who is a casual shooter should crimp his reloads for the safety reasons described previously. If the bullet has a cannelure or groove, that makes it easy, though it gives little flexibility in overall length to obtain the best accuracy. I prefer to use the C-H taper crimp die and crimp as a separate operation, because that results in less misalignment. It also lets you accommodate non-cannelured bullets. When taper-crimping, use no more crimp than necessary lest you damage the bullet. Test bullet push by resting a bullet point against a bathroom scale and leaning on it. If cartridge overall length doesn't change more than .01 inch after withstanding five seconds of a sustained, 40-pound load, there is little fear of that bullet telescoping during the feeding cycle or in the event of a jam. If it moves, a smaller expander plug or taper crimp is indicated.

Proper overall cartridge length for semiautomatic rifles is determined by magazine length and the standard bullet profile. If loading 5.56mm ammunition for the M16 or AR-15, overall length with military or Sierra match bullets should be 2.25 to 2.26 inches; for the 7.62x39, 2.19 to 2.20 inches; for the 7.62 NATO for the M14 or M1A, 2.79 to 2.80 inches; and for .30-06 in the Garand, 3.32 to 3.33 inches. For slow-fire loads, to be single-loaded, you can sometimes do better in a long or worn throat by seating the bullets out a bit to reduce the jump. In typical military chambers, 2.30 inches is correct for 5.56mm and 2.89 inches for 7.62mm NATO. The .30-06 throat seldom accepts loaded rounds longer than 3.33 inches unless the rifling origin is well worn. In a new SAAMI 06 chamber, GI or Sierra match bullets may have to be seated shorter than 3.30 inches to chamber without engaging the rifling.

The ballistic advantages of boat-tailed bullets are slight at hunting ranges but there are other advantages to using them. I prefer boat-tails because they start easier into the case and will stand alone on a case mouth when placed there prior to seating. To load flatbased bullets with equal ease on a progressive machine you must use a Lyman M-die to expand the mouth a bit over bullet diameter for about $\frac{1}{16}$ inch. I usually do this on target loads

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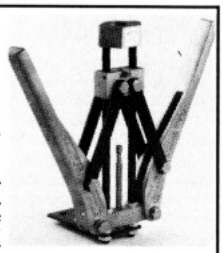

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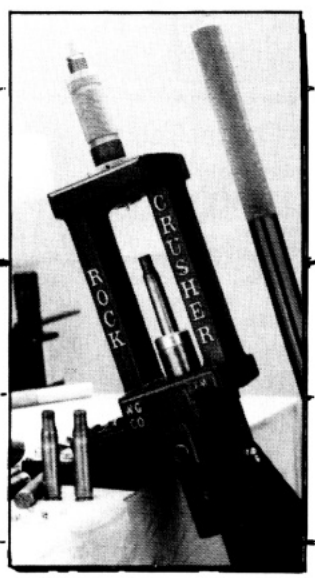

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even with boat-tails because it aids concentric bullet seating and reduces base damage.

There is nothing wrong with flat-based bullets. It is easier to make flat-based bullet punches and the tools last longer so bullet manufacturers like them. Unless a particular manufacturer has lots of experience making boat-tails, their flatbases may shoot better.

When used against game, flatbases usually retain their cores and are less prone to separate upon impact. Good match bullets will shoot well in either shape. The major ballistic advantages of boat-tails aren't noticeable until they get to the 600-yard line.

Some handloaders want their ammunition to be waterproof for long-term storage or reliability under adverse conditions. Imitating military mouth varnish and primer lacquer is usually a waste of time and effort. In fact, if correct materials and methods aren't used, dangerous conditions can result.

Normal handloading practices will provide centerfire loads which will withstand an ordinary drenching in rain or a capsized canoe — even an accidental trip through the family washing machine. The extreme water and oil-proofing required of military ammunition is irrelevant for most of us.

If you insist on waterproofing primers or wish to identify batches of loads, the following method will give satisfactory results. Obtain some model airplane lacquer (not epoxy or urethane-based paint), of a highly visible color such as red, green or blue. Dilute it with lacquer thinner to a watery consistency. With the primed cases or loaded rounds stacked base up in an MTM box or similar container, dip a straightened paperclip about half an inch into the diluted lacquer. That should leave exactly one drop on the clip. If you touch the end of the wire to the edge of the primer pocket, the lacquer will flow neatly and perfectly, looking just like Lake City did it. You can seal the bullet by holding the round in your fingers and applying a single drop where case mouth and bullet meet. Use one drop on a .22 to .270 round and not more than two on a 7mm to 8mm cartridge.

The loads in the accompanying tables are proven combinations which should give reliable functioning and match-winning accuracy without further experimentation. ●