Reloading for Semi-Autos and Service Rifles

Why a separate section on reloading for service rifles? Aren't the procedures used to load ammunition for them the same as for a more conventional bolt-action? In a word, no. There are enough differences, quirks and concerns that the subject needs to be addressed separately. Some issues relate to safety, others to reliability and accuracy. Frankly, reloading for semi-autos is, and should be considered, an advanced handloading activity. Our comments here are intended primarily for shooters using semi-autos in NRA High Power competitions.

Based on sheer numbers of registered and classified shooters, High Power rifle matches are the most popular competition in the United States. Much of this popularity can be attributed to the types of rifles used. The competition is divided into two categories: Match Rifles and Service Rifles. The Service Rifle category, as the name implies, is limited to the M1 Garand, the M14, the M16A2 or their commercial/civilian equivalents. In the past, Match Rifle usually meant a bolt-action, often a Model 70, modified for "over-the-course" usage. This is no longer the case since the ascent of the M16/AR-15 family of autoloaders in this type of competition. Many of today's guns for the Match Rifle class are built on the M16 family of rifles, or their larger cousins, the AR10 and SR-25s. These so-called "space guns" are now in vogue.

Reloading for gas-operated semi-autos is a bit more demanding than the same process in a bolt-action rifle. Considering the tremendous popularity of Service Rifle competition in the NRA High Power game, more shooters are entering this specialized reloading field every year. In the end, the result should be the same — safe, reliable and accurate ammunition. Just how we get there will take a slightly different route.

As basic as this may sound, a Service Rifle is not a Benchrest rifle. Both of them are extremely accurate, and both are used in their respective competitive venues. However, the requirements placed on the ammunition are quite different. Many of the techniques beneficial for a Benchrest rifle are of no value for a Service Rifle. Others may be counterproductive, and some can even be dangerous. Well-intentioned handloaders who fail to appreciate these differences face potentially serious problems and a lot of frustration. We encourage you to read and understand the differences involved.

Cautions

Handloading ammunition, by its very nature, involves certain inherent dangers. This is especially true for Service Rifles. Minimizing these dangers requires some knowledge of the ammunition, firearms, and details of the reloading process. Loading for Service Rifles, and for semi-autos in general, present some unique challenges. Performing this type of handloading safely requires some knowledge of how the systems operate.

Slam fires

Slam-fires are an ever-present danger with Service Rifles (particularly with the M1 and M14 family). A slam-fire occurs when a round discharges as the bolt is closed. This can result in an accidental discharge with no other damage, or it can virtually destroy the rifle and injure the shooter. The deciding factor here is whether the rifle is fully in battery. Unfortunately, most slam-fire incidents are due to improperly assembled handloads, sometimes combined with poor gun-handling techniques. A few simple precautions can decrease the chances of a slam-fire.

Virtually all U.S. military Service Rifles utilize firing pins that rest freely within the bolt. Referred to as a floating firing pin, it will actually strike the primer lightly when the bolt is closed. This results in a slight dimple in the primer, which is plainly visible if the unfired round is extracted. This isn't a problem with military ammunition because they use primers with thicker cups specifically because of this. However, it can be hazardous with the more sensitive commercial primers. The risk increases with high primers, headspace problems, and poor gun-handling technique. These risks are covered in greater detail elsewhere in this section. Please pay particular attention to the sections about rifle manipulation, sizing and priming.

Out of Battery Fires

An out-of-battery firing occurs when the bolt is not fully closed and locked. This is less of a problem in the M16/AR-15 series of rifles due to their bolt design, but it can easily happen with the M1 or M14/M1A rifles. Several safety features are built into these rifles specifically to prevent this from happening. However, these safeties can be defeated, and the condition needs to be understood.

In the case of original G.I. M1s, we are dealing with rifles that are at least 50 years old. Most have seen hard service on battlefields around the world, often in incredibly harsh conditions. Those that have remained in the U.S. inventory (and were subsequently sold through the DCM/CMP) often have been rebuilt at least once, sometimes more. While the design is one of the best ever fielded, the safety features are mechanical in nature. That means that out-of-spec parts — whether caused by wear, poorly manufactured (after-market) parts or improper assembly — can override these safety features. This will become more of an issue as time goes by since fewer gunsmiths will be thoroughly trained in the M1/M14 Service Rifles.

Rifle Manipulation and Its Role in Causing Slam-fires and Out of Battery Fires

Most shooters, particularly those who have plunked down a lot of hard-earned cash for a new Match gun, are inclined to be careful with their rifles.

And that's good — to a point. We need to remember that Service Rifles were designed for combat conditions. They are robust, sturdy and durable. They should be handled with care in regard to their sights and bedded areas, and of course, always with an eye toward safety. But they shouldn't be "babied" in operation. Many new shooters find it a bit disconcerting to see and hear the heavy slamming of the bolt as it is released to strip and feed the first round from the magazine. That is exactly how they were designed to operate, and any attempt to change it will cause problems. This is most commonly seen in shooters attempting to "ride" the bolt home by grasping the op rod handle and easing it forward. Don't do it. Let the bolt slam home with its full force, stripping the round from the magazine and chambering it in one swift motion.

Another often-attempted technique is to place the cartridge directly into the chamber before seating the bolt. This poses two serious potential problems. If the bolt is allowed to slam home on a cartridge that is fully inserted into the chamber, there is

a real possibility of a slam-fire. This is rare with military ammo, but the potential increases with reloaded or commercial ammunition. (The reasons for this are covered more extensively in the sections on primers and headspace.) The second potential problem can occur if the bolt is ridden home slowly and allowed to seat. The bolt may not be fully rotated into battery. This can result in an out-of-battery firing and can be destructive to both the rifle and the shooter. Despite the safety features built into the rifles to prevent this from happening, they can—and occasionally do—fail. Again the solution is simple; allow the bolt to strip the round from the magazine and chamber with its full force.

This is almost impossible with the M16/AR-15 family of rifles when long-range ammunition is used. This is due to both the OAL of the ammo (which is generally too long to fit a standard magazine), and the difficulty of pushing a round down into a seated magazine through the smallish ejection port. Fortunately, these rifles are less prone to such slam fires than the M1/M14 series. The key word here is "less"; they can still happen. Keep your hand away from the ejection port when the bolt is released, and follow the recommendations concerning priming and sizing. This should decrease the potential for trouble. Some competitive suppliers, such as Sinclair, sell a special follower for single-loading the AR family. They make the task a bit easier, and we heartily recommend using them where applicable.

Where the M1 and M14 are concerned, a slam-fire or an out-of-battery firing is an extremely serious occurrence. Stick to loading them only from the magazine. While this isn't difficult with the M14, it can be troublesome with the M1 and its en-bloc clip arrangement. There are several aftermarket clips available that reduce the rifle's capacity, while still allowing the rifle to be fed as it should be. At least two of these are intended specifically for the High Power competitor: a two-round clip and a modified single-round clip that stays in the rifle upon firing. With this clip in place, the bolt locks to the rear after each shot, and the next round is manually snapped into the magazine before releasing the bolt. When the stage is completed, the clip can be unlatched from the magazine and will pop out normally. We strongly recommend their use for safety and because they make shooting the Garand a lot easier.

Component Selection

Component selection for the Service Rifle is yet another area where we deviate from more conventional reloading. Specific cases, primers, powders and even a narrow range of usable bullets make this an area that requires more consideration than other action types. We have today the widest array of available components that reloaders have ever been blessed with.

Considering the strict limitations imposed by the gas-operated action, this is something of a mixed blessing. Service Rifles present a fairly unique set of challenges for the reloader. Sometimes the requirements to meet these challenges seem — and in many ways, may be — contrary to each other. The nature of the gas-operated action dictates certain compromises.

Understanding how these systems operate and interact with one another makes these selections considerably easier. Our goal here is to provide sufficient information to make intelligent choices. Our goal with this section is to offer a better understanding of how all these components need to and do interact with one another when used in a gas-operated semi-auto rifle. This knowledge will make the entire process of handloading for such rifles easier, safer and less likely to damage a valuable rifle.

Case Selection

As if we don't already have enough to think about when reloading Service Rifles, we need to make a few comments about the cases as well. In bolt-action rifles, the cartridge case serves as little more than a gasket, sealing the chamber and keeping gases from going back through the action. Their feeding, extraction and ejection cycles are, by comparison, exceptionally gentle. With the extreme demands placed on cases used in Service Rifles, their selection requires a slightly different set of criteria.

The old standby, GI surplus brass, is still some of the best available for reloading ammunition bound for Service Rifles. This is particularly true where the M1 and M14/M1A are concerned. It's tough, properly dimensioned and correctly annealed for use in a Service Rifle. But there are still a few things to watch.

Reloaders will occasionally encounter very appealing deals on once-fired 7.62mm NATO cases. Almost without exception, these are cases that have been fired in machine guns. With their generous chambers (and frequently open-bolt operation), many of these cases are stretched or bulged so badly that they can not be reloaded safely or cost effectively. In the case of used military brass, the old adage that "what seems too good to be true, isn't," is good advice. Unless the brass comes with a known pedigree, such as Match brass that was fired in M14s, M24 or M40 sniper rifles, pass it by. It's false economy to invest the extra time required to get this brass to a point where it might be usable, or risk an expensive rifle or your safety trying to save a few bucks on cases.

There is at least one exception to this — M852 National Match brass. Originally loaded with Sierra's 168 grain MatchKing, the M852 was originally intended for Match use only. As issued, the boxes were clearly labeled "Not For Combat Use." To reinforce this point, the cases bear a rolled-in cannelure around the body just ahead of the extractor groove. This is precisely the area where most case stretching takes place, and the cannelure may weaken the brass at exactly that point. We've heard stories of this brass suffering head separations at their first reloading, but have never experienced it ourselves. This cannelure was dropped on later lots and is entirely absent on M118 or M118LR ammunition. We recommend these later batches as being preferable to the cannelured M852 brass for reloading.

As they are with so many other issues, the M16/AR-15 family of rifles are less finicky about cases. We've had excellent results with a variety of military brass, and several commercial brands. The biggest drawback to using the military brass is the required removal of the primer crimp prior to the first reloading. Even this may not always be a problem, as there are several sources that provide once-fired military brass that has already been processed; that is, sized, trimmed, primer crimp removed and polished. On the commercial front, Winchester 223 brass has become a particular favorite among Service Rifle shooters. By all means, take the time to talk to your fellow competitors about their preferences and sources.

Powder Suitability

Powder suitability takes on a different meaning with Service Rifles. To most reloaders, a powder's suitability equates to getting good velocities at reasonable pressures. There are other issues to address with gas-operated Service Rifles. Powder burning rates, in particular, must be appropriate for the rifle. As contradictory as this sounds, a load that gives significantly less than maximum pressures can still damage the rifle if an inappropriate powder is selected. That's right. A perfectly safe load can damage the rifle. What we're dealing with here is port

pressure. Service Rifles are designed to function within both a set range of maximum chamber pressure—like any bolt-action rifle—and a given range of port pressure. This is defined as the amount of pressure remaining in the bore as the bullet passes over the gas port. Controlled by selecting a powder with an appropriate burning rate, the object here is to cycle the action at the correct speed. Excessive port pressure results in the action's being violently slammed open, possibly damaging it. This is particularly critical in the M1 Garand. With its closed gas system and relatively fragile operating rod, choosing the correct powder is essential to avoid damaging the rifle. Despite the robustness of the M1, the operating rod is about as close as it comes to having an Achilles heel. In this example, it is possible, indeed quite common, for M1 Garands to be damaged with loads that are perfectly safe as far as chamber pressures are concerned. This problem is lessened in the M14/M1A family of rifles, but it's still a topic that needs to be addressed. Fortunately, it is a very easy problem to avoid altogether. By sticking with those powders originally used in military ammunition, with similar bullet weights and velocities, port pressure problems need never become an issue. With the 308 Winchester/7.62mm NATO in the M14 family (or in M1 Garands rebarreled to the smaller cartridge) or with the 30-06 in the M1, this means sticking to those powders in roughly the same burning range as IMR 4895 or 4064.

The M16/AR-15 family presents fewer issues in regard to this situation, but still warrants some consideration when choosing a powder. If in doubt, take the time to talk with other competitive shooters or gunsmiths specializing in Service Rifle work. At this writing, Hodgdon's Varget and Alliant's Reloder 15 are two of the top choices for the AR-15. VihtaVuori N135 and N140 also have a loyal following.

Bullet Selection

As with powder options, Service Rifles also have a fairly narrow range of bullet weights that can be recommended. Again, sticking to those bullet weights closely approximating weights used by the military will help sidestep most potential problems. In the M1 and M14 family of rifles, bullets running from 150 grains on the light side to 175-180 grains on the heavy end will handle everything from reduced course matches to 1000 yards. Working with bullets lighter than these is perfectly feasible, as long as the powder selection still falls within the appropriate burning ranges. Function is the bigger concern here, and loads must be checked accordingly.

As with powders, the M16/AR-15 series provide more latitude in bullet selection. This is again courtesy of their more forgiving gas system. Depending on the course of fire, bullets from 52-53 grains to 80 grains will serve quite well. For across-the-course shooting, most competitors will use the 77 grain MatchKing at 200 and 300 yards, and the 80 grain MatchKing at the 600 yard line. The 80 grain MatchKings have also been used successfully at 1000 yards.

Primer Selection

As with powders, bullets and cases, some primers are better suited to use in Service Rifles than others. Certain types of primers can be eliminated, simply due to the nature of the cartridges and powder charges (weight and type) involved. Magnum primers may be helpful for ammunition that will be used in sub-zero weather conditions, but will rarely be necessary for general shooting needs. The burning rates of those powders used in Service Rifle cartridges, combined with the charge weights used, simply aren't that difficult to ignite. Ball powders may be the one exception, but even in this case are rarely an actual necessity. Standard primers are usually the first choice for these guns and generally are the best place to start.

Benchrest or Match primers are favored by many shooters, with an eye toward achieving the ultimate accuracy. Such primers generally contain a somewhat milder pellet mixture that contributes to improved accuracy potential. Some makes may also utilize a thinner cup to guarantee reliability, although this is not always the case. The Remington 7 1/2 Benchrest primer, for example, uses a fairly thick cup. Sensitivity can become an issue here and may increase the risk of a slam-fire. The Federal 210M (Match) primers, a very popular choice among competitive shooters, have developed a reputation for being rather sensitive. While this may not be the case, Federal 210M primers have developed a reputation as a potential source of trouble when used in Service Rifles. Over the years, we have used literally thousands of 210M primers in both M1 and M14/M1A rifles without incident. We feel that the single most significant cause to such slam-fires can be traced back to improper seating, not the primer itself.

In 1994, CCI began marketing a line of rifle primers specifically manufactured to meet military specifications for cup thickness and sensitivity. These are the No. 34 (large rifle) and No. 41 (small rifle) primers. Their use in military-type rifles with floating firing pins should decrease the possibility of a slam-fire as long as the pocket is properly prepared, and the primer correctly seated. These are ballistic equivalents to their respective Magnum primers. This extra energy should ensure reliability in virtually any weather conditions, but their real advantage rests with the reduced possibility of a slam-fire.

As important as the choice of primer may be, its proper installation is even more so. Our ultimate goal here is reliable ignition with acceptable accuracy while eliminating (or as nearly as possible) the chances of a slam-fire.

Remember, safety first; all other considerations secondary.

Case Preparation

Having chosen the appropriate components for our particular application, we need to take a quick look at case preparation for Service Rifles. As with so many other facets of reloading for these guns, a few steps are a bit different. Some of this material will be applicable to reloading for other action types; some will not. Other phases of the case preparation process pertain to the case itself, regardless of what type of action it will be used in. A little understanding of the process involved and why it is or is not necessary will clarify matters.

Primer Pockets

With the exception of Match brass, such as that produced at Lake City, most military primers are crimped in place. This crimp must be removed prior to the case being reprimed. Failure to do this makes the case extremely difficult to prime, leading to the potential for high primers—a very dangerous condition. While there are several tools on the market to correct this, Dillon's Super Swage 600 is one of the best we've worked with. Whether with swage or cutter, the remnants of the original crimp must be removed.

Removing the primer crimp is a one-time operation, but keeping the pocket clean is an ongoing process. The goal here is the same — to eliminate the potential for a high primer. It's rare that enough residue would build up to prevent a primer from fully seating, but it is a possibility. Keep a close eye on the primer pockets during your case prep, and clean them if there is any question about how well the next primer will seat.

Sizing

Full length sizing is the only option in the Service Rifle world. Minimal sizing does have its place in bolt actions, particularly where top accuracy is the goal. It can also be used in some other types of actions when reliability is not a top priority. However, anything other than full length resizing is a potentially serious problem with the Service Rifle. The case needs to be resized to the point that it will enter the chamber freely, completely and with absolutely no hint of resistance whatsoever. Failure to follow this simple practice is an invitation to some major headaches.

The most common problem is the failure to fully chamber the round. This is troublesome at best. Considering the force with which the bolt slams home, it can also wedge the round tightly enough in the chamber that it is very difficult to extract without damaging the rifle. In the worst case scenario, it sets the stage for an out-of-battery firing when the trigger is pulled. Improper or insufficient resizing, particularly when combined with a high primer, is also a leading cause of slam-fires.

Despite the oft-repeated advice that autoloaders, pumpguns and lever-actions require small base dies, the Service Rifles may be the exception that proves the rule. While it's true that all of these action types lack the powerful camming forces of a bolt-action, the more generous chamber dimensions common to most Service Rifles are normally compatible with standard dies. Please understand that this is a general statement, and that there are exceptions to this. The point is, you don't need to automatically go to a small base die set. Most of the standard reloading dies produced by reputable firms, such as RCBS, will resize fired brass properly to work in these rifles.

Neck Sizing

Neck sizing is a popular technique among accuracy-minded reloaders and frequently an effective way to improve accuracy. In essence, it amounts to sizing only the neck portion of the case while leaving the remainder of the shoulder and body untouched. This provides that "custom-fit" of the brass to chamber that so many shooters are working toward. Chambering a cartridge that has been neck-sized will normally give some slight resistance to closing the bolt. This is perfectly normal and to be expected when using this technique. While it's a minor detail with the powerful camming forces of a bolt-action, this can be a serious problem with a service rifle. It can cause a failure to fully seat and chamber, effectively jamming the rifle. If the lugs have partially engaged, this can be a very difficult stoppage to clear. Under extreme circumstances, it can even lead to a slam-fire. The solution to these aggravating and potentially dangerous problems is simple: Don't neck size for semi-auto rifles. For any reason. Ever. Whatever minor accuracy improvements are gained —and there is not always an improvement — are more than offset by the problems that are going to occur. Neck sizing is perhaps the best single illustration of a technique that is beneficial for a bolt-action, but is dangerously out of place in a Service Rifle. Stick to full length sizing—ALWAYS—when reloading for autoloaders.

Neck Turning

Neck turning — the removal of brass around the outside surface of a case neck to improve concentricity — is another area where well-intentioned hand-loaders can create problems for themselves. While neck turning is a useful, even necessary technique for improving accuracy in some types of guns, Service Rifles aren't one of them. Again, the requirements of cycling imposed by an autoloader necessitate a different approach. In standard chambers, even those commonly used in Match-grade Service Rifles are fairly generous to facilitate proper feeding and function. With

the attendant (radial) stretching and subsequent reworking during the sizing operation, necks will split in fairly short order. Thinning the brass too much may also make it difficult to achieve and maintain proper neck tension. This, in turn, leads to even more potential problems to avoid, such as bullet set-back during chambering. Leave the turned necks to Benchresters and varminters with tight-necked chambers.

Priming

The physical act of repriming a case for use in Service Rifles is no different than that of ammunition to be used in any other type of action. That said, however, there are some areas to which special attention must be paid. High primers where the dome of the primer remains slightly above the case head after seating are always a problem. In a bolt-action, single-shot or lever-action rifle, they can cause difficulty in chambering, creating in effect an insufficient headspace situation. In semi-autos, this condition becomes downright hazardous. With their higher bolt speed and greater inertia, the chances of a high primer igniting when the bolt drives home is greatly increased. In the case of Service Rifles in particular, high primers are far and away the leading cause of slam-fires. Slam-fires are very rare in serviceable rifles using military ammunition. Handloaded ammunition, unfortunately, is another story. Most slam fires can be traced directly to certain errors in the reloading —and most often, the priming process. Since this is a phase that we have considerable control over, this does not need to be the case. Some additional cautions in component selection and preparation pays dividends not only in accuracy, but also safety. The primary rule to remember here is to never allow a high primer to get past your final inspection and into the chamber of your rifle. The following are a few basic points that deserve some added attention during the priming process.

1) Ensure that the primers are always seated to at least 0.003” below the case head. The industry maximum seating depth is 0.008” below flush, with 0.006” below being ideal. This can be checked with a depth gage or even with the tail of a caliper. After having worked with a few, a remarkably adept “feel” can be developed with the tip of your index finger. By lightly dragging your fingertip over the head of a reprimed case, you will quickly learn to identify the correct amount of “dip” present in a correctly seated primer.

2) Primer pockets, particularly those of military brass, need to be checked carefully and uniformed if required. Potential problems, such as the remnants of a crimp, burrs or a pocket bottom that isn’t flat must be corrected. The goal here is to assure that the primer can be seated below flush with the case head, resting squarely on the bottom of the pocket.

3) Learn to “feel” the primer as it seats in the pocket. Perversely enough, some of the least expensive tools are the best in this regard. The Lee Auto-Prime hand tool is very inexpensive but provides an exceptionally good value. It is used widely by competitive Benchrest shooters, and in this example, works just as well for Service Rifle shooters. Probably the best tool available is the model available from Sinclair International. Either will provide better results for match priming than any bench- or press-mounted accessories. Avoid any tools that deprive you of the sensitivity needed to feel the primer’s anvil stop against the floor of the pocket. Most press-mounted priming accessories fall into this category.

4) Flash hole deburring, a common technique among accuracy shooters, is viable for Service Rifle shooters as well. It is not a safety concern and not a necessary step, but may improve accuracy for competitive ammo. Considering the abbreviated case life caused by Service Rifles, such time-consuming operations should be weighed carefully before investing the effort. One option would be to perform this operation

on only those cases to be used for long-range ammo, where the results are more tangible and the effort better justified.

Powder Selection

Powder selection for gas-operated service rifles is considerably more limited than for bolt actions of the same caliber. In addition to the issues of accuracy and velocity, port pressure is also a consideration. Port pressure is defined as the amount of gas pressure remaining in the system when the bullet passes over the gas port. It is this pressure that provides the power to cycle the action. Most gas-operated rifles are designed to function with a narrow band pressure. If the pressure is too low, the action will not cycle completely. Too high, and the action is cycled violently, leading to premature parts wear and breakage. It is particularly important to understand this last point, as it is key to understanding how a rifle can be damaged by loads that are perfectly safe and within "normal" pressure ranges. For the handloader, this means that suitable powders are limited somewhat.

In the M1 and M14 series, powder choices are fairly straight-forward; use nothing slower than IMR 4320 as shown on a burning rate chart. The use of anything slower than this will raise port pressure to unacceptable levels and will eventually damage the rifle. As a general reloading practice, avoid powders that are overly fast as they can generate dangerous chamber pressures long before the case is reasonably full. Two of the more popular choices have been IMR 4895 and 4064, both of which were used in military ammunition for many years. For those who prefer ball powders, Winchester's 748 is a good choice and is quite similar to the ball powder used in many lots of Lake City Match ammunition.

The M16/AR-15 series offer a wider range of acceptable propellants. Since they became the dominant Service Rifle in competition, there has been a good deal of experimentation with the various powders. Current favorites are Hodgdon's Varget, Alliant Reloder 15 and VihtaVuori N140. The venerable 4895, in either Hodgdon or IMR incarnation, is another popular choice. A little time spent talking to your fellow competitors should provide a good starting point as to what's popular (and readily available) in your particular area.

In addition to the requirements of proper burning rate, there's at least one other consideration that competitive shooters need to take into account: powder compatibility. In this instance, we're not talking about a safety problem, but one that can greatly effect accuracy. It also applies to any type of firearm, not just semi-autos. Powder residue sometimes reacts very badly to a second powder being fired in the same barrel without cleaning. In the course of a High Power match, most shooters use different ammunition for at least the 600 yard stage, since heavier bullets are normally used at long-range. If the shooter was using a load of 4895 at the 200 and 300 yard lines and switched to 4064 back at the 600, we may have a problem. While it is not a safety issue, it frequently takes several shots before the second load will settle down and begin shooting accurately. If the powders were dissimilar, such as a double-based ball powder followed by a single-based tubular powder (or vice versa), this settling problem will be even more pronounced. With only two sighters allowed in some matches and none in some others, this loss of accuracy becomes a critical issue. If at all possible, try to find a powder that works with both bullet weights and use it all the way across the course.

The problem isn't just restricted to match shooters either. Many shooters have tested a variety of loads, including several different types of powder at the same range session. If the rifle was not cleaned when switching from one type to another, this may have manifested itself as an accuracy problem. The shooter who is unaware

of this phenomenon would have most likely dismissed the later groups as being less accurate than the first one tested. When several different loads are being evaluated together, take the time to clean whenever powders are changed.

Brass Preparation

Case selection is a common facet of almost any type of reloading but becomes especially important when loading for the Service Rifle. Aside from the normal considerations of the functions a case must fulfill, the violent nature of the Service Rifle's cycling imposes some unusual requirements on the reloader. Steps and/or techniques that are unnecessary when loading for other action types can be beneficial, even required when dealing with a semi-auto Service Rifle.

Case segregation should be done as a routine with any type of reloading. Semi-autos or Service Rifles take this requirement to a new level. Given their more finicky nature, they require greater attention to detail than their manually operated cousins to function reliably. At the very minimum, cases should be sorted by headstamp. Ideally, they should be kept sorted not only by maker but also by lot and number of firings. That is, they should be loaded as a single lot, each and every time. The goal here is to make sure the entire lot receives the same use and wear (the same number of firings, trimmings, etc.), so it is easier to tell when to discard the batch. This also removes the potential problem of mixed brass that should receive different loads due to their internal volume.

The conventional wisdom to reduce loads with military brass is familiar to most reloaders and is generally good advice. The rationale here is that the military cases tend to be somewhat thicker and heavier than their civilian counterparts, which in turn reduces capacity and raises pressures. This additional pressure normally requires a one or two grain reduction from the loads shown in most manuals or other data developed with commercial cases. While this is most often the situation with both 308 Winchester and 30-06 cases, it is less true with the 223 brass. We have found that military cases often have significantly more capacity than several brands of commercial brass. Again, take the time to do a side-by-side comparison of the cases you are working with and adjust your load as needed. There may be no need for such a reduction with the 223. Know your components and keep them segregated accordingly.

Case sizing for Service Rifles is accomplished in exactly the same fashion as it is for a bolt-action. There are a few points that need to be addressed a bit more emphatically. Headspace, while important for any other type of action, is absolutely critical in an autoloader. When setting up a resizing die, the final adjustment should be made using a chamber type headspace gage or one of the other multi-purpose gages, such as the RCBS Precision Mic or the Redding Instant Indicator. The regular use of such gages will virtually eliminate an entire range of problems that stem from headspace — related maladies. Take a few extra moments to use these gages throughout the reloading process — both for the initial set-up and as a periodic quality control check. It's time well spent.

Trimming

Case trimming, probably considered the most onerous chore in any reloading operation, is unfortunately a necessary task. There is nothing different about the operation itself or the reasons for doing it in either a bolt-action or a Service Rifle. That said, semi-autos have a tendency toward greater case stretching than most other action types, and trimming may be required more frequently. Because of the larger quantities of cases so often associated with reloading for Service Rifles, some

thought should be given to ways of streamlining this operation. In our own use, we've found the motorized trimmers to be the best option. Two of the most popular among competitive shooters are those made by Doyle Gracey and the Dillon 1200B trimmers.

The Gracey operates exactly like a pencil sharpener. In use, full-length sized and deprimed brass is inserted into the unit, just like a pencil into an electric pencil sharpener. As the case stops on a shoulder built into the shell holder, a set of cutters neatly trims the case to length and simultaneously chamfers the neck. It's fast, precise and very easy. While Doyle claims the unit will do 500 cases an hour, our experience has shown this to be a conservative figure. If everything is laid out beforehand, it is easy to run closer to 600 cases or more in an hour.

The Dillon 1200B uses an altered sizing die, topped off with a high-speed cutting motor. Mounted in a reloading press, the case is sized and trimmed in a single stroke of the handle. While the process is fast and accurate, the Dillon requires a bit more handling of the cases. After trimming, the cases must be chamfered, and the neck tension dealt with separately. On the positive side, it is not difficult to size/trim upwards of 1,000 cases an hour with the 1200B. Either of these units makes it fast and easy enough that cases can be trimmed for every firing, as they should be for use in Service Rifles.

The collet-type lathe trimmers offered by Wilson, RCBS, Redding, Forester and others are all capable of doing a good job, but suffer from being slow in operation. This applies to powered models as well as those that are hand-turned. One advantage to this type of trimmer is that several of them can be modified (with the appropriate additional accessories) to perform other tasks, such as neck-turning. This may be an advantage if the unit is used for other firearms (such as varmint guns), but we can't recommend neck-turning for Service Rifles.

Neck Tension

When we stop to consider the vigorous (read, downright violent) chambering cycle a loaded round endures in a Service Rifle, it becomes pretty clear it suffers abuse that would never happen in a bolt-action. This is simply the nature of the beast. It needs to be dealt with since there is no way around it.

There are two distinctly different forces that need to be considered: those that force the bullet deeper into the case, and those that pull it out of the case. When the round is stripped from the magazine and launched up the feed ramp, any resistance encountered by the bullet risks having it set back deeper into the case. Due to the abrupt stop the cartridge makes when the shoulder slams to a halt against the chamber, inertia dictates that the bullet will continue to move forward. This is exactly the same principle a kinetic bullet puller operates on, and it works within a chamber as well. Some years ago, we decided to examine this phenomenon more closely. During tests here at Sierra's range, we chambered a variety of factory Match ammunition in an AR-15 rifle. This ammunition was from one of the most popular brands in use today, loaded with Sierra's 69 grain MatchKing bullet. To conduct the test, we chambered individual rounds by inserting them into the magazines and manually releasing the bolt. We then repeated the tests by loading two rounds into the magazine, chambering and firing the first, and then extracting and measuring the second round. This eliminated any potential variation caused by the difference between a bolt that had been released from an open position (first round in the magazine) and those subsequent rounds that were chambered by the normal semi-automatic operation of the rifle. Measuring the rounds before chambering and then re-measuring after they were carefully extracted resulted in an average increase of

three thousandths (0.003") of forward bullet movement. Some individual rounds showed up to seven thousandths (0.007") movement. Please bear in mind that these results were with factory ammunition, normally having a higher bullet pull than handloaded ammunition.

To counteract this tendency, the semi-auto shooter is left with basically two options: applying a crimp or increasing neck tension. The first option, crimping, brings up some other issues that can be troublesome. In general, crimping degrades accuracy. Most match bullets are not cannelured (which also seriously damages accuracy potential), a requirement for correct application of most crimps. Still, there are taper crimp dies available from most of the major manufacturers. Lee offers their "Factory Crimp" die as an alternative, which seems to be one of the better options for those bullets without a cannelure. That having been said, crimping is still, at best, an occasionally necessary evil. Avoid it if at all possible.

The other—and in our opinion, better—option is increased neck tension. This, in turn, leaves us with two more options depending on what type of equipment you're using. The object of either is simply a tighter grip on the bullet. Using conventional sizing dies, (i.e., those utilizing an expander ball) this is accomplished by reducing the diameter of the ball itself. This can be done by chucking the expander/decapping rod into a drill and turning it down slightly with fine emery cloth or a stone. The goal here is to decrease the diameter two or three thousandths (0.002" to 0.003") under bullet diameter. This is a trial and error process, and must be done slowly. The end result is an expander ball that opens the case neck up somewhat less than the as-issued item. This, in turn, increases the grip of the case neck on the seated bullet.

A better alternative to achieve the same effect is the use of a bushing die, such as those from Redding Reloading. This is by far the best solution, not just for Service Rifles, but for a broad range of reloading applications. The basis for this system is a fairly conventional sizing die, at least where the body and shoulder of the case is concerned. In the neck area, however, the die is fitted with a removable bushing. Available in .001" increments (as measured at the inside diameter of the bushing), they can be matched with a specific batch of brass to provide optimum neck tension. This tension can be increased or decreased by simply moving up or down in bushing size. The one drawback to this system, if it can be called a drawback, is the absolute necessity of sorting cases and loading them in batches. This, of course, is how virtually all loading should be done anyway.

Bullet Seating

While the physical act of seating bullets for an autoloader is no different than for any other type of action, there are some special considerations again that must be taken into account. The most important is magazine length. One of the most common methods of improving accuracy in a rifle is to seat the bullets to an optimal length in relation to that particular throat. This is rarely an option for the Service Rifle, limited as they are in their magazine lengths. With the exception of the 600 and 1000 yard stages, ammunition must be loaded through the magazine. The requirement, of course, is that the ammunition must be held to an OAL compatible with the interior dimensions of the magazine. The problem begins when a single round is used to set up a seating die, giving just enough clearance to allow the cartridge to load into the magazine. Bullet lengths vary, routinely by as much as .015" to .020" within the same batch. This is perfectly normal and does not affect accuracy. This variation, however, must be taken into account when setting up a seating die. The main point to monitor is that the longest cartridge will still load and feed through the magazine without binding.

Long-range ammunition is frequently set up to provide less of a jump to the rifling and thereby improve accuracy. This has become even more common since the M16/AR-15 rifles have taken over the High Power scene. It is due to the long ogive bullets, such as the Sierra 80 grain MatchKing, used for the 600 yard stages. With their sharper profile, they are much less forgiving of this jump to the throat than the shorter ogive bullets used at the 200 and 300 yard lines. Some method of locating the throat and then being able to set a seating die accordingly is in order here. While there are several gages on the market, most operate along the same lines as the Stoney Point gage. We recommend these and use them faithfully ourselves.

Gaging

Today's handloaders, like it or not, are graced with the widest range of gages since the advent of the metallic cartridge. These run the gamut from highly useful tools that should be on every handloader's bench, to others that only complicate or confuse the process. A means of measuring case length and loaded cartridge length are the bare minimum required for safety. Other, more esoteric units run from ogive measurement to primer depth gages. The bottom line here is take a hard look at the end result (and whether it really serves a useful purpose) before you break out the credit card.

Calipers are an essential item for any reloader, but particularly so for Service Rifle shooters. Varying case lengths can contribute to poor accuracy, and those that exceed maximum length can dangerously raise pressures. Calipers provide a fast and easy method to avert problems with length issues. Vernier calipers are still available, but most reloaders are probably better served by the newer dial or digital models now available.

Case gages are another item that should be a high priority item for Service Rifle shooters. Available from a variety of sources for around $20, they are a fast, easy-to-use tool. They are essentially nothing more than a minimum dimension chamber with a small step milled in each end. The case is inserted into the gage, stopping on the datum line of the shoulder. By examining the ends of the gage, you can see any discrepancy in either case length or headspace. One of the best uses for these gages is checking the initial adjustment of sizing dies when a run of cases is started. As we previously stressed, insufficient sizing and excessive sizing can be serious problems. The case gage makes it simple to set the die correctly.

There are several gages that accomplish this same task with the added benefit of giving an actual dimensional reading. These are the RCBS Precision Mic and the Instant Indicator from Redding. While differing considerably in construction and operation, both accomplish the same task. Each allows taking a measurement from a fired case to determine how much the case's headspace lengthened upon firing. When resizing cases, they allow the handloader to set the sizing die to a precisely defined point. Again, getting this adjustment exactly right when setting up the die is the ultimate goal for either of these units, and one they accomplish quite nicely.

Gaging is a much recommended (and far under-used) step in the hand-loading process. It becomes virtually essential where semi-autos are concerned and should be a normal part of the reloading process. Fortunately, there are several excellent tools available today. These are covered in more detail in the Reloading section of this manual. While the gages are a good idea for any reloading, they are a necessity for the service rifles.

To Load or Not to Load

In spite of all the hard work that goes into its preparation, case life can be brutally short in service rifles. In the M1 and M14/M1A rifles, the cases should become suspect after just three or four firings. This limited case life needs to be carefully considered before sinking too much time in case preparation. Weigh time spent versus tangible benefits gained to avoid wasting time at the reloading bench. This gets back to the fact that loading for Service Rifles is just plain different than loading for Benchrest rifles. Or just standard bolt-action rifles, for that matter. The M16/AR-15 series of rifles are considerably better in this regard because of their different gas system design. Still, there are signs to look for every time a case is prepped for its next firing. Excessive stretching or thinning ahead of the extractor groove, often indicates an impending head separation. Damage, either as dings or gouges in the rim or extractor groove will cause feeding problems. Deep scratches, gouges or dings created during the chambering/extraction cycles are cause for scrapping the case. Loosened primer pockets (in addition to being a clear sign of too much pressure) can cause serious problems if they manage to drop an expended primer into the action. Again, scrap the case. Trying to get more life out of tired cases— in any type of action— is always false economy. It is, however, particularly problematic with the Service Rifles. To avoid problems, case inspection must be conducted with a brutal, unmerciful and unsentimental eye toward the end result. Extensive case preparation work should be weighed against this short life span and high attrition rates.

Another point that drives home the need to gage during the reloading process is that Service Rifle shooters tend to load fairly large quantities of ammunition. There are few sights sadder than a shooter who's loaded a thousand rounds or so, only to find out later that it won't feed or function in his rifle. This is, unfortunately, far more common than one might think. It is also completely avoidable. Take the time to use your gages faithfully when setting up dies, presses or other reloading equipment. Once the reloading process is under way, stop occasionally and recheck the set-up again with the appropriate gage. It really is just that easy to avoid all these headaches.

Summary

With everything we've just covered, it's easy to get the impression that reloading for the Service Rifle isn't worth the effort. Nothing could be further from the truth. The fact is—excluding service team members who have their ammo provided for them—most competitors reload their own. Our goal here is to make this an easier, safer and more productive endeavor. The major point to remember when stepping into this arena is that it is not the same as loading for Benchrest, although accuracy is still a critical objective. It is not the same as loading for your deer rifle, although velocity is going to be a prime consideration. It is not the same as virtually any other form of reloading. Take your time, pay attention to detail, and recognize that this particular venue has some unique requirements, and you'll do just fine.