

My first shot was a 3 at 12 o'clock. I had applied a correction of one minute right for the wind and an elevation of 30 clicks, my best estimate for the conditions. What was the reason for this high shot? More important, what correction should I make for the second shot?

I was firing the 600-yd. stage of the 1966 Fort Dix High Power Regional Service Rifle Match (over the National Match course) sponsored by The National Board For The Promotion of Rifle Practice (NBPRP). This is commonly referred to as a "leg" match, because legs or credits are awarded to the high 10% of competitors who have not qualified for the Distinguished Rifleman medal. No sighting shots are permitted. The service rifle allowed has been the M1 or M14. Normally only ammunition issued on the firing line is permitted.

The rifle I was firing was a National Match M1. Like most civilian riflemen, I prefer to use the bolt-action Match rifle in NRA high power rifle competitions. Consequently, I fired the Service rifle only in those matches restricted to it. In NRA regional matches either the NRA Match rifle or the Service rifle is permitted.

The M1 rifle was designed for use as a grenade launcher and a bayonet handle as well as for firing bullets to hit particular targets, and the stock is much thicker through the grip than that on my Match rifle. The stock on each model of Service rifle is of a single size and configuration, and is unlikely to fit an individual as well as the custom-fitted stock on his Match rifle. The shooter therefore must adapt himself to the rifle.

The Service rifle has a post front sight and an aperture rear. The 0.052" aperture is larger than the one I normally use on my Match rifle. I use the sight alignment commonly taught in Service-rifle marksmanship training courses; the top of the front post is centered in the rear aperture and the bull is aligned at the top of the post—commonly called the "6 o'clock hold". It is difficult for many riflemen to judge when the front sight is precisely at 6 o'clock on the bull. The sights do not permit a sight picture as precise as the front and rear aperture sights on my Match rifle.

A glance through my spotting scope indicated there had been no change in wind from its 6 o'clock direction. I lowered the sight 2 minutes and fired again, getting a 4 at 7 o'clock. The wind was now at 5 o'clock, so I made a one-minute-right windage adjustment and raised the sight one minute. The third shot was a 3 at 3 o'clock. The fourth shot would probably have been a 5 had I not made a common error: I moved the rear sight in the wrong direction and the shot was a miss at 3. (The aperture moves in the opposite direction for a given directional movement of the knob than that of U.S. commercial match sights.) I then set the sight at the estimated windage zero and made the correction I had intended. Fourteen of the remaining 16 shots were in the black of



The Civilian And The Service Rifle

By LARRY MOORE

the C target, but the damage had been done.

I fired this rifle the following month over the same course in the National Trophy Individual match at Camp Perry, with nearly the same results.

After Camp Perry I took this rifle to my home range to investigate its grouping from a cold barrel. I found it generally impacted the first shot two minutes high and one minute left of the normal center at 200 yds. when it had not been fired for several hours. A review of my performance showed that good scores could not be

expected with the Service rifle by firing only a few times a year and only in matches restricted to the Service rifle.

Civilian shooters in general do poorly with the Service rifle. Of the top 100 shooters in the Service rifle aggregate in the 1967 National Matches only six were civilians, though 382 of the 997 Master shooters in this aggregate were civilians.

It would be a rewarding experience for all serious high-power riflemen to spend sufficient time and effort to produce good scores with the Service rifle. The skill and experience gained could be applied advantageously to other types of shooting. Civilians can improve their performance with the Service rifle by improving the accuracy of their rifle, by improving their knowledge of it, and by intensive training with it.

There is a greater difference among National Match rifles than among Master-class riflemen. Twenty-five new NM M1 rifles were subjected to 100-yd. accuracy tests using M72 match ammunition at Aberdeen Proving Ground in 1963. Three rifles assembled by marksmanship unit armors and field-grade rifles were also tested. Each rifle was fired four 10-shot

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Larry Moore, a native of New England and frequent contributor to *The American Rifleman*, has been a competitive shooter since 1936. His working life has been spent at Aberdeen Proving Ground and Rock Island Arsenal as a mechanical engineer. In 1963 National Matches he won the 600-yd. Crowell Trophy, the 600-yd. Air Force Cup and the coveted 1,000-yd. Wimbledon Cup.

groups from both machine rest and bench rest by a Master rifleman. (There was no appreciable difference between the averages from machine and bench rests.) Average extreme spread for the 25 NM rifles was 3.28", the largest being 5.0" and the smallest 2.4". The averages for the rifles match conditioned by marksmanship armorers were 2.4", 2.6" and 2.5". Averages for the field grade rifles were 5.1", 4.4" and 3.4".

Members of military marksmanship units are well aware of the importance of the rifle. Effective methods for match conditioning the M1 and M14 rifles have been developed by their armorers. Each team member may be issued 2 or more rifles, and a reserve is available if needed. Rifles may be assembled completely with carefully selected parts or they may be rebuilt NM rifles. Rifles are tested before issue to team members, and highly-trained armorers are available to support the shooters during competitions.

The civilian must learn to be an armorer as well as a shooter. The problem is basically the same as cleaning and maintaining the Match rifle, but there are more details when using the Service rifle.

The shooter should first have a knowledge of the Service rifle's design and functioning. Several articles in *The American Rifleman* describe the M1 and M14 NM rifles (Ref. nos. 1-6). An article on the

and that on the M14 is assembled to the flash suppressor. Therefore any free movement of the gas cylinder or flash suppressor will increase the sighting error. Generally there is free movement within the rear sight.

The marksmanship unit armorers have done much to improve the accuracy performance of the Service rifle (10, 12). Two common methods for match conditioning have been described (12). The most common method, and probably the most effective, is that in which the stock is shimmed at front of the receiver and plastic material is applied to bring a downward force of the stock ferrule onto the band and barrel. This method also reduces the chance for contact between stock and operating rod. A good fit among parts can be obtained by selecting parts, peening, or use of plastic material. A plastic material is generally used to obtain a suitable fit of the stock to receiver, trigger housing and band (15, 16).

A quality barrel is a most necessary part of any Match rifle. Ordinary inspection methods are not always adequate. While the diameter and finish of the bore can be noted, uniformity of wall thickness and homogeneity of the steel cannot be determined readily. There is thus some risk that a particular barrel will not perform in the manner desired, and accordingly it is necessary to test the assembled

exclude moisture. The moisture content and dimensions of these wood parts change with the weather, which can affect both dispersion and center of impact.

The M14 rifle is equipped with a flash suppressor which is also designed to serve as a muzzle brake. The bottom bar of the suppressor is wider than the others, the greater surface exposed to the gas creating a downward force which helps hold the muzzle down. This also causes some upward deflection of the bullet. The ring at the front of the suppressor deflects the gas escaping between the bars, applying a forward force on the barrel.

Specification inside diameter is 0.349" + .005" for the suppressor on the issued M14 rifle. The suppressor must be aligned with the bore and it must be tight on the barrel, to prevent contact with the bullet. The suppressor is secured to the barrel by a castle nut, locked with a set screw engaging a notch in the nut. It may not be possible to advance the nut on some rifles sufficiently for the screw to engage the next notch, then a modification or a replacement of the nut will be required.

A single drop of water on the lower bar of the suppressor can affect accuracy and 10 drops can cause the bullet to break up under some conditions. Firing erodes the suppressor and sharp burrs develop inside the forward end of the slots. These reduce the inside diameter and may cut the bullet. Armorers are well aware of this and they increase the inside diameter as a precaution (13).

The Service rifle trigger requires a rather heavy pull for positive functioning. Care should be taken to avoid a pull so close to the minimum limit of 4½ lbs. as to be questioned by the range officer, or one which does not have sufficient engagement. Insufficient engagement between hammer and trigger may cause "doubling" or the firing of two shots on one pull. The second shot is quite certain to be a miss.

Oil or water in the M1 or M14 rear sight will be sprayed to the rear with each shot fired. There may be sufficient spray on the shooting glasses after a few shots to obliterate the target. Also on these sights the aperture moves on an arc as it is elevated. The elevation value therefore is slightly greater at 45 clicks than at 10. However, each click raises the aperture about one minute of angle over the elevations commonly used.

The current NM rifles have a hooded aperture with a hole drilled 0.002" off center. When this is rotated 180° it gives a vertical difference of 0.004" and this provides ½ minute adjustments. At the same time the windage screw thread was changed from 32 threads per inch on the Service M1 to 64 tpi on the NM. Since there are 4 clicks per revolution of the knob, the windage clicks on the NM sight now provide ½ minute adjustments.

Numerous modifications have been made by armorers to improve the rear sight for match shooting. A plate has been secured to left side of the receiver, having notches which mate with corresponding projections on the pinion to give ½ minute of angle

Understanding the capabilities and limitations of the M 1 and M 14 is the key to success in shooting the service rifle.

production of the M14 rifle is of interest (Ref. no. 7). Several articles describe modifications to improve the accuracy of the Service rifle (Ref. nos. 8, 9, 10, 11, 12). A manual issued at the SAFS contains information on selection of an M14 rifle (Ref. no. 13). Another brochure at times made available at Camp Perry describes both rifle and ammunition (Ref. no. 14). While the rifle in the hands of the marksmanship unit competitor may have 15 or more modifications from the NM rifle, many of these do not contribute appreciably to accuracy. The object, however, is to keep the parts in constant relationship and to permit the barrel to expand freely with the heat of firing.

It is necessary to eliminate free movement among parts which affects accuracy. The field-grade Service rifle has considerable free movement among parts, by design. The handguards, lower band, and gas cylinder on the M1, and the handguard, band, and gas cylinder on the M14, are normally somewhat loose on the barrel. The stock is secured between the receiver and trigger guard on both models by a clamping action. A heavy load at the points of contact causes the wood to set and permit some shifting of metal parts within the stock during firing. The front sight on the M1 is assembled to the gas cylinder

rifle to determine its suitability.

The time for operation of the firing mechanism on the Service rifle is longer than that for Match rifles and this makes the follow through more important. The high-power rifleman generally closes his eyes momentarily at the shot and he resists the movement of the rifle in recoil. He may develop a push on the butt when he anticipates the shot, and may not be aware of this unless there is a malfunction, which allows him to observe that the sight alignment was affected by his shoulder movement. The major reason for the difference between impact centers of rapid- and slow-fire groups is that the shooter's reaction is different and the lock time is long enough for this to be observed.

The Service rifle barrel is lighter and it may be shorter than that on the Match rifle, and it has a complex configuration rather than a straight taper. Furthermore, the operating mechanism is attached to the barrel. These characteristics make the rifle sensitive to change in firing position, ammunition, and climatic conditions. Good accuracy can be obtained only if the rifle and cartridge are compatible, and this can be determined only by firing.

The military rifle stock and wood handguards are dipped in an oil such as linseed or tung at the factory, but this does not



Civilian shooter is prepared to fire the National Match Course with the M1 rifle. Ammunition, scorebook and cleaning equipment are carried in shooting stool. Clips loaded for rapid fire stages are carried in cartridge belt.

elevation adjustments. The windage knob also has been modified to provide indents to engage a spring-loaded ball in a special hole in the receiver. This permits the windage mechanism to function in the same manner as in a conventional sight.

Both M1 and M14 rifles give a high noise level, and ear protection is necessary to preserve the hearing (18,19). Also a reduction in noise level on the shooter improves his concentration. Either ear plugs or ear muffs are effective. If a shooter is sensitive to noise he should wear both plugs and muffs.

Shooting glasses should be worn when firing self-loading rifles because particles of unburned propellants are ejected with the case. These particles cause discomfort when they hit the eyes and this could cause the development of undesirable habits.

Which of the three rifles permitted in NBPRP competitions (M1, M1 with 7.62 NATO barrel, and M14) is the most advantageous?

There is little difference in the average performance among the three models, but there may be considerable differences

among individual rifles. An individual may prefer one model over another because of his training or physique. The M1 has the advantage of a more favorable center of gravity (farther forward, which contributes to steadier holding in the standing position), it can be reloaded quicker, and it is readily available to civilians. The M14 has the advantage of a smaller stock at the grip and a slightly shorter receiver, but it has the disadvantages of a shorter sight radius and a protruding magazine which may not permit normal prone or standing positions. The cal. .30 match cartridge gives a slightly higher bullet velocity than the 7.62 mm. NATO. However, the cal. .30 cartridge is not loaded to its full potential and there is considerable air space within the case, which causes a greater dispersion in velocity and target grouping. Thus the M118 cartridge appears to be more compatible in the M14 than the M72 in the M1. For this reason some Service teams have rebarreled their caliber .30 M1 rifles to fire the M118 cartridge.

It is not uncommon to see shooters on the firing line who cannot load their M1

rifles and the entire line may be held up for several minutes. Before the individual enters his first Service rifle match he should be well trained in basic marksmanship and in firing the Service rifle. A number of American Rifleman articles give instructions for shooting the Service rifle (20, 21, 22). Military marksmanship units have developed highly effective positions and techniques. Detailed manuals on shooting the Service rifle have been issued to participants in the SAFS (13).

The civilian rifleman may participate in several types of rifle competitions, and if he has spent years to develop an effective position for a type of Match rifle it should be effective with the Service rifle also. The position may require some modification because of the configuration of the rifle.

The Camp-Perry-trained high-power rifleman can be spotted on his home range by his shooting stool and his carbide sight-blackening light. A common technique for standing shooting has been developed in Service rifle matches, in which the shooter sits on a stool between shots. While this makes it convenient to keep a scorebook,

it takes time and there is exercise which increases pulsation. The shooter with small-bore gallery or free rifle training may find it advantageous to remain standing during the match. This leaves more time for holding and trigger operation.

Dry-firing with dummy rounds will develop skill in loading and unloading. Before the first training period it is well to learn the rifle's mechanism, to prevent the injury known as "the M1 thumb" (the thumb is caught between bolt and receiver in loading). Many points are lost because the shooter failed to observe that not all rounds were seated to rear of the M1 clip, which consequently could not be loaded into the rifle. The rules do not permit a refire for this oversight. Failure to latch the magazine into the M14 rifle can result in a failure to feed. It is also important to assure that the appropriate cartridge is issued. While there is no danger in firing the 7.62 mm. NATO cartridge in the caliber .30 chamber of the M1 rifle, it could cause a miss at 600 yds.

The shooter must know his rifle. The characteristics of the particular rifle can be determined only by range firing. Try the rifle with several cartridge lots. Several civilian rifleman who fired the M14 rifle in 1963 tests observed a strong interaction between rifle and ammunition (23). Small-bore rifle shooters well know the importance of this and they test various makes and lots in order to mate the rifle and cartridge. Unfortunately the Service rifle shooter cannot always obtain the most advantageous combination of rifle and cartridge. Both dispersion and group center vary with the cartridge lot and the shooter must be alert to estimate the contribution of rifle and ammunition to the dispersion.

A testing range of 100 to 200 yds. is advantageous because of convenience and small wind deflection. It is important to determine the impact point of the first shot from a clean bore, and the impact point as well as dispersion of shots fired from the barrel as it heats in firing, as well as the impact point for the separate firing positions. When the rifle and ammunition characteristics have been established, and the accuracy obtained is considered suitable for match use, the shooter should go to the range for practice firing over the NMC.

Adjust the rear sight elevation knob after the elevation for a given range has been established. Take care with the tension adjustment on elevation and windage knobs so that the aperture will not shift during firing and the windage knob can be turned without difficulty in both directions. If the elevation knob is properly adjusted it will be unnecessary to count the clicks from lowest position of the aperture for each change in range.

Accurate records are important. However, it is not necessary to maintain a detailed shot-by-shot account of each firing exercise. The shooter has a limited time in which to fire and he must allocate it between keeping his records and firing. Frequently it is most advantageous to concentrate on wind conditions and technique of fire. The most important things to record

are date, rifle, ammunition, sight adjustments, weather, and firing conditions.

Maintenance is important. Self-loading rifles generally develop a greater amount of fouling and brass chips in their mechanisms than bolt-action rifles. Keep oil out of the rear sight. Disassemble the match-conditioned rifle as infrequently as possible. A fair cleaning and lubrication can be accomplished without removing the stock. Special attention should be given to cleaning the chamber—rusty chamber is a common cause of failure to extract.

Observe the pattern of the ejected cases. They should fall at the 1 or 2 o'clock position from the line of fire. If they fall at 3 or 4 o'clock they will hit the shooter on your right, and he may lose his sense of humor when a hot case falls on his neck while he is concentrating on his aim and squeeze. A pattern of ejection at 3 or 4 o'clock generally indicates the rifle needs cleaning and lubrication, or it has a defective ejector spring, extractor spring, or extractor.

The sights, the gas cylinder lock screw on the M1, and the gas cylinder plug on the M14 should be checked regularly to assure they do not loosen during firing. Protect the rifle against damage in transportation. The trigger guard should be disengaged during the long periods in which the rifle is not used. Special care is needed in bad weather, especially in the rain.

It may be advantageous to have an extra firing pin, extractor, extractor spring, and ejector spring available. AR 920-30 states "The competitor must report to the Chief Range Officer with the disabled piece repaired or secure a satisfactory replacement weapon within 30 minutes of the time the piece is officially declared disabled by the line officer of his target."

The manual issued at the SAFS covers selection of squad members, squad training, and team coaching and it gives details on physical conditioning, individual firing, team firing, and match firing; but it does not state how the individual will arrange for the time, equipment, ammunition, and money for entry fees and travel. Obviously the manual was prepared by and for military shooters. It might appear the military competitor has a considerable advantage, since he has only to go through the exercises scheduled for him with the equipment furnished him. But there are advantages for the civilian shooter. While he must be his own administrative officer, supply officer, armorer, and coach, he should be the best qualified individual for each of these duties. If he falls short in one or more he need not take time making complaints. He can take the corrective action that he thinks appropriate.

The shooter should first establish his objectives. If he is satisfied to be average, his only training requirement probably would be a few snapping-in exercises before departure for a match. If he is a serious shooter, he should be satisfied with nothing short of first place. Since he must perform the duties of various team officials, and provide financial support for this ac-

tivity, it is a challenging game.

The serious shooter should plan his shooting season well in advance. After his equipment and training reach the desired level he should enter as many competitions as his budget and time permit. The equipment should be conditioned and the ammunition prepared several months in advance, so full attention can be given later to training and competition.

The shooter needs a rigid training schedule. Daily dry-firing exercises with the Service rifle develop familiarity and effectiveness. The shooter knows his weak points and he should schedule the greatest time to correct or improve on them. The Sunday shooter should plan to spend sufficient time on the range to establish his rifle characteristics and determine his sight adjustments.

After each match look at yourself with your coach's hat on and adjust your training as required.

The match program will give general information and special rules. General rules and regulations for National Trophy Matches are contained in AR 920-30 and additional information is given in the NRA High Power Rifle Rules.

When the civilian rifleman makes good scores with the Service rifle, he will know he has performed his duties as administrative officer, supply officer, coach, armorer, and rifleman as he should. ■

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