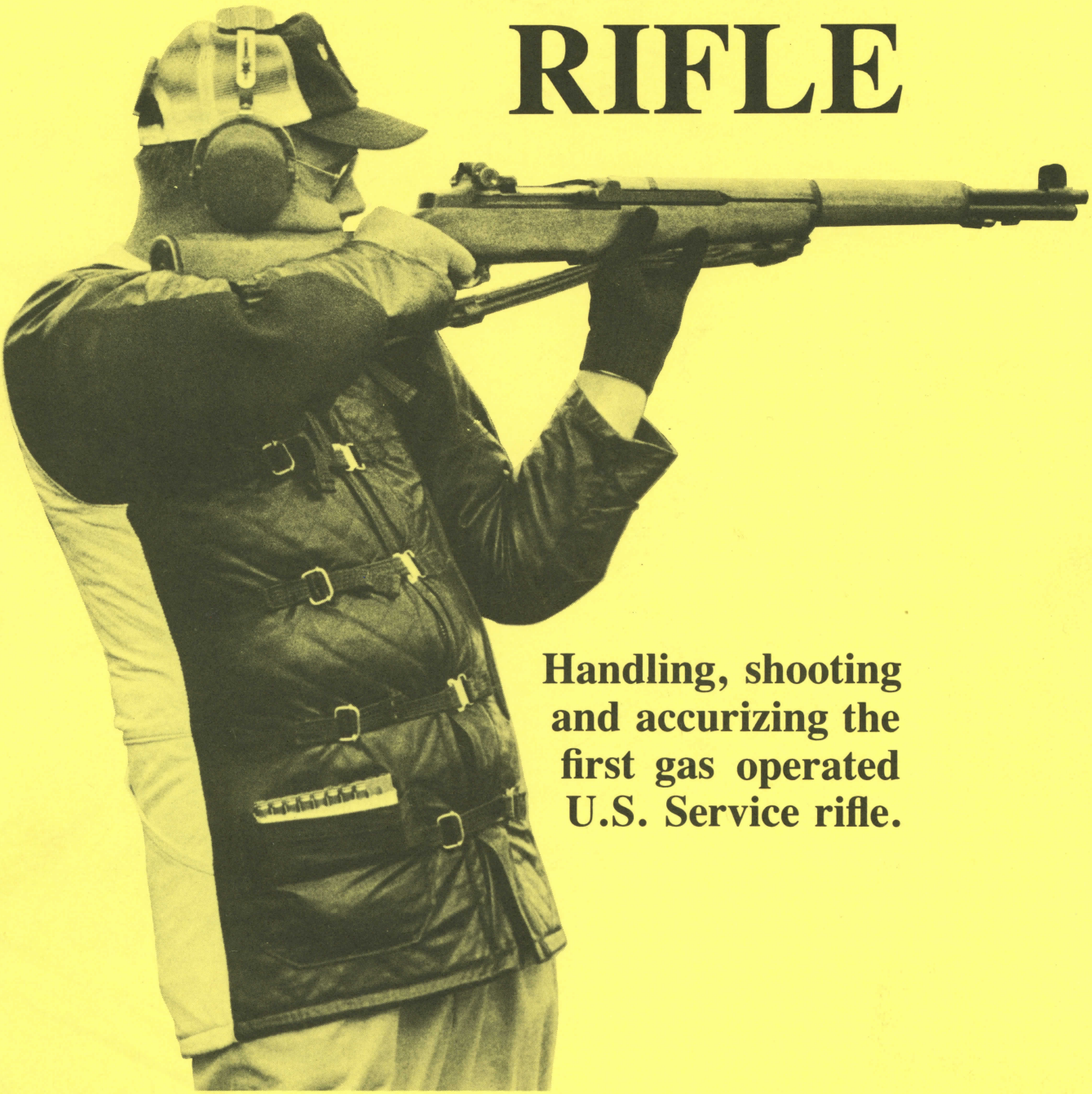
NRA

AN AMERICAN RIFLEMAN REPRINT

THE M1 RIFLE

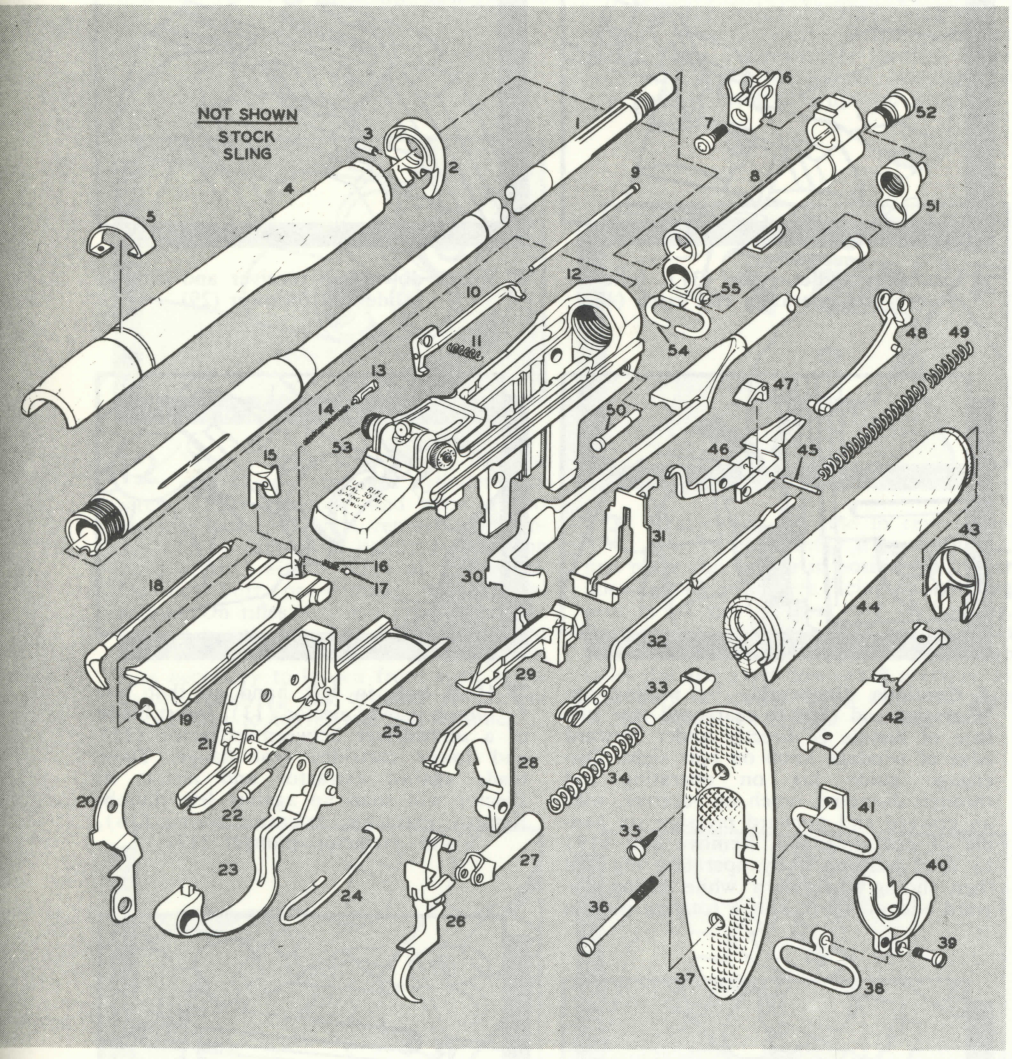


Handling, shooting and accurizing the first gas operated U.S. Service rifle.

For information, write the NRA at 1600 Rhode Island Ave., N.W., Washington, D.C. 20036

U.S. Rifle, Cal. .30, M1

By Thomas E. Wessel



On Jan. 9, 1936, the U. S. Army adopted a semi-automatic rifle to replace the Model 1903 bolt-action Springfield which had been the standard U. S. Service rifle since 1903. The new rifle, designated U. S. Rifle, Cal. .30, M1, was also adopted shortly afterward by the U. S. Navy and the Marine Corps.

The M1 rifle was invented and developed at Springfield Armory by Canadian-born John C. Garand, a civilian engineer who had been employed at the Armory since 1919. Garand's experience in the field of design and production was extensive. His initial design was a primer-actuated light machine gun which he developed at the National Bureau of Standards shortly after World War I. This gun showed such promise that Garand was transferred to Springfield Armory to work on development of a primer-actuated semi-automatic shoulder rifle. He subsequently designed a series of such rifles, but the one finally adopted in 1936 was gas-operated rather than primer-actuated.

Initial delivery of machine-made M1 rifles from Springfield Armory began in September 1937. As might be expected, early production rifles did not perform well in service but the majority of defects noted were due to slight but critical dimensional differences, not in accordance with the design, between the Service test models and the machine-made guns. These troubles were eventually corrected and it is a matter of record that the Ordnance Dept.

Parts Legend

1. Barrel
2. Lower band
3. Lower band pin
4. Rear handguard
5. Rear handguard band
6. Front sight
7. Front sight screw
8. Gas cylinder
9. Clip latch pin
10. Clip latch
11. Clip latch spring
12. Receiver
13. Ejector
14. Ejector spring
15. Extractor
16. Extractor spring
17. Extractor plunger
18. Firing pin
19. Bolt
20. Safety
21. Trigger housing
22. Trigger pin
23. Trigger guard (old style)
24. Clip ejector
25. Hammer pin
26. Trigger/sear (old style)
27. Hammer spring housing
28. Hammer
29. Slide and follower
30. Operating rod
31. Bullet guide
32. Follower rod
33. Hammer spring plunger
34. Hammer spring
35. Buttplate screw, short
36. Buttplate screw, long
37. Buttplate
38. Stock ferrule swivel
39. Stock ferrule swivel screw
40. Stock ferrule
41. Butt swivel
42. Front handguard spacer
43. Front handguard ferrule
44. Front handguard
45. Accelerator pin
46. Operating rod catch
47. Accelerator
48. Follower arm
49. Operating rod spring
50. Follower arm pin
51. Gas cylinder lock
52. Gas cylinder lock screw/valve
53. Rear sight
54. Stacking swivel
55. Stacking swivel screw

1 Disassembly of the M1 rifle is accomplished by first pulling rearward on the trigger guard (23) and then out and away from stock. Entire trigger housing (21) and assembly will separate from rifle. Lift receiver (12) and assembly away from stock

during this period endured criticism which was often partisan, to say the least.

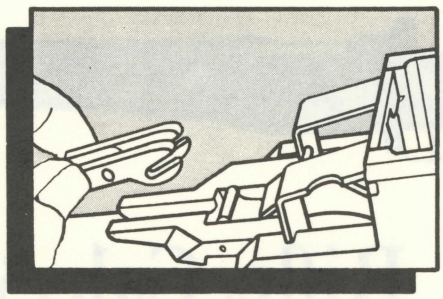
Entrance of the United States in World War II resulted in accelerated production of the M1 rifle at Springfield Armory with corollary production by Winchester Repeating Arms Co. beginning in January 1941. By V-J Day (Aug. 14, 1945) a total of 4,028,395 M1 rifles had been produced, of which Winchester manufactured 513,582. During the Korean War additional large numbers of M1 rifles were produced by Springfield Armory, and by International Harvester Co. and Harrington & Richardson, Inc.

That the M1 rifle gave a good account of itself in every theater of combat in World War II is an accepted fact. Subsequent performance in the Korean War only emphasized its general excellence as a battle rifle.

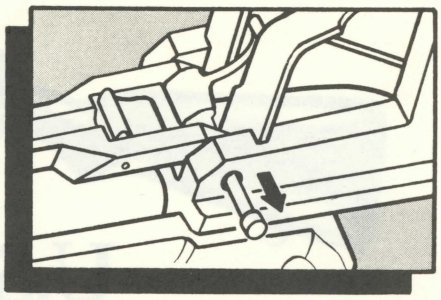
Target shooting activities in the years since the Korean War have shown the M1 to be a superior target rifle as evidenced by comparison of scores fired at all ranges with the 1903 Springfield and the fine National Match M1's and accurized Service rifles in use today.

The M1 does have certain limitations which were emphasized during the Korean War. A primary criticism is its weight, which sometimes exceeds 10 lbs. when the stock is of dense wood. The system of *en bloc* loading with an 8-round clip is also open to criticism since a partially expended clip cannot be conveniently refilled during a lull in battle. Also the infantryman often needed greater magazine capacity when confronted with massed infantry attacking at close range, especially at night when aimed fire was impossible.

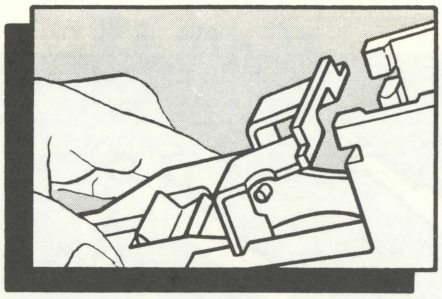
To meet the dual requirements of reasonable weight and increased magazine capacity, the Ordnance Dept. developed the M14 rifle which was adopted in 1957. The M1 rifle will remain limited standard until rearming of troops with the M14 rifle is completed.



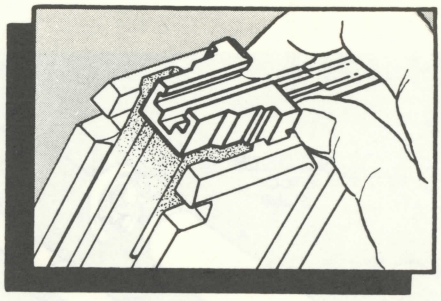
2 Disengage follower rod (32) from follower arm (48) by moving rod toward muzzle end. Remove follower rod and operating rod spring (49)



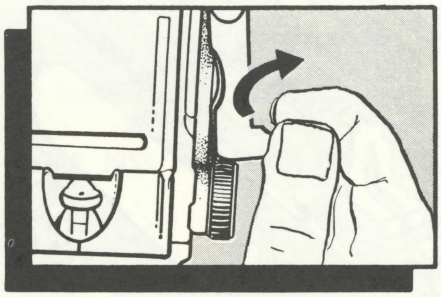
3 Next push out follower arm pin (50) from left side of receiver



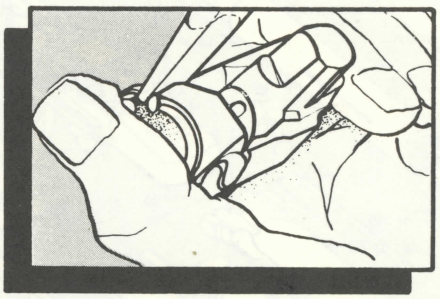
4 Lift away bullet guide (31), follower arm, and operating rod catch (46)



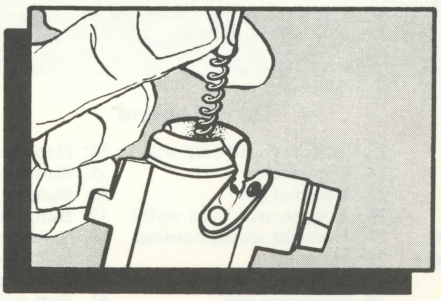
5 Reach down into receiver and lift out slide and follower (29)



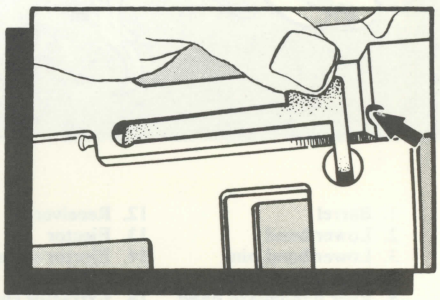
6 Continue disassembly by pulling operating rod (30) to rear until rear surface of handle is directly under forward edge of windage knob on rear sight. Disengage guide lug on operating rod through dismount notch on receiver, with an upward and outward pressure on handle of operating rod. Remove bolt (19) by first grasping it by operating lug and then sliding it forward while lifting upward and outward with a rotating motion



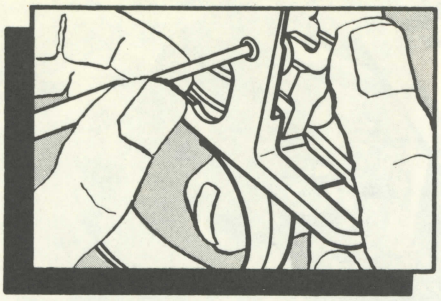
7 Hold bolt in left hand so that left thumb is over ejector (13). Insert blade of a screwdriver between extractor (15) and lower cartridge seat flange. Twist blade against extractor and unseat it. Ejector will snap up against left thumb. Remove extractor, extractor spring (16), and extractor plunger (17)



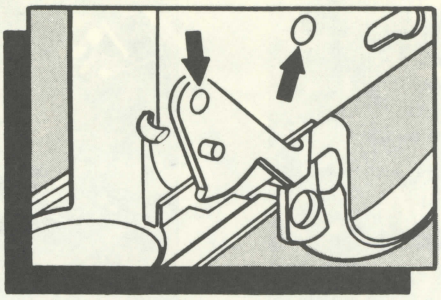
8 Lift out ejector and ejector spring (14). Do not separate these parts. Remove firing pin (18) from rear of bolt



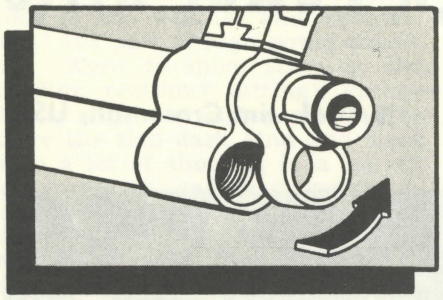
9 To remove clip latch (10), first depress it to remove tension of clip latch spring (11). Using a drift, push forward on clip latch pin (9—arrow) to unseat it. Withdraw pin and remove clip latch and clip latch spring



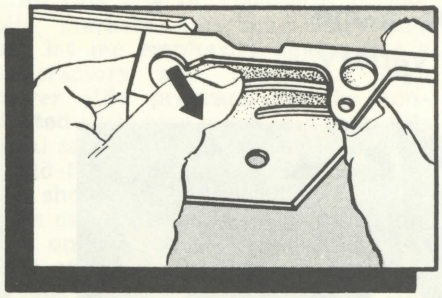
10 Trigger housing assembly is disassembled by first closing and latching trigger guard. Squeeze trigger (26) to permit hammer to go forward. With index finger on trigger and right thumb pushing against sear portion of trigger, drift out trigger pin (22). Lift out trigger and remove hammer spring plunger (33), hammer spring (34), and hammer spring housing (27)



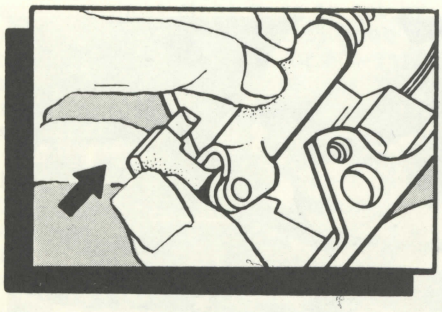
11 Drift out hammer pin (25—left arrow) and lift out hammer (28). Unlatch trigger guard. Using a small drift or punch, push safety stud from its hole (right arrow). Remove safety (20) from trigger housing (21). Swing trigger guard down to open position and slide it rearward until wings are aligned with safety stud hole. Rotate it right and upward until hammer stop inside the right wing clears trigger housing base. Remove trigger guard. Place a screwdriver through lower hole in left side of trigger housing and pry clip ejector (24) upward and out



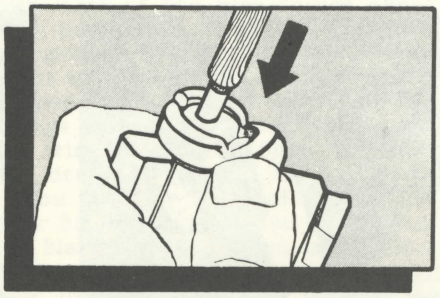
12 With a blunt screwdriver, unscrew and remove the gas cylinder lock screw (52). Unscrew and remove gas cylinder lock (51). Next, remove gas cylinder (8) by tapping it lightly forward on bayonet stud with a piece of soft wood. Do not burr or damage the internal splines. On rifles with gas cylinders modified by a cut extending from front sight base dovetail downward to lower splines, it is necessary to loosen front sight screw before removing gas cylinder to prevent damage to barrel and gas cylinder



13 Reassemble the rifle in reverse order. To reassemble trigger housing, first place clip ejector in position in trigger housing with short arm facing up and long arm in its slot at front end of housing. Position loop of clip ejector on top of its stud and hold it there. Hold long arm up in its slot and exert downward pressure on rear part of spring. Long arm will snap into notch on trigger housing base



14 Replace trigger guard, safety, hammer, and hammer pin. Assemble hammer spring housing, spring, and plunger as a unit. Place the plunger in its seat on hammer. Make sure that open side of spring housing is toward safety. Hold these parts in a raised position with left thumb and fingers. Insert trigger and trigger pin. Press forward on sear, and seat pin by pressing on its head



15 When reassembling bolt, first insert firing pin and then, with bolt face upward, place ejector and ejector spring into hole in face of bolt. Replace extractor spring and plunger. Put stud of extractor into its hole in bolt. Exert thumb pressure on extractor and, using a piece of hardwood dowel, depress ejector into face of bolt until extractor seats with an audible click ■

A MAN TO REMEMBER

JOHN C. GARAND

Invented the Garand rifle

Born—Jan. 1888, St. Remi, Quebec, Canada

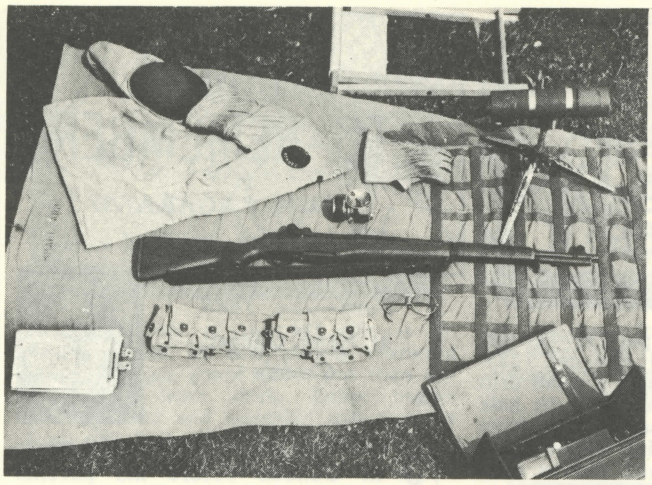
JOHN GARAND spent only 10 years in Canada before his parents moved to Denisonville, Conn., and then on to Jewett City. At age 20 he became a tool- and gauge-maker for Browne & Sharpe and then in 1914 he became acting foreman and machine designer for Federal Screw Corp. in Providence, R. I.

From Providence, Garand moved to New York City, and it was there that he turned his attention to developing automatic firearms. The first World War focused attention on such weapons, and Garand was interested to learn of the frequent malfunctions that plagued them.

Having conceived some designs which he thought would eliminate such failures, he approached the Naval Invention Bureau and was soon put to work at the National Bureau of Standards in Washington, where he successfully developed a primer-activated light machine gun. There Maj. Lee Wright met the inventor and was sufficiently impressed to obtain Army Ordnance sponsorship and move Garand to the Springfield Armory in 1919.

Garand's machine gun had been soundly designed, but it failed to perform the functions the Army desired in such an arm. Thus Garand was instructed to develop a semiautomatic rifle, and this he proceeded to do, still using the explosion of the primer to activate the mechanism. He succeeded in perfecting such an arm only to have a change in ammunition adopted in 1925 force him to redesign his rifle, this time utilizing gas pressure for the activation.

Tests of the new rifle were highly satisfactory, but before even limited production could be started the caliber of the rifle was ordered increased from .276 to .30, and this caused further delays and alterations before the final adoption of the arm on Jan. 9, 1936. John C. Garand died Feb. 16, 1974, at age 86. —HAROLD L. PETERSON



Typical high power rifle shooter's gear: stool, coat, glove, scope, carbide lamp, rifle, dope book, belt, glasses, shooting kit, and a shooting mat

A convenient prone set-up: scope near left elbow, elbows on shooting mat, shooting kit and dope book close to right hand

PART I

How to Shoot the High Power Rifle

Nowhere else in the shooting game can you get such spice and variety

By Col. Jim Crossman, USA

In slow-fire shooting use your time profitably

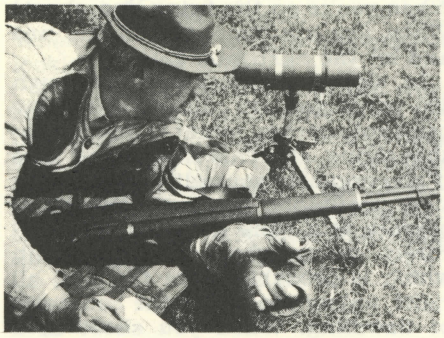
If you use an M1903 rifle, loading the five-round clip in rapid-fire can be tricky

Blackening the sights with a carbide lamp will kill any glare

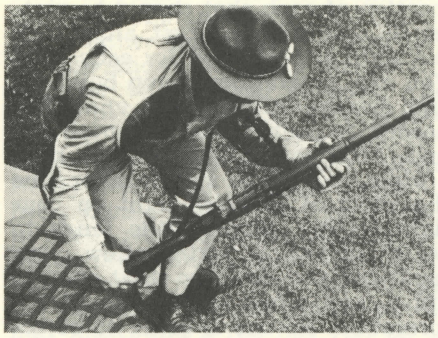
To save time, study of the dope book should be done while the target is in the pits

In slow-fire, spotting each hit carefully pays dividends

As the rifle is wedged firmly into the shoulder with the right hand, the sling tightens up across the back of the left hand and on the left arm



Careful study of conditions and shot plotting in the dope book will gain points



Dropping to sitting in the cross-legged position

Getting a comfortable cross-leg sitting position

So you're interested in high power rifle shooting, are you? Well, c'mon in—I'm delighted to see you, and you are talking to the right guy, because of all the various rifle, pistol, and shotgun shooting games I've tried, high power rifle shooting is the one for me.

Do you want to try careful, precise, long-range shooting, with detailed study of the weather and wind effects? It's part of high power shooting. Want to shoot some in the standing position? Sitting? Prone? They're all part of high power. Maybe you're the slap-dash kind and want to do a lot of shooting in a hurry? You should try the high power rapid-fire stages. Do you want to invest a young fortune in fancy rifles, scopes, and other equipment? I guess you can if you set your mind to it, but most of us are getting by on a pretty cheap outfit. I don't know where else you can get such spice and variety in the shooting game with such an inexpensive outfit.

The high power rifle game consists of shooting a moderate weight center-fire rifle in various positions, slow-fire and rapid-fire, at ranges of 100 to 1,000 yards. The usual courses of fire consist of standing slow-fire at 200 yards, sitting rapid-fire at 200, prone rapid-fire at 300, and prone slow-fire at 600 and 1,000 yards. Not all clubs can get up to 1,000 yards—it's the rare and fortunate club that can—and most clubs have to get by on less than this. In fact, a club is fortunate to have a 500- or 600-yard range, but a very satisfactory program can be built on the shorter ranges of 100 to 300 yards.

While you can see bullet holes all right at short range, it becomes more difficult at 200 and 300 yards and impractical beyond. So high power rifle targets are usually mounted on a balanced frame, sliding up and down like a window. A pit is dug to protect the man who marks targets, and when a shot is fired he pulls the target down and puts a spotter on it, so you can see where you hit.

The spotter is a large cardboard disc, black on one side for shots in the white and white on the other for shots in the black bull. A peg, fastened to the disc, fits in the bullet hole in the target. When you fire your next shot, the marker moves the spotter and pastes the first shot hole, and so on for your whole string. Rapid-fire is handled a little differently, as the targets are run up for the specified time, pulled down, and all ten shots then marked.

All this talk of 1,000-yard ranges, pits, markers, etc., may scare you, but let me emphasize again that a satisfactory and successful high power rifle program can be conducted with very much less than this ideal set-up. You can learn standing, rapid-fire, and prone pretty well at the shorter ranges, although you do miss out on long-range wind doping and on the poor visibility you often find at the long ranges.

This subject of high power rifle shooting is a big one—many books have been written about it. I've broken it down into chunks of a size we can handle more easily, but don't forget that all the chunks are really part of one big piece.

Equipment

While the beginner can borrow equipment for a time, eventually his welcome wears out, and before matters get to that point he should have begun to invest in some gear of his own. One of the nice things about high power rifle shooting is that you can get by on a rather limited investment without being too badly handicapped. The few essential important things should be gotten first, with the trimmings added later as necessity demands and the purse permits.

You probably think of the rifle as your first investment, but it may not be. Many NRA-affiliated clubs have drawn M1 service rifles for use by club members from the Director of Civilian Marksmanship, an agency of the U. S. government's National Board for the Promotion of Rifle Practice.

Within the limits of the match rifle class, you will find a great variety of equipment being used, including the Springfield, Enfield, Winchester M54, Winchester M70, etc., in original and modified versions.

Whatever rifle you get, be sure it has sling swivels for the wide 1¼-inch sling, a good blade or interchangeable front sight, and a good micrometer target-type rear sight capable of easy adjustment in ½- or ¼-minute clicks. The stock should have a big, flat comfortable fore-end, should be long enough to keep your face out of the bolt but not so long you can't work the bolt rapid-fire, and should be as straight as you can use in the standing position.

Assuming you now have a rifle, your next investment should be a shooting coat—not, as you might think, for the purpose of keeping your shoulder from getting sore from recoil, but to protect your arm from the sling and your elbows from being ground raw. Since you can learn a great deal of shooting at home with an unloaded rifle, you should get a coat as soon as you can, and then use it for plenty of practice.

Sitting rapid—starting down

Keeping book

A score book can be easily improvised or bought pretty cheaply, and will be worth its weight in gold if used properly. It really should be called a 'dope' book rather than score book, because the score is the least important of the entries in the book. During the shooting of a string, the

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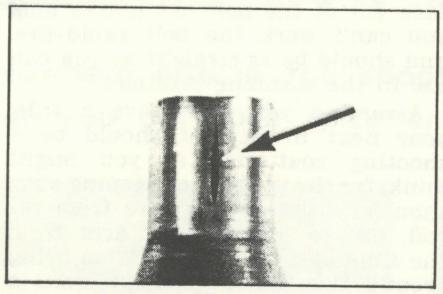
COL. JIM CROSSMAN, USA, has years of experience in high power rifle shooting.

NECK CRACKS

I have been reloading for my .30-'06 about a year, with excellent success so far. Now, however, several of my cartridge cases have a crack like the one in the fired case illustrated. Is this a sign of poor brass, or the result of some incorrect step in reloading?—F.N.S.

Answer: In most cases this failure (see arrow in cut) is simply a sign the case is at last worn out. It is caused by the repeated stretching and squeezing of the brass at that point, as the case is fired and resized over and over. It is not dangerous, since the case body behind it seals the chamber against any gas escape to the rear.

Such a crack is at times mistaken for a 'season crack', which used to appear after long storage of old .30-'06 military ammunition made with a hard case neck to ease operation of the Springfield rifle bolt. A season crack (now comparatively rare) is a fine even crack the full length of the neck, and does not look like this kind of crack at all.



This failure can, if necessary, be postponed by 2 special measures. The first is to make sure your case sizing die does not reduce the neck excessively, as many do. The second is to keep the neck soft by annealing it after each few reloadings, which is done by heating to a low red only the neck (not the case body, which for strength must be left as it is) and quenching in water, the effect being opposite to that in hardening steel. However, the cost of a new die is hardly justified for this purpose even if you could be sure of getting a correct replacement. Neck annealing is seldom worth the bother even where necessary equipment is available.

While case life varies with brass quality and sizing die dimensions, in .30-'06 it probably averages at least 20 firings. After that many, you may fairly conclude that the case owes you nothing more. Cartridge case cost in reloading is therefore very small.

Examine your cases before each loading, which should be done in any event, and discard all defectives. When the remainder finally become too few to reload as a lot, throw them away—their life is about at an end, and they should not be mixed with newer cases of different characteristics.—E.H.H.

This question and answer is taken from the "NRA Illustrated & Indexed Questions & Answers Handbook" and are typical of those appearing in THE AMERICAN RIFLEMAN *each month.*

location of each shot should be plotted on a miniature target, along with the sight setting used for each shot. You can watch your group build up, and determine if a sight change is needed to center your group on the bull. After you have used the book a while, you will be able to determine the effect of different light on your sight setting, if your rifle tends to 'walk' during a string, how your rapid-fire and slow-fire sight settings differ, and other useful bits of information. No one is going to object if you put in the score, and it's sort'a fun to look back at your past shooting.

A spotting scope is a pretty useful item, and will earn its way. While spotters are generally put in bullet holes in targets at 200 yards and beyond, a scope will help you determine the exact location and let you check on the pit boy. In rapid-fire matches spotters are not always used, and it is nice to be able to see your bullet holes in the target—but you can't rely on seeing them all the time. The spotting scope is most useful in helping you dope wind. If you aren't frantic to see bullet holes at 300 yards, you can get by with fairly simple equipment—a pair of binoculars, or even a monocular. A stand of some sort to hold the scope and to permit you to use and adjust it easily in the prone position is required also.

Handy and helpful

Other equipment can be bought or made from time to time as the need arises. A shooting glove to protect your hand and wrist from the sling and sling swivel will be helpful. You may want some method of taking the bright glare and shine off the sights, especially if they aren't well shaded from the sun, the most popular scheme being to smoke them with a miner's carbide lamp.

Some people like to carry a rifle rest for use in keeping the rifle off the ground between relays. A ground cloth or pad of some sort is handy on a very rough firing point or on one covered with loose dirt or gravel. A light folding stool gives you a chance to relax during an offhand string, and is useful at other times when you are waiting. You may want a bag or box to keep all your trinkets together, but you should beware of getting loaded down with too much gear. On some ranges you may have to carry all this stuff a half mile or more and you don't want to arrive on the firing line exhausted.

On the firing line

The firing point was built for only one purpose—for firing. If you want to debate the fate of the world, to overhaul your gun, or to write detailed notes on your shooting, do it before or after you are on the line. When you're on the firing line, shoot! When you are done, get off the line and let the next man get up.

In slow-fire matches up through 600 yards you are allowed a minute per shot, or ten minutes for a ten-shot string, etc. This is plenty of time if you organize yourself and use your time profitably. Many civilian clubs operate at a more leisurely pace and rarely worry about a time limit, which is probably more fun and all right, unless you get in the bad habit of dawdling. When you shoot in a match run on a time limit, you may end up with shots not fired.

Long before you get into a serious tournament, you should have worked out for yourself what equipment to take with you for a standing match, for a rapid-fire string, and for a long-range shoot. The gear probably will be different for the three matches. During this process, you should also have worked out how you want this stuff distributed on the firing line when you are in position.

For standing, I take a stool and shooting bag, while rapid-fire calls for the scope and score book. In a prone match, I first pick a likely spot for my left elbow and place everything in relation to it, with the scope close to the elbow position, ground cloth at the correct angle and not too far up, shooting bag to the right front, ammunition in the left side, score book open and on the right side, and so on.

Watch the elements

Before you are called up on the line, study your score book, the wind, temperature, light, and other conditions and decide what sight setting you should use. Having decided, note the setting in your score book and put it on your sights. Fill out the other dope in your score book—ammunition type, weather, date, location, etc. Having set your sights, blacken them if they need it. Check your sling for proper adjustment and give a final run-down on other details—right kind and amount of ammunition, squadding ticket, scope, etc. Then relax and wait to be called. Don't wander so far away that a search party has to be sent for you.

When you are called, move up promptly, set up your gear, and get ready to shoot. Assuming you are shooting a slow-fire string, make a last minute check of conditions to see if they have changed since you set the sights a while back. If not, check the sights to be sure they are right and then shoot. Now write in your score book any changes in sight setting. As soon as your target comes up, check spotter location and wind conditions, make any necessary sight change, and shoot again. Now plot in your score book the changed sight settings for the second shot, and the location of the first shot. In this

scheme, you do your bookkeeping while the target is down in the pits. When the target is up, you should be looking at it or shooting at it.

When you have fired your last shot, collect your gear and move it off the line as soon as possible. Then go back and pick up the empty cartridge cases—'brass', shooters term these—check with the score keeper and sign the score card. But clear the firing line as soon as you can.

Rapid-fire

Tell a man he has to shoot ten shots in less than a minute, call it rapid-fire, and you have the makings of a first class panic. For this reason the Army changed the name from "rapid-fire" to "sustained-fire", which is equally descriptive and less terrifying.

Rapid-fire at 200 yards is fired either with the M1 rifle or with the match-type rifle, in a ten-shot time limit of 50 seconds for the M1 and 60 seconds for the match rifle. While the 200-yard stage is fired either sitting or kneeling, the 300-yard stage must be fired prone, with time limits of 60 seconds for the M1 and 70 for the match rifle.

Perhaps the best way to understand this rapid-fire business is to stand beside ol' Henry Hotshot and take a few notes on times and events while he shoots a string. We first see Henry as he is sitting on the ready line waiting for the first relay to finish. He is wearing his shooting coat and glove, has the sling on his arm, and has his other personal gear ready to be moved with him. Henry has ammunition in a coat pocket, his score book in a pocket, and his spotting scope close by. He has already studied conditions, determined his sight settings, put them on the rifle, entered them in the score book, blackened his sights, and done all the other preliminary jobs. From now on let's write down the commands and important times, along with what happens.

"Second relay on the firing line"—Henry moves up to the firing line, checking in with the scorer as he goes by, to be sure he's at the right place and time. Since this is the 200-yard stage, he knows the rules permit firing either kneeling or sitting and he also knows that this means sitting, for all practical purposes. So Henry picks out a likely looking spot and sits down, squirming around until he is situated just right. When Henry is satisfied, he notes where his heels should be—but not by digging a deep pit—and then stands up, which indicates to the range officer that Henry is ready to go. Meanwhile, the targets have been pasted, put at half-mast, and a red flag run up to indicate the pits are ready.

"Load and lock"—Henry, being an old hand at this game, knows that the man shooting a Springfield, M70, or other bolt-action rifle would put four rounds in the magazine and one in the chamber and put on the safety. He would have another clip loaded with five rounds nearby to complete the ten-shot string with. However, Henry is shooting an M1 rifle, which calls for a different procedure since the M1 has an eight-round magazine. Using an empty clip and both hands for manipulation, *two* rounds are put in the M1 rifle, after the safety has been put on. He would have a clip loaded with eight rounds nearby. Henry then stands relaxed, waiting for further commands. Or perhaps he will make a final adjustment of the sights.

"Ready on the right? Ready on the left?"—Questions put to the shooters by the range officer. If not ready, the shooter should yell out "Not ready, target XX" and he will be given more time.

"Ready on the firing line"—Indicates to the pit detail and shooters alike that everyone is ready and rarin' to go. Brother Hotshot takes off the safety, glances down again at the number on his target stake, then watches his target like a hawk, while he stands erect and in a relaxed position from which he can rapidly drop into position.

Out of the corner of his eye, Hank sees the red flag in the center of the pits wave for a few seconds. Then Hotshot sees the flag disappear, but he remains relaxed, watching his target. As soon as he sees the targets start up, he starts down, dropping into position with his heels in the previously marked locations, breaking his fall with his right hand if necessary. He squirms around a bit until the position feels right, as he brings the rifle to his shoulder. When he has the right position, he rechecks his target number, aims and starts his squeeze.

Careful here

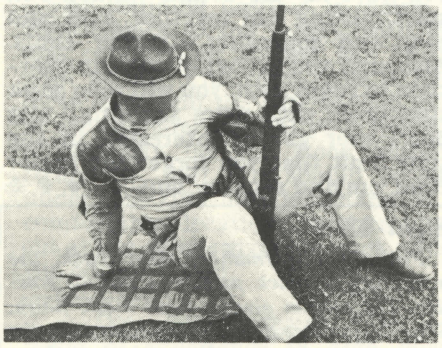
Here is where the beginner goes wrong. He thinks he has to yank the shots to finish in time, and so he shoots all over—and off—the paper. There is a difference between a fast squeeze and a yank, and a vast difference in the results. When they finally get the idea, and begin to shoot good rapid-fire scores, many shooters find their slow-fire improves too, because they learn to get a shot off quickly without yanking.

After ten seconds Henry has gotten his position and has just squeezed off his first shot.

After 15 seconds he's fired his second shot and since he is using an M1 rifle, he is now engaged in doing something about reloading it, and has taken the rifle down off his shoulder.

After 25 seconds Henry has taken a full clip from his cartridge belt, jammed it firmly down in the M1 magazine, given the operating rod handle a smack with the palm of his right hand to help the bolt close, shifted position as necessary, gotten the rifle back up to his shoulder, checked his target number, and probably squeezed off his third shot. If his position wasn't just right on the first two shots, he takes a little extra time to make it right before firing his third.

After 35 seconds Hotshot is well on his way, squeezing off his shots in a smooth, regular cadence. He knows that he has three or four seconds per shot for the last eight shots, which is plenty of time if he uses it profitably. His position is just right, so that as he recovers from recoil, his sights are nicely lined up and he can add the few necessary extra ounces of trigger pressure to that he put on as he was recovering from recoil. The



Sitting rapid—almost down

The spread-leg position—wedging the rifle into the shoulder

Sitting rapid—squeezing one off

usual beginner finds his ears popping, eyeballs starting out, and face turning black at this stage, because he has forgotten completely about breathing and has been holding his breath all this time. The old hand like Hotshot has learned to hold his breath while he is aiming, then to grab a quick new one while recovering from recoil, between every shot.

Time is fleeting

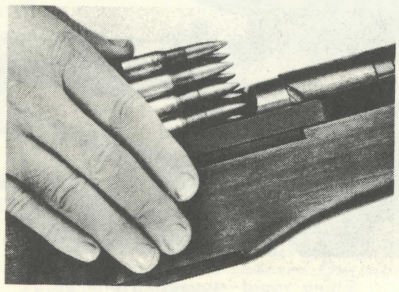
After 45 seconds Hank is just squeezing off his ninth shot, confident that he still has plenty of time for his last shot. You see, Hank is one of these guys who isn't happy until he turns the last one loose just as the target dives for the pit. Personally, I can't stand the pressure of running so close to the limit, and I do better by finishing a few seconds ahead of time. Then I know I have spare time in case of trouble along the way.

After 50 seconds the targets go down and Hank sits there, knowing he has squeezed off ten good shots, and has used his 50 seconds to the best advantage.

"Cease firing, unload"—at this command Hank checks his rifle, gets up, moves his stuff off the firing line and polices his brass, while keeping an eye on his target. When it comes up he drops down behind his scope, watches the discing, and studies his group size and location. When satisfied that he's gotten the right marking, he checks with the scorer, signs his card, and gets off the firing line.

The man who is shooting a bolt-action rifle at this 200-yard rapid-fire game would follow pretty much the same procedure as Hank, except that he would have 60 seconds for his ten shots, would load five rounds to begin with, and would have to operate the action by hand. The other details —getting into position, sighting, squeezing, breathing, etc.—are much the same with either rifle.

Due to the difference in clips for the M1 and for bolt-action rifles, the loading procedure is quite different. Where the M1 "en bloc" clip with its eight rounds is inserted into the rifle as a complete package, the Mauser-type "clip" for the M70, Springfield, or similar rifle is really a charger, serving to hold the five rounds in a convenient group until you are ready to charge them into the magazine.



Reloading—force the clip down with a single firm motion

Clip loading is an operation that may ruin the beginner's rapid-fire score. It should be done smoothly, firmly, and rapidly, but without rushing.

In loading the M1, when once the clip is started in the receiver, give it a good husky push with the thumb to be sure it seats on the first try, and your thumb rocks up out of the receiver as the palm of your hand hits the operating rod handle. An occasional round will work forward in the M1 clip, until the extracting groove on the case has gotten forward of the mating ridge in the clip. When you try to put such a clip into the M1, you get a horrible jam. *Check your clips before it's time for trouble.*

Loading the magazine

In loading with the five-round charger, a little more finesse is required. With the thumb about one-third of the way forward on the cartridge case and with the fingers around the floorplate for added control, the thumb should smoothly 'roll' the cartridges out of the clip and into the magazine—and be sure you seat the last round in the magazine. If your thumb is in the wrong location on the top cartridge when you start, you will likely end up in an awful mess. Clip loading either the M1 or the five-round magazine is best learned at home with dummy ammunition.

Timing is different with the two rifles, although for the first and second shots timing is about the same—that is, the first is off within ten seconds and the second about four seconds later. Then the man with the five-shot rifle should go along at about four or five seconds per shot, firing his fifth just before half-time. About five seconds to reload and a few more to get the rifle up and squeeze, should see the sixth shot off at about 35-40 seconds. He should roll along at about a four- or five-second cadence, which will bring his last shot at around 55 seconds, leaving a little margin for emergencies.

Since the M1 rifle does all the work of reloading between shots, it would seem that you should have more aiming and squeezing time, even with the shorter time limit. Since you don't move around, as you do in swinging the bolt and reloading the magazine of the bolt-action rifle, there is less chance to recover if you are kicked out of position.

It is most important to get a good position for the first shot of the clip. And despite your first awkward attempts, it isn't hard to learn how to operate the bolt and how to do it easily and rapidly. But the place to learn is not on the firing line—not as long as you have any spare time at home.

The other two sorts of rapid-fire are prone at 300 yards, in 60 seconds with the M1 rifle, or 70 seconds with the bolt-action rifle. Sighting, aiming, reloading, and breathing are much the same as at 200 yards. Although you are shooting from the more steady prone position, the increased range requires relatively smaller groups. A group measuring six minutes of angle will just fit the 12-inch bull at 200 yards, but the same bull at 300 yards calls for a four-minute group. Because of this, the extra time you have should be devoted to a bit more careful aiming and squeezing.

And this brings us to a most interesting point. Sight settings at both 200 and 300 yards rapid-fire may not be the same as your settings in slow-fire, and the only way to find out the right dope is lots of rapid-fire shooting and careful study of your group sizes and locations.

Getting into position

A major difference is in the method of getting into position. When you have your prone position, stand up, with your feet in the marked position, sling on, left hand in position under the sling, right hand grasping the rifle at the heel. Drop forward on your knees, while you lean backwards to ease up on the landing shock. Throw caution to the winds now and fall forwards, while you toss the butt of the rifle well ahead and to your right. As you land, break your fall with stock in your right hand. Now drop your left elbow into its marked position and with the right hand, wedge the stock into your right shoulder. The trick here is to throw the butt of the rifle well ahead as you fall forward.

Before you rush out and start spraying the countryside with bullets, be sure you can shoot good scores sitting and prone slow-fire. Then work out the mechanics of loading and reloading, of getting into position, and of bolt manipulation, without doing any shooting. When you have all the details worked out, start putting 'em together, slow and easy and squeezing all your shots. Although you probably will run overtime to begin with, you will soon work that down with more shooting. But don't ever get so interested in the time limit that you forget the basic: Hold 'em and squeeze 'em!

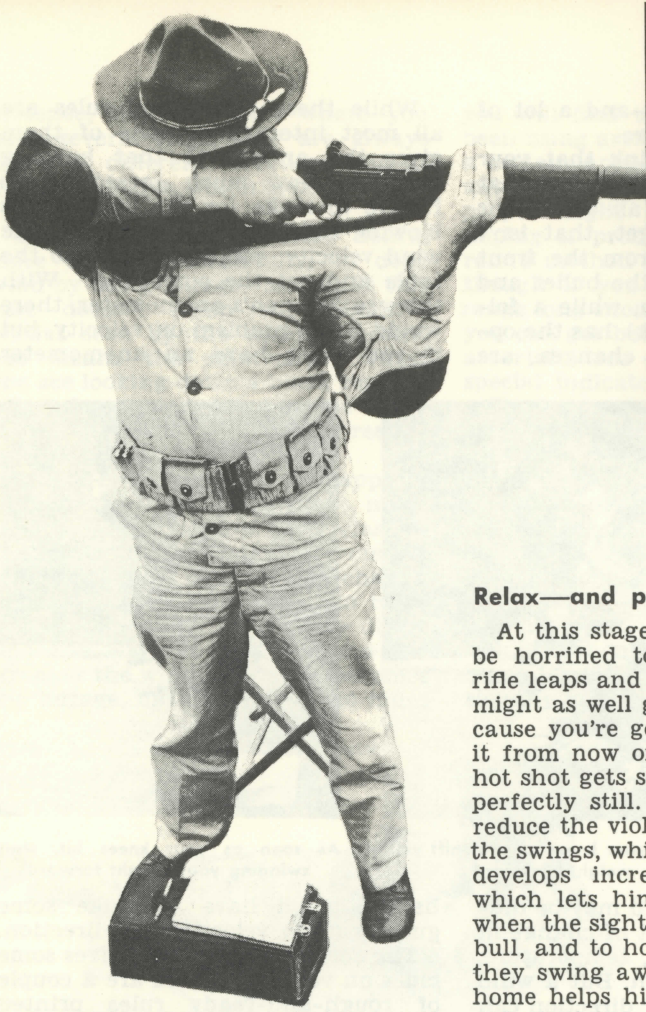
Sight black

For a semi-permanent sight black, use a mixture of black paint and talcum powder. The talcum gives a dead matte finish. Some experimentation is necessary on the proportions, since too little talcum fails to kill the glare and too much keeps the paint from sticking.—FORREST HALTER

How to Shoot the High Power Rifle

PART II

By Col. Jim Crossman, USA



In the standing position, keep body erect and weight evenly balanced on both feet. Note handiness of score book and pencil

THE standing position is an invitation to disaster with the usual beginner. He's standing up waving around in the breeze when suddenly the bull appears on the front sight for a moment, which tempts him into giving a wild yank to the trigger. While yanking may be a good way to get teeth out, it's a poor way to get bullets out, and leads to wildly erratic and lousy scores. The beginner to the standing position should be encouraged to shoot for the paper and to heck with the bull—in fact it's good training to blank out the bullseye and shoot merely for the paper until he can fairly consistently stay on the paper.

The standing position is facing at right angles to the target, with the feet comfortably spread, say 12 inches or so. The right arm is held quite high, and the rifle bedded high in the shoulder, so that your face fits comfortably on the stock without straining. Left arm should be well under the rifle and left hand at a comfortable location, neither clear out at the sling swivel nor back under the trigger guard.

COL. JIM CROSSMAN, USA, *has years of experience in high power rifle shooting.*

Relax—and practice

At this stage of the game you will be horrified to watch the way the rifle leaps and bounds about, but you might as well get hardened to it, because you're going to have to watch it from now on. Not even the very hot shot gets so he can hold the rifle perfectly still. By practice he does reduce the violence and frequency of the swings, while at the same time he develops increased trigger control, which lets him apply pressure only when the sights are lined up with the bull, and to hold that pressure when they swing away. Much practice at home helps him develop both skills.

A stool is a handy thing to have, so you can sit down and rest your shattered nerves between shots and while you do your plotting in the score book.

A popular pastime is to keep holding and holding and holding, while you try to make each shot perfect. You don't want to throw shots away, but hanging on like grim death trying to get a shot away usually results in a wild yank. If you don't get it off in a very few seconds—say five to ten—take the rifle down and start over again. You have one minute per shot, or ten minutes for a ten-shot string, which is plenty of time if you use it properly, but which doesn't mean you have to aim each shot for a minute.

At first glance the prone, slow-fire stages look like the lazy man's delight, but after you struggle through a 20-shot string under the hot sun, you will change your mind. The bull isn't very big and you have a lot of work to do in that half-hour. The 20-inch black subtends about four minutes of angle at 500 yards, and a bit over three at 600. The 36-inch bull on the long-range target is worth less than 3½ minutes at 1,000 yards.

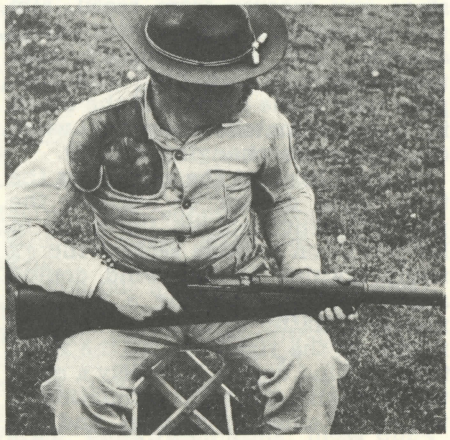
These stages call for careful holding, precise sighting, and a refined trigger squeeze. Wind doping is a necessity under some conditions, but under others it may be of no use; however, when you need to dope, you'll probably need it badly.

While you may not think it's possible to be uncomfortable lying down on the line, let me assure you it can be. With a one-minute-per-shot time limit at midrange, 20 shots can use up 20 minutes, and at the long ranges a 20-shot string can run a half hour.

Comfort is helped by having the proper set-up of scope, rifle rest, score book, and other necessary gear so that you can use 'em all with least effort. Nor is it considered sissy to take along a ground cloth or pad to soften some of the bumps.

A useful trick

You don't have to see like an eagle to shoot good midrange and long-range scores. If you are using a scope sight, there's no problem, but with iron sights you may have trouble seeing the front sight sharply and seeing a black, round bull. In very bad weather, the 1,000-yard bull may practically disappear, and the old hands at the game learn to sight at the top of the frame, or more commonly at the top of the bank, where it joins the target. One of the old stunts they used to pull at the school at Perry was to have you shoot a string at 600 yards on a blank piece of paper. Instead of aiming at a bull, you merely centered your sight in this blank piece of paper. Nearly



Relax on your stool between shots, but be ready to knock the target down as soon as it is marked

First preparatory step to rapid-fire with the M1 is "Lock — two rounds load"

Relaxed and ready to get into position

Drop to your knees as you shift your weight backward

As soon as your knees hit, start swinging your weight forward

everyone was surprised at how well he could shoot. So if your eyes give much argument, compromise in favor of a sharp front sight, and shoot for the center of the target.

The dawdling habit is easy to acquire in prone. Once you get a good sight picture, there is a great temptation to lie there and admire it instead of squeezing off the shot. Meanwhile your muscles begin to shake as you tire, you begin to get that desperate feeling as you run out of wind from holding your breath too long, and your eyes get blurry. If you try to turn the shot loose now, it may be anywhere on the paper, and if you've helped it along by hunching your shoulder, it may be a clean miss. If your original sight picture is OK, start your squeeze and bring it through promptly, as long as the picture remains good. In the rapid-fire stage you recover from recoil, aim and squeeze off a shot in three to five seconds, and you shouldn't take much longer in slow-fire. The slow, poky man is the despair of the coach in a team match, especially when conditions are changing rapidly.

The old hand at the game uses the term 'wind doping' to frighten the poor innocent tyro, but I'm going to let you in on a trade secret—there's really nothing to this wind doping stuff. Just like playing a piano is merely a matter of putting the right finger on the right key at the right time, so wind doping is merely a matter of making the right estimation of the wind's effect on a bullet, and applying the proper correction to your sights. If you want to be good at either piano playing or wind doping, a little practice helps—and a lot of practice helps even more.

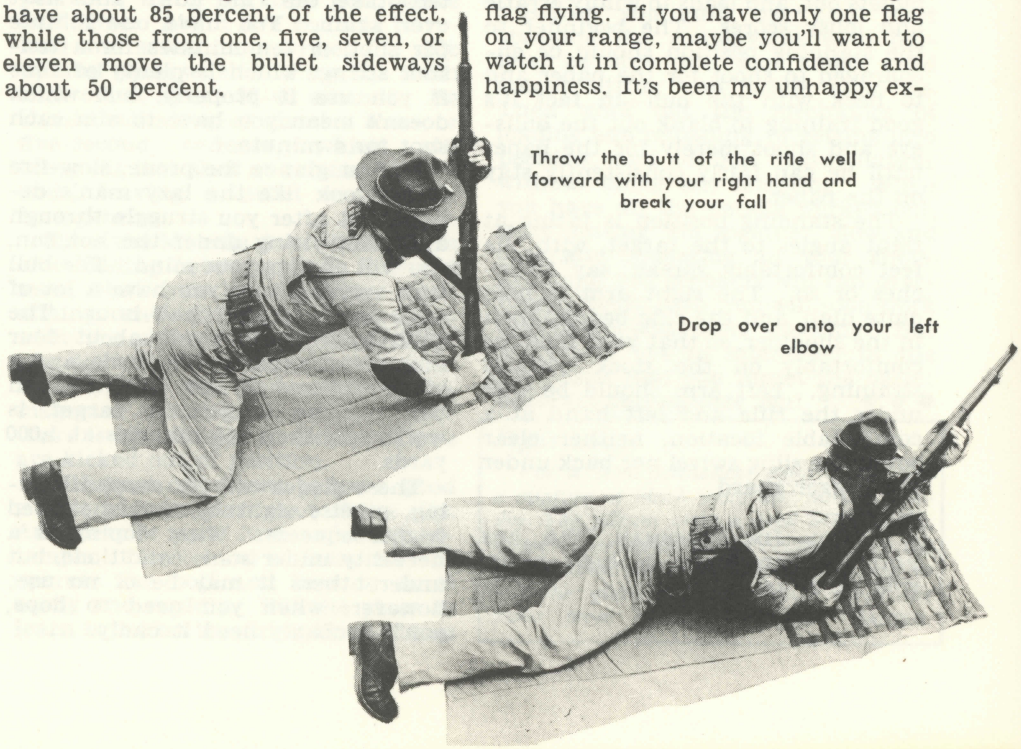
While you might think that your bullet gets to the target so fast that it won't be affected by air conditions between gun and target, that isn't so. A wind blowing from the front (12 o'clock) will slow the bullet and call for more elevation, while a following wind (six o'clock) has the opposite effect. These changes are often hard to detect and may be hidden by the larger effect of change in elevation due to light, temperature, and your own condition. But a wind blowing from any other direction can really put you all over the target. The greatest influence is by a wind from three or nine o'clock. The amount the bullet will be moved will depend on the range, wind strength, and other factors, and is something that the ballistics men can calculate for you.

Since winds from three or nine o'clock have the most effect, and winds from 12 or six have the least, it's reasonable to find that winds from two, four, eight, or ten o'clock have about 85 percent of the effect, while those from one, five, seven, or eleven move the bullet sideways about 50 percent.

While these tables and rules are all most interesting, none of them gives the answer to that burning question—How much correction do I have to make for the wind that's blowing right now? If you knew the wind velocity, you could refer to the table and get the correction. With the weatherman's anemometer, there would be no problem on velocity, but if you don't have an anemometer handy, you'll have to make some guesses as to velocity and direction.

The *accompanying table* gives some clues on velocity. There are a couple of rough-and-ready rules printed with the table, which give passable dope for the first shot.

After some experience, you can learn to estimate by licking your finger and letting it dry in the wind, squirting a stream of 'baccy juice in the air, tossing grass and twigs in the air, and similar scientific methods. The British and Canadians are strong for flags, and have them scattered all over the range. U. S. ranges aren't usually so well decorated, but we usually have at least a danger flag flying. If you have only one flag on your range, maybe you'll want to watch it in complete confidence and happiness. It's been my unhappy ex-



Throw the butt of the rifle well forward with your right hand and break your fall

Drop over onto your left elbow

perience, however, that where you have several flags, they are always flying in different directions and at different angles, which is no end confusing.

Most American shooters learn, more or less successfully, to dope wind by using mirage. Mirage in this case doesn't mean the beautiful castles seen by the desert traveler, but means the shimmering effect you see looking down a black road on a hot day. This mirage is due to irregular heating of the air and resulting changes in density.

On a calm day, mirage appears to have a rising, waving effect, much like passing a piece of wavy glass in front of you, and distant objects are distorted and continually change shape. As the wind begins to blow, this waving effect leans in the direction the wind is blowing, and the stronger the wind the flatter becomes the mirage, until at around 20 miles per hour the mirage practically disappears. On dull, overcast, cold days it is pretty hard to find much mirage, but if you look along the tops of number boards or targets, you can usually get a flicker. You can help see the mirage by focusing your spotting scope at a little shorter range than the target, or by focusing on the target and pulling the eyepiece a bit further out.

After you have used mirage a bit, you will find that the tables you've been using aren't necessary, and that a certain appearance of mirage will automatically bring to your mind a proper sight correction. Mirage-doping is probably as good an all-round method of doping as any, although if you inhabit a particular range long enough, you may find that you can get better dope by watching a certain tree or flag or some other special indicator.

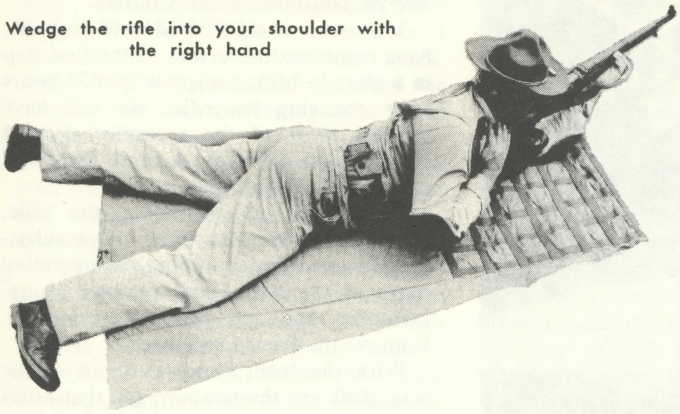
Since many matches allow no sighters, making up your mind about the wind for the first shot, or for a rapid-fire string, is a heart-rending task. One of the best ways of getting the right dope is to ask some guy just coming off the firing line—but before relying completely on him, better check his score and the location of his last shot. And before you ask him, you should have your own mind made up as to your estimate. Occasionally you will get the wrong dope, usually because he doesn't know what the right setting should be, although you may run into the guy who gives you the wrong dope on purpose. In any event, cross both these guys off your list and don't patronize their wind-doping service any more. And I hope you always give only the correct information!

The unknown zero is a source of much apparently bum wind doping. Just because the windgage on your sight has an "0" graduation doesn't necessarily mean that this is the actual zero. The old M1 I have been using has a zero three minutes left, so all my windage corrections must be made from this point, not the mechanical "0" of the rifle, but my new M1 has the zero two minutes right.

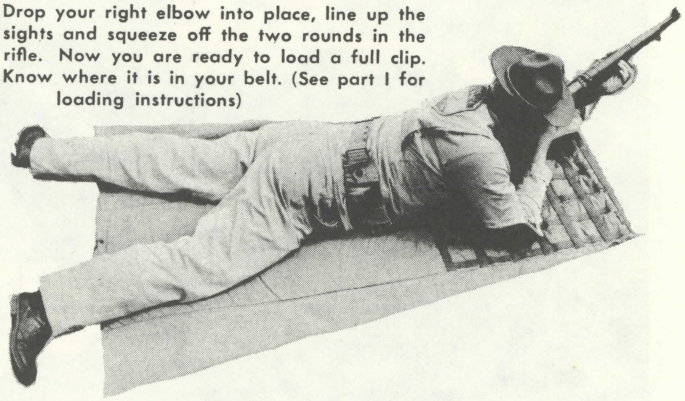
And then there is that horrifying phenomenon known as the "windgage wind", which is produced by the shooter firmly grasping the windage knob and giving it a violent turn, followed a shot later by another violent turn, probably in the opposite direction and so on through the string, with the spotters popping up first on the left and then on the right side of the target. Meanwhile the guy on the next target, who's too ignorant to know anything about wind, is plunking shot after shot in and around the bull, without touching the windgage.

There's an old maxim in wind doping you should never forget: "When in doubt leave the windgage alone!"

If you put together standing slow-fire, sitting rapid-fire, prone rapid-fire and long-range slow-fire, with the wind doping, and all the other extras, that's the high power rifle game. To my mind it's the most varied, most fascinating, most difficult, and most interesting shooting game. ◆ ◆ ◆



Wedge the rifle into your shoulder with the right hand



Drop your right elbow into place, line up the sights and squeeze off the two rounds in the rifle. Now you are ready to load a full clip. Know where it is in your belt. (See part I for loading instructions)

WIND DOPE

Wind Velocity (miles per hour)	Indication (Flag, linen, about 5 ft. x 5 ft.)
2	Flag still; smoke slants
5	Flag moves; wind felt on face
10	Flag out; paper blows; brush moves
15	Flag rise & fall to 90°; trees tops active
20	Flag out steadier at 90°; trees & water active
30	Flag flapping at 90°; trees whistling
	MIRAGE
5-10	Mirage light, move slowly, upward trend
10-12	Mirage fairly strong, close to 45° rise
12-15	Mirage nearly flat, slight rise
15-20	Mirage racing; practically invisible over 20 m.p.h.

WIND CORRECTION

The following table gives wind correction in minutes of angle for full value wind (3 or 9 o'clock) M2 Ball (150-gr. flat-base at about 2,800 feet per second)

Range (yards)	Wind velocity (miles per hour) 5	10	15	20	25
200	1	1	2	3	3
300	1	2	4	5	6
600	3	6	8	11	14
1,000	5	11	16	21	27

Other bullets & loads will require more or less correction. M1 Ball, for example, takes about 2/3 of above figures.

Approximate wind velocity = ¼ times the angle between flag and pole.

If in doubt, and a very strong wind from 3 or 9, use as a wind correction the number of minutes equal to the range in 100's of yds.; e.g., 6 minutes at 600 yds., etc.

Approx. wind correction for M2 Ball $\frac{\text{Range (in 100's of yds.)} \times \text{wind velocity}}{10}$ = number of minutes for wind from 3 or 9.

GLASS BEDDING

THE M1 RIFLE

. . . is the first and least expensive step in upgrading a service-grade rifle for highpower competition. Most shooters can perform the work themselves.

BY J. B. ROBERTS, JR.

SINCE 1968, just over 10,000 shooters have been able to purchase a service grade M1 rifle from the Director of Civilian Marksmanship. Each of those purchasers, it is hoped, will use his M1 to participate in the Civilian Marksmanship Program.

The man who shoots competitively with his "DCM" M1, however, is going to find rather quickly that his rifle won't perform like the National Match rifles in the hands of state association shooters. A service grade M1 may not, in fact, shoot as well as the man behind it.

Do not despair! For less than $10 — U.S. dollars, — the hobby gunsmith can refit his DCM-M1 in a manner to take the worst kinks out of it and provide himself a rifle that is both reliable and sufficiently accurate to compete on reduced 100- or 200-yd. National Match Courses.

The owner of a DCM-M1 will probably have completed a portion of the first step in a glass bedding project within 24 hours after receiving his rifle. He will have cleaned *most* of the preservatives and storage dirt off of it. A more thorough cleaning is needed.

Begin by field stripping the rifle, separating it into its three major subassemblies and disassembling the operating parts of the barrel and receiver group, including the gas cylinder assembly. Remove the front handguard.

With the front handguard out of the way, drift out the retaining pin that holds the lower band in place and drift (it should be tight) the band forward, off the barrel. Slide the rear handguard forward and remove it.

1 Start the operation by giving all of the wooden parts of your M1 rifle a thorough cleaning—inside and out.

The first step is to really clean the wood of the dirt and lubricants accumulated during decades of storage. Liquid paint remover works very nicely for this purpose, each application followed by brisk scrubbing with No. 2 or No. 0 steel wool. It may take several applications to get all the grime out of the wood, but it's a job worth doing well. Dirt and oil in the wood may keep the sealant, that will be applied as a finale to this process, from adhering completely. Incomplete sealing in its turn makes a moisture-constant condition of the wood much harder to achieve.

Once the wood — we are talking about the handguards, too — is clean, the temptation is there to pull the old finish, steam up any dents, sand and restain the wood. That operation is a bit like icing a cake — it makes the cake look nicer, but it doesn't necessarily make it taste better. I removed the old finish on my stock, steamed up the dents, and restained the wood so the stock and handguards would match. I like icing.

When the wood is clean, it's time to start the task of glass bedding the receiver and trigger housing group. Begin by cleaning to bare wood the surfaces that will be bedded. These include the receiver-bearing flats atop the stock, the abutments inside the receiver mortise on which receiver shoulders bear and the surfaces, underneath the stock, where the trigger housing seats into the wood. When the wood is bare, reassemble the rifle and, using a sharp scriber, scribe a line on the wood around the outside of the receiver. This line provides a border inside which some of the bedding relief cuts are made. The edges of the trigger housing are similarly scribed.

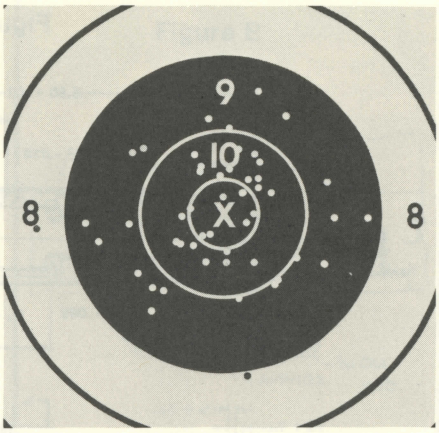
Relief cuts for the bedding are made on the top and bottom of the stock, and in the corners of the bedding surfaces inside the receiver mortise. The locations and sizes of these cuts are shown in **Fig. A**, reproduced here from an old National Match Rifle bulletin. Use a channel gouge or veining tool to cut the relief grooves, or if one is available, a hand grinder like Dremel's Moto-Tool. The important thing is to cut precisely and accurately, according to the drawing.

Before actually glass bedding the receiver, two fixtures must be fabricated and one minor modification must be made to the receiver. First the modification.

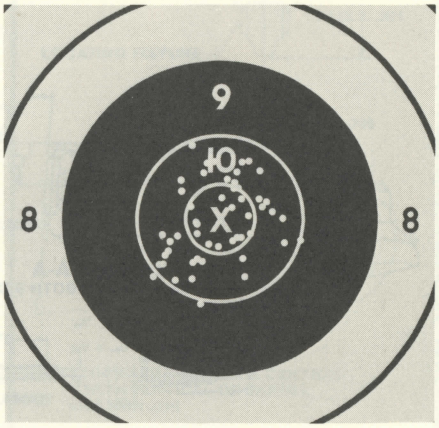
Use a fine cut, flat mill file to file a short bevel on the rear corner of each of the rear tangs of the receiver. This will ease removal of the receiver from the bedding and will minimize future damage to the glass that inevitably occurs when the rifle must be diassembled.

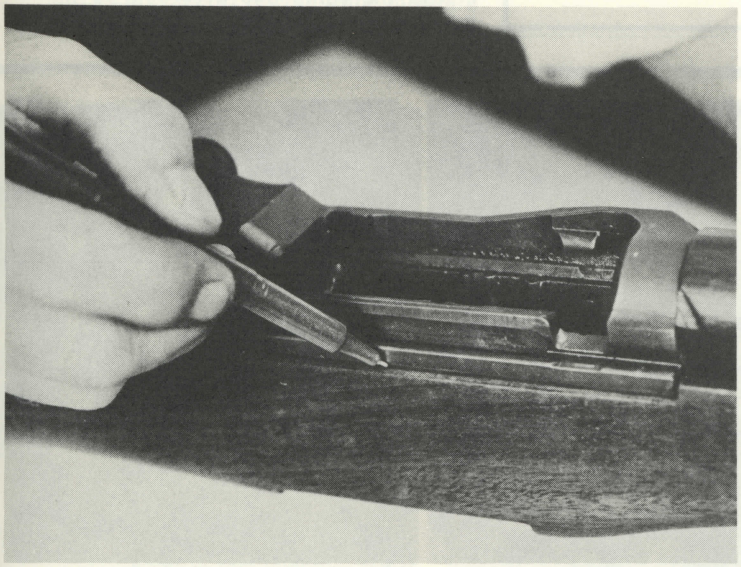
The fixtures, dimensioned drawings of which appear in **Fig. B**, are needed to hold the barreled receiver, stock group, and trigger housing in their optimum relationship while the glass cures. The horseshoe clip may be made from 3/16″ diameter brass or steel rod. The 1/4″ space between the legs of this clip provides proper tension between the bedded trigger housing group and the bedded receiver.

The other locating fixture holds the barrel centered in the barrel channel and provides proper tension at the joint of the lower band and stock ferrule of the

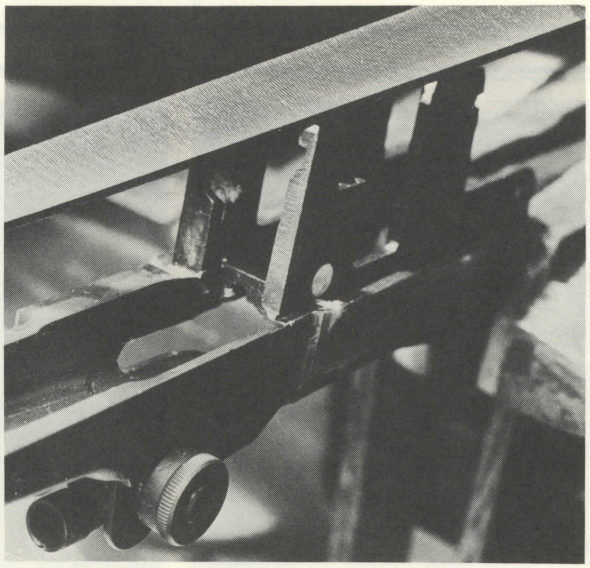


From the box, the author's M1 met service criteria for accuracy, but still would not hold the SR target's aiming black at 200 yds. Now glass-bedded, the rifle will meet National Match standards, with work still to do. These targets are reconstructed 50-shot composites of five-shot test groups.



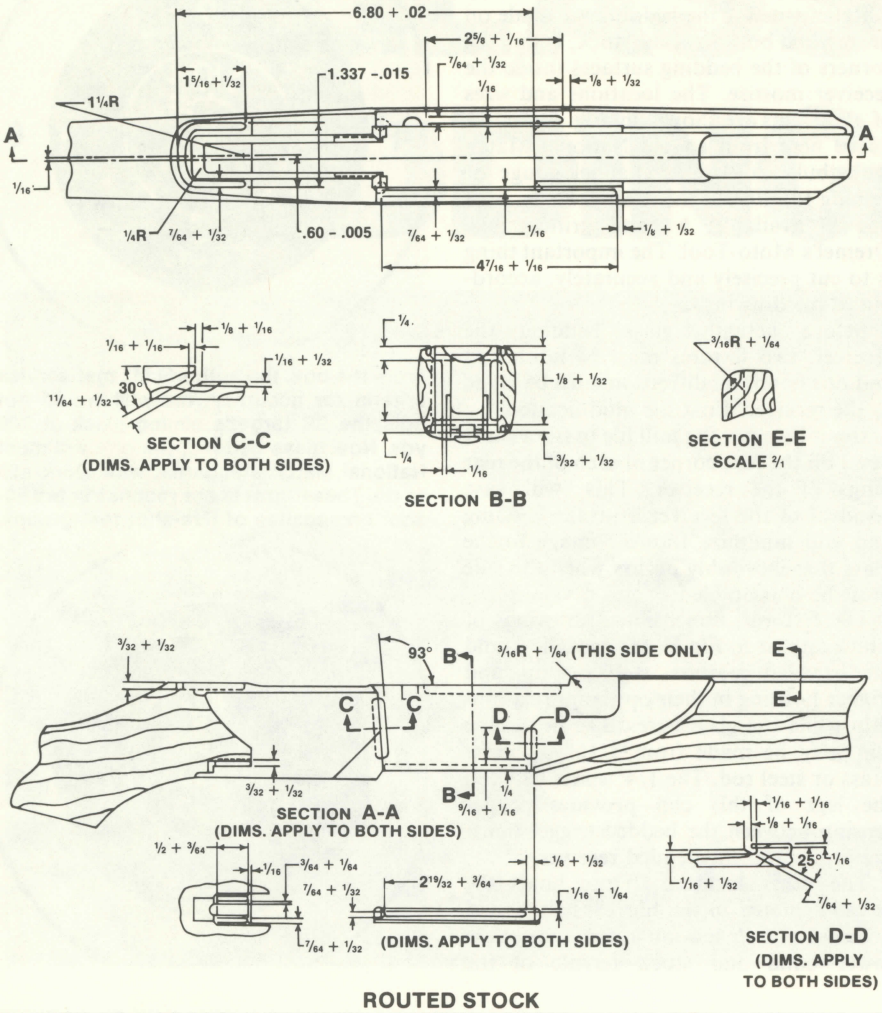


2 **Prior to routing the stock (see Fig. A, next page), replace the barrel and receiver group in the stock group and use a sharp-pointed marker to trace the receiver's outline onto the stock.**



3 **To make the receiver easier to get out of the glass-bedded stock, use a file or stone to bevel the rear receiver tangs. To do so is to avoid a headache later.**

Figure A



bedded, assembled rifle. It may be cut from 3/8″-thick aluminum, or, in its place a 1″ inside diameter ring of 3/16″ brass or steel rod may be used. In the latter case extreme care must be taken when bedding the rifle to insure that the ring is correctly located and straight.

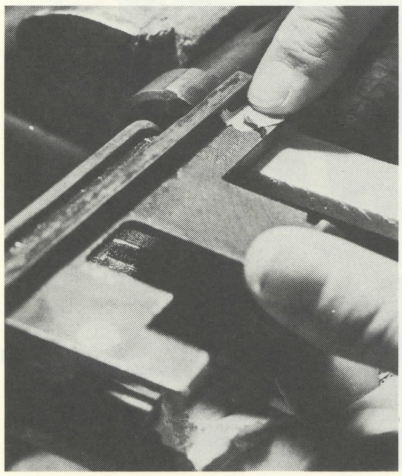
Once these two fixtures are on hand, detail disassemble the trigger housing group, leaving the trigger guard, its pin, and the safety in place in the trigger housing. Remove the clip release, its spring and pin from the receiver. Fill all the holes and clearance cuts in the receiver and trigger housing with modeling clay and coat all metal surfaces with release agent. At this point it is also a wise idea to fill with clay the clip release cut in the stock and the inletting at the rear of the action mortise and up front below the receiver bearing surface. It makes cleaning up the bedding a good deal easier.

The brand of glass bedding used is an individual choice. Consider, however, that a relatively stiff mixture is easiest to work with and that a resin that contains (or can be mixed to contain) a metallic filler will give the best results.

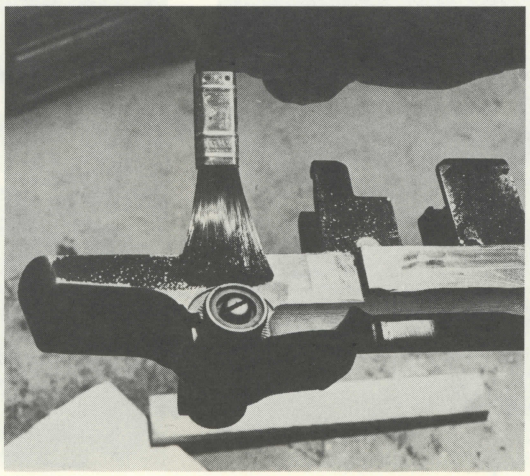
We used Bisonite Type R-188A, steel-filled bedding compound, purchased from one of the dealers on Commercial Row at Camp Perry, based on a team armorer's recommendation. The Marines like Devcon Type B, aluminum-filled bedding. Micro-Bed will work, as will Acra-Glas. The new Acra-Glas Gel should be ideal inasmuch as it doesn't sag and gives a reasonable working time.

Whatever compound you use, dry-run the whole procedure at least once before mixing the bedding. Put things where they can be reached easily and quickly when they are needed.

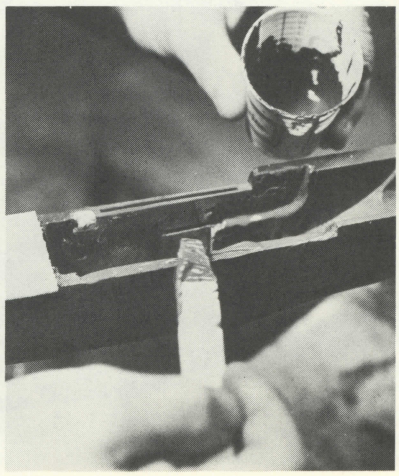
Mix the compound according to the manufacturer's directions. Apply the



4 Use modeling clay or paraffin to fill all the holes in the receiver and in the trigger housing group.



5 Be thorough and generous in the application of release agent—Brownell's in this case—to the receiver and to the trigger housing group.



6 The receiver is bedded first. Be sure that all the channels are filled with glass bedding.

bedding to the top of the stock and interior of the stock inletting first, and bed the receiver. Then, with the receiver in place, invert the rifle, clean excess compound from inside the stock, and bed the trigger housing.

Partially close the trigger guard to apply tension against the receiver and insert the horseshoe clip between the guard and safety. Turn the rifle right side up and, if the ring is used instead of the barrel locating fixture, double check to make sure the barreled receiver is centered in the inletting and that the ring is straight. Then let it set.

Getting an M1 out of its glass bedding the first time is tricky but not difficult.

After the bedding has cured thoroughly, clamp the rifle upright in the padded jaws of a vise. Make sure the trigger housing is entirely clear of the vise. Remove the horseshoe clip from the trigger guard and safety and unlatch the trigger guard from the receiver. Reach inside the receiver with a wood-block drift and, with gentle taps of a soft-faced hammer, drive the trigger housing downward until it drops free of the bedding.

Then invert the rifle, clamping the buttstock in the vise, and rest the barrel, at the end of the stock, on a raised block. Insert the woodblock drift down between the rear tangs of the receiver until it rests on the supporting cross-member at the back of the magazine and drive the receiver downward and out of the bedding with even blows of a soft-faced mallet.

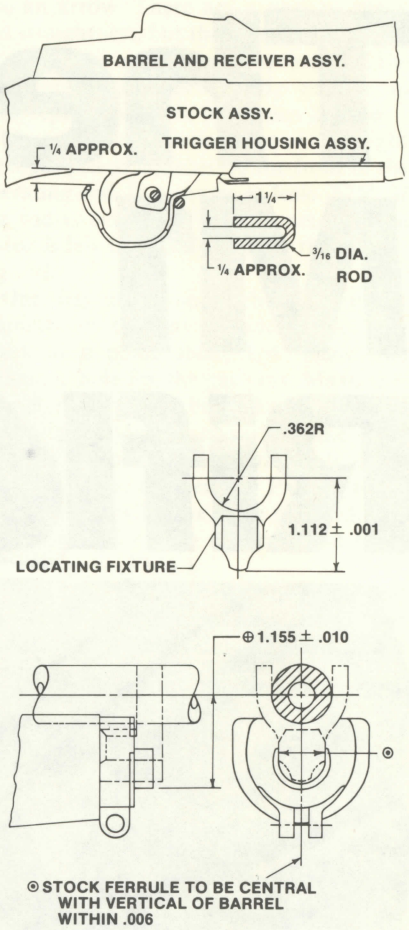
From there it's a matter of cleaning up the rough edges, removing the modeling clay, getting release agent off of the metal and off the glass (use an alcohol-base thinner and a stiff toothbrush) and reassembling the rifle's mechanism.

It's also time to restore some moisture to the wood and seal it. I use boiled linseed oil, purchased in a paint store, to restore the moisture, brushing on progressively lighter coats with sash and trim brushes. Each coat is allowed to soak in for 24 hours and the stock buffed off with cheesecloth before the next coat is applied. It usually takes about four coats, inside and out. Remove the buttplate and soak the wood under it and in the cleaning equipment wells, too. Avoid getting linseed on the glassed areas.

For sealing I use Birchwood-Casey's Stock Filler, three coats usually, and sand the excess off after each coat dries. Final finishing and sealing is done with exterior grade semi-gloss polyurethane varnish. As with the stock filler, the excess is cut off after each coat dries. Three coats, or four, usually does it; the last being put on a fingertip-full at a time. Under the buttplate and in the wells, I just paint it on.

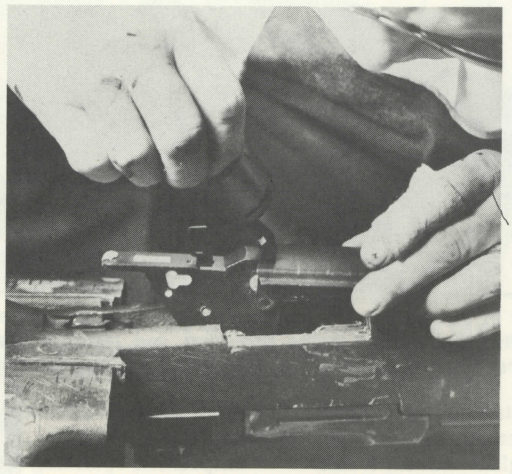
In the case of my M1, glass bedding it in the manner described changed it from a rifle that would hold the 13″-diameter aiming bull on the SR target to one that would hold the 7″ 10-ring. Studying the reconstructed targets illustrated will show what the glass did (it stopped the random scattering of shots) and what it did not do. It did not change the tendency of the rifle to string its shots vertically. The cure for vertical stringing can be found in the fit of the metal parts in relationship to one another. The operations necessary to effect that cure will be described in another article, to come. ■

Figure B



USE OF BARREL LOCATING FIXTURE

7 With the glass bedding laid in, locate the receiver in the stock and press it firmly into place.



8 When the receiver is in place in the glass, invert the rifle and bed the trigger. Clean glass off the exposed receiver tangs first.

9 Drive the receiver from the bedding using a wood drift. Both buttstock and fore-end are supported.

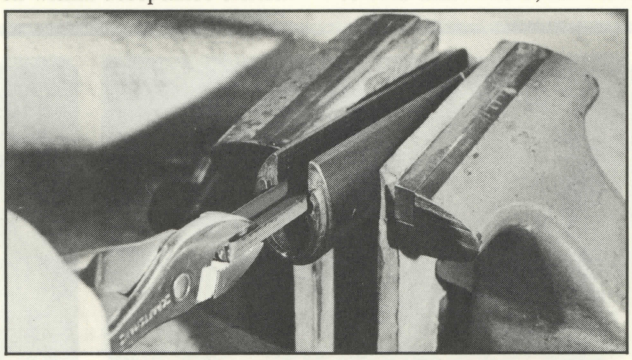
Accurizing The M1 Rifle

Glass-bedding substantially enhanced the accuracy of the author's Service Grade Garand, but more improvements were in order.

BY J. B. ROBERTS, JR.

WHEN the glass-bedding job on my DCM-M1 was completed (see January, 1984, pp. 36-39), the rifle, which had sprayed hits all over the SR bullseye, shot well within acceptance criteria for the National Match M1 rifle. Those limits were not tough: 3½" average extreme spread for three 10-shot groups at 100 yds. range; no single group over 5" extreme spread. That, according to the 1961 *National Match Rifle Bulletin,* was all it took, though in all fairness, most rifles did better.

Those criteria were also geared to the accuracy requirements of the old five-point targets, a 12" five-ring for 200 and 300 yds., a 20" five-ring for 600 yds., and 36" at 1000 yds. They won't really get the job done on the current 10-point series of targets; nor will they suffice for real competition on the 600-yd. stage of the 200-yd. reduced course where the 10-ring is just larger than 3¾" diameter. My rifle, for example, after it had been glass bedded, would group 50 consecutive shots in the 7"-diameter, 10-ring of the SR target, good for scores in the 80s on 600-yd. reduced target. Fortunately, where my M1 was concerned, there was something more that could be done.

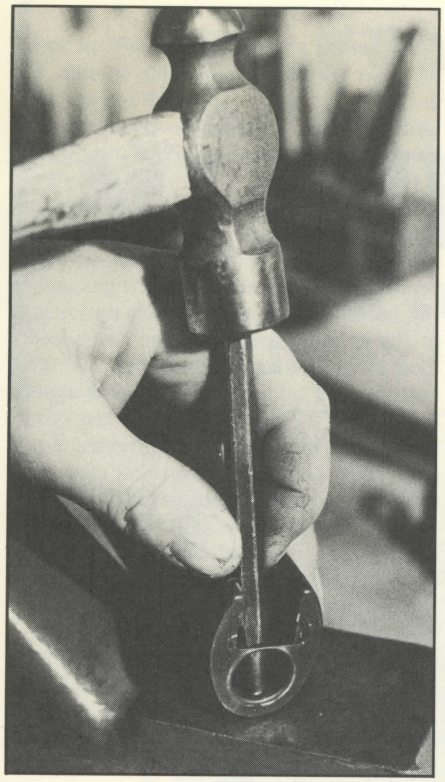


The liner in the M1's front handguard is not needed in a target rifle. Its removal helps grouping, but renders the handguard itself useless as a protection for the barrel.

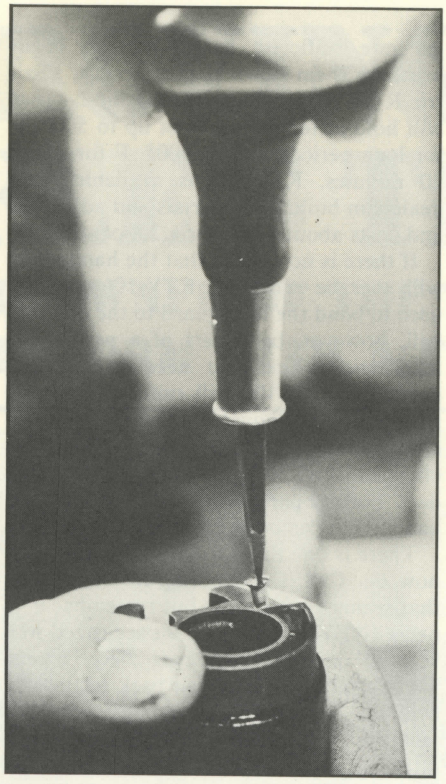
The U.S. Navy, in the late 1960s, did a considerable amount of pre-planned tinkering with M1 rifles, both cal. .30 and converted to 7.62 mm NATO, for match use. They turned up a number of kinks having to do with the wood- and metal-to-metal fit—not the bedding—of the M1 that resulted in a more precise-shooting rifle. That is to say the Navy's M1s would shoot rounder groups that were smaller by virtue of having fewer fliers. These procedures have been published, but there is no harm in recapping them and revising the techniques so that the hobby gunsmith can make the modifications.

Begin by disassembling the rifle, removing all metal and wooden parts from the barrel. Set the stock group and trigger housing group aside. They won't be needed until it's nearly time to reassemble the rifle.

Inspect the operating rod to insure that it is *straight.* Looked at from the side, there are two bends in the rod. They are intentional, providing clearance so the operating rod will not strike the breech portion of the barrel. The section of rod between the



The barrel should not contact the front handguard. Peening the reinforce to clear the barrel helps achieve this condition.



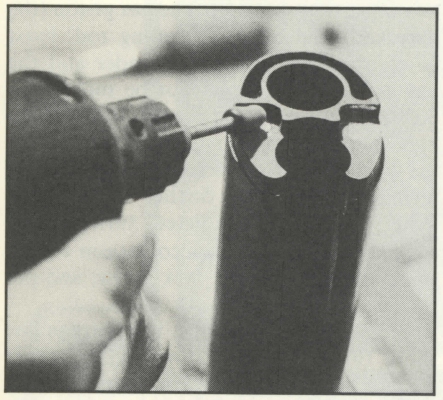
The floated handguard is attached to the middle band using bedding compound. Two woodscrews increase the joint's strength.

bends and the two end sections must be straight and the front (on which the gas piston is fitted) and rear portions (the operating rod handle) must be parallel. Checking the rod from above, it must be like an arrow. There are gauges to check rod straightness, but the hobbyist will have to depend on a "calibrated eyeball." If the operating rod is bent badly enough to need replacement, the bends can be seen.

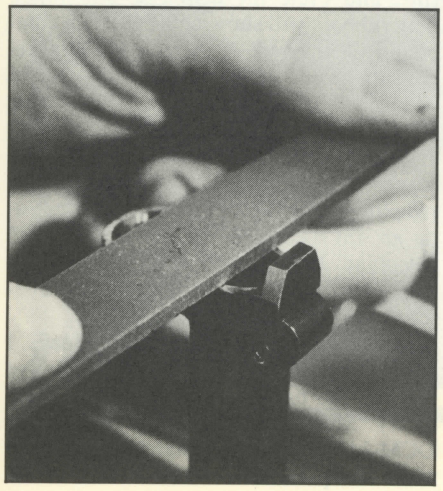
Next, measure the diameter of the bright steel gas piston attached to the front of the operating rod. It must be at least .525". If the rod is bent, or if the diameter of the piston is less than .525", replace the operating rod.

One may also wish to check the inside diameter of the gas cylinder. Make the check at a point about 1/4" below the clearance hole for the gas port. Maximum diameter is .532". Above that dimension, replace the cylinder. (Note: Unlike glass bedding, reworking the metal parts of an M1 may not be inexpensive. Parts that are unserviceable will have to be replaced, and the job calls for tools that may not be in the average tool box.)

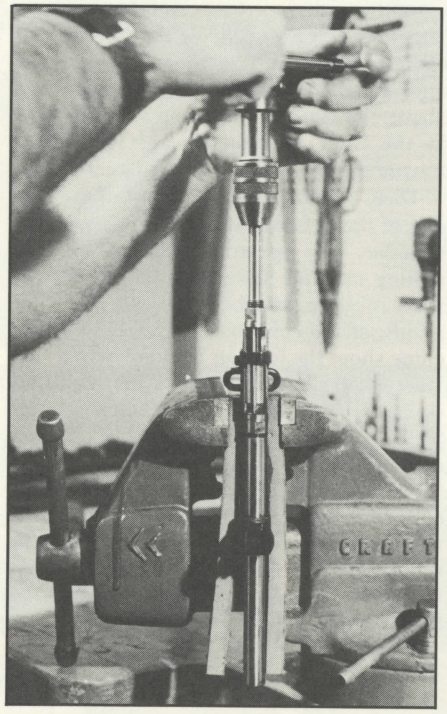
Presuming that the operating rod and gas cylinder are serviceable, let's shift our attention to the lower band and handguards.



Grind the woodscrews flush with the surface of the middle band to provide clearance for reassembling the rifle.

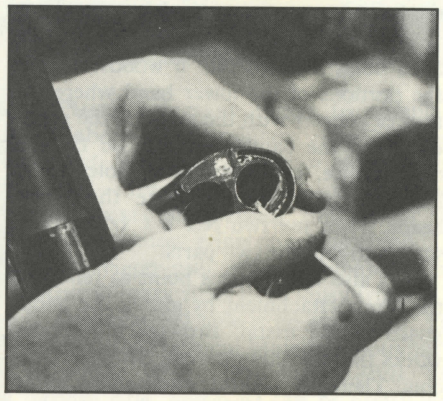


File 30° bevels on the edges of the guide tang on the gas cylinder and shorten the cylinder by milling or by careful filing.

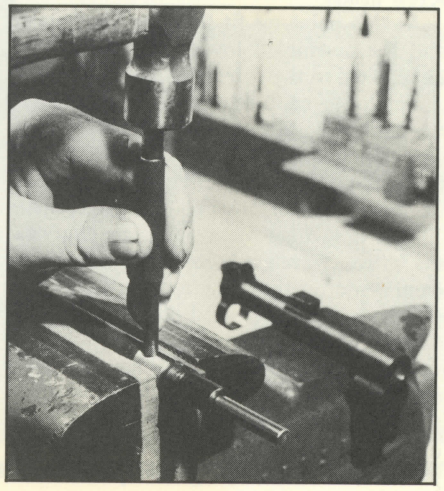


Ream or bore out the rear ring on the gas cylinder to give about 0.01" radial clearance between the rear ring and the barrel.

To hold the gas cylinder in place, peen over the cylinder splines on the barrel. A bore spud prevents damage to the lands.



If the middle band is not tight on the barrel, a high temperature adhesive may be used to permanently bond the parts.



Start actual work with the rear handguard and trim 1/16" or 3/32" from its back end. Shortening the rear guard by that amount will prevent it from contacting the receiver when the rifle is assembled.

The front handguard requires a little more work. It must be modified so that, when attached to the lower band, it does not contact either the barrel or the operating rod.

The first step in reworking the front handguard is to remove the sheet metal liner from inside the operating rod channel. It's easy to do. The liner is held in place by tabs at either end. Bend them straight, grab the liner with a pair of pliers, and jerk it out. Then throw it away.

Now, with a round-faced punch and a pair of pliers, bend the sheet metal cap on the forward end of the front handguard so that it does not contact the barrel. There will be some trial fitting involved, here, but the desired end result is that the barrel floats inside the guard. Since the operating rod must also move freely inside the guard, now is a good time to check that and, if need-be, to relieve the sides of the operating rod channel.

Once the barrel and the operating rod are free of contact with the front handguard, we are going to permanently attach the front handguard to the lower band.

The best way to do that is to drill clearance holes for two No. 6 woodscrews in the portions of the lower band where the area of contact with the guard is the greatest. Turn the band over and, on the flat rear surface, countersink the holes to at least partially accommodate the screw heads. Then use two No. 6 x 1/2" woodscrews to join the two parts.

It is also wise, at this point to reinforce the screw attachment by gluing the handguard to the metal. Brownell's Acraglas works fine for this purpose. So does Devcon. There is a third alternative, to be discussed shortly. Whatever is used, when the adhesive has dried, use a small flat file or hand grinder to dress off the protruding screw heads.

At this point we fit the rear handguard and the assembled lower band and front handguard to the rifle.

The lower band must be a driving fit on the barrel. If it is not (and it probably isn't after being disassembled and reassembled for glass bedding and for trial fitting of the front handguard) it must be tightened. This is best done by peening the edges of the barrel clearance hole on the rear of the band—and on the front too if a long drift punch is available—and then gluing the band in place on the barrel.

The adhesive used for this step must be of a type that does not deteriorate at relatively high temperatures. Fiberglass bedding and common epoxies will not do the job here, since two strings of rapid fire will generate sufficient barrel heat to begin breaking them down. I use General Electric RTV-106, a silicone-base adhesive that will hold at temperatures of up to 500° F for long periods and at 600° F for 15 or 20 minutes. RTV-106 is available from dealers in building materials and adhesives and costs about $7.00 for a 2.8-oz. tube.

If there is no chance that the handguard will ever be removed, RTV-106 may be used to bond the handguard to the band. It will, however, be a part of a permanent installation. The heat needed to break down the RTV-106 will ruin the barrel—thus limiting removal of the band to occasions upon which the barrel is to be changed—and burn the handguard to cinders. For my part, I used RTV-106 on the band, Acraglas on the handguard.

There is one thing to keep in mind from now on. Call it a handling instruction, if that seems appropriate, but remember it—never (NEVER!) pick up an accurized M1 rifle by the front handguard, ever again.

Let's turn our attention back to the gas cylinder. Just as the barrel must not contact the handguards, except where absolutely necessary, the gas cylinder must not contact the barrel, except at the front where the two join together. The gas cylinder must not contact the front handguard either.

Start modifying the cylinder by filing a 30° bevel on each side of the tongue that extends rearward from the stacking swivel and, in the unmodified rifle, protrudes about 3/8" into the operating rod channel in the front handguard. That keeps the tongue from touching the handguard.

Then, remove about 1/32" from the rear end of the cylinder and the ring above the cylinder. This operation is best done on a milling machine since the back of the cylinder must be straight and square. Lacking a mill, or the convenient services of a machine shop, the job can be done with a file. It is, when done that way, a job requiring skill and painstaking care. When it is completed, the gas cylinder assembly will not contact the front handguard.

The final modification to the gas cylinder assembly is the enlargement of the inside diameter of the rear mounting ring so that it does not touch the barrel. This, too, is a job for a machine shop, although it can be done with an expandable reamer.

If the latter method is selected, a pilot will be required—and must be fabricated—to keep the reamer straight. Turn the pilot on a lathe, .520"±.003" diameter and 8" long. That diameter will slide easily through the three splines that hold the gas cylinder on the barrel, and that length will provide guidance for the reamer for its entire cutting length.

Ream the rear ring from its nominal .620" i.d., up to .640", a radial increase of .010"—and be careful. The web between the gas cylinder and the ring is about .050" thick before reaming. The .040" of metal left after reaming is still thick enough, but only just. Do not thin the web too much. A Critchley "C" expandable reamer with a working range between .5938" and .6562" is the tool to use.

When the gas cylinder is reassembled on the barrel, there are two criteria governing the way it fits. First, it must be tight. Second, when seated so that the gas port in the barrel is aligned in the clearance hole in the cylinder assembly, the gas cylinder lock must not turn more than 60° past bottom dead center before stopping against the face of the cylinder. If this last condition is not met it can be corrected artificially, but there is no permanent cure short of procuring a supply of gas cylinders and cylinder locks and trial fitting them until a combination is found that will work. For economy's sake the artificial correction is the better choice.

To tighten the gas cylinder on the barrel, lightly peen the spline cuts on the barrel until the cylinder has to be driven lightly into place. Drive the gas cylinder onto the barrel until the gas port is wholly visible at rear of the clearance hole. Reassemble the remaining parts of the barrel and receiver group. Close the bolt.

Then, using the gas cylinder lock as a tool, swage the gas cylinder rearward until two conditions are met. The gas piston (the chromed head of the operating rod) must be completely inside the cylinder and the gas cylinder lock must not be more than 60° past bottom dead center. When those two conditions are met, stake the rear of the splines on the barrel to keep the gas piston from moving further to the rear. When staking is completed, turn the gas cylinder lock screw back to bottom center, insert the gas cylinder lock screw, and put it down *tight*.

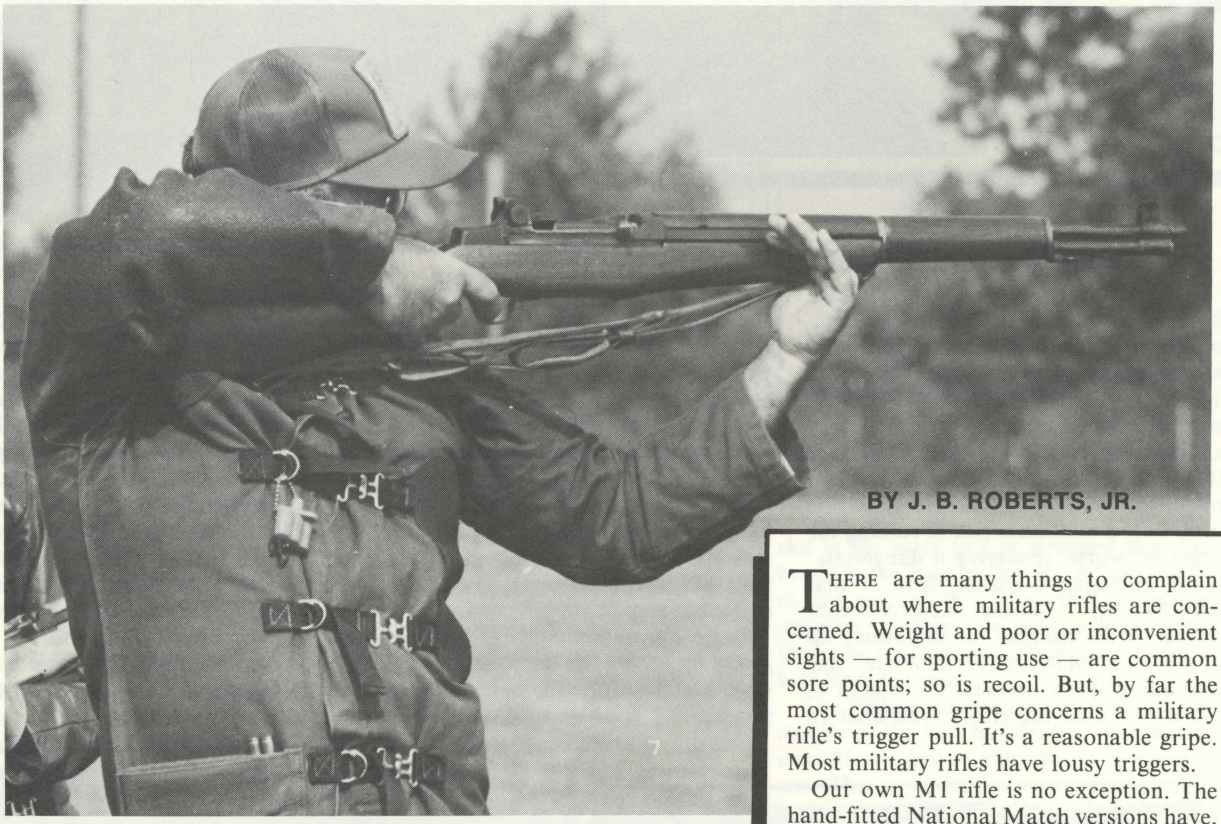
The job is almost done, but there is one more thing. The operating rod must not bind or rub against the ferrule on the stock group. To insure that it doesn't, coat the inside of the ferrule with Prussian blue or a similar spotting compound, reassemble the rifle, and cycle the action several times. Any rubbing will show up as spotting compound on the rod. If there is binding, relieve the inside of the ferrule with a round file until it ceases. Now, the job is complete.

Test shooting my M1 following performance of these modifications resulted in a reduction of group size (a 50-shot composite group) from a 6¾"x5" oval to a 5¾" circle at 200 yds. That's plenty good enough to hold the nine-ring on my personal nemesis, the MR 52 target.

Maybe, by experimenting with reloads, I can do better. I don't think so. I think I've reached the barrel's limit. But, I'm going to try. Meantime, I'm going to take my DCM-M1 to some rifle matches and try to make Sharpshooter. ■

IMPROVING THE M1 RIFLE'S TRIGGER

...IS A TASK THE OWNER OF THE TYPICAL SERVICE RIFLE CAN PERFORM WITH A FEW HAND TOOLS.



BY J. B. ROBERTS, JR.

THERE are many things to complain about where military rifles are concerned. Weight and poor or inconvenient sights — for sporting use — are common sore points; so is recoil. But, by far the most common gripe concerns a military rifle's trigger pull. It's a reasonable gripe. Most military rifles have lousy triggers.

Our own M1 rifle is no exception. The hand-fitted National Match versions have, as a rule, pretty crisp trigger pulls. The service rifle, however, can be pretty well depended upon for a heavy, creepy but not quite unmanageable trigger pull. And, what can you do about it?

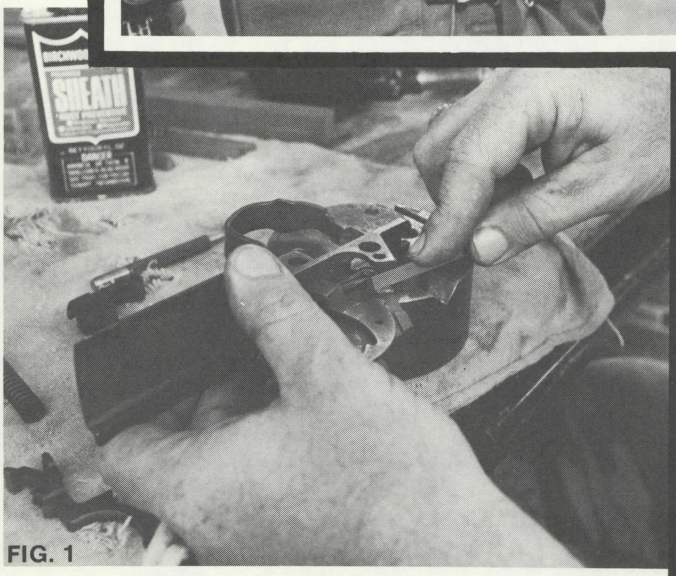


FIG. 1

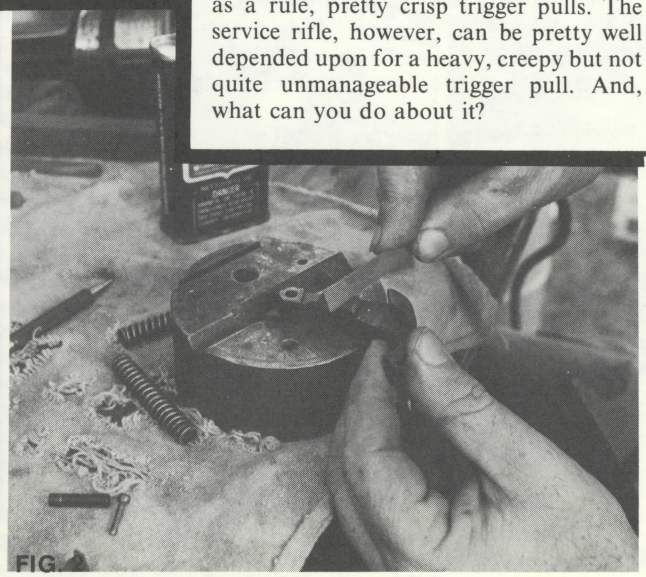


FIG. 2

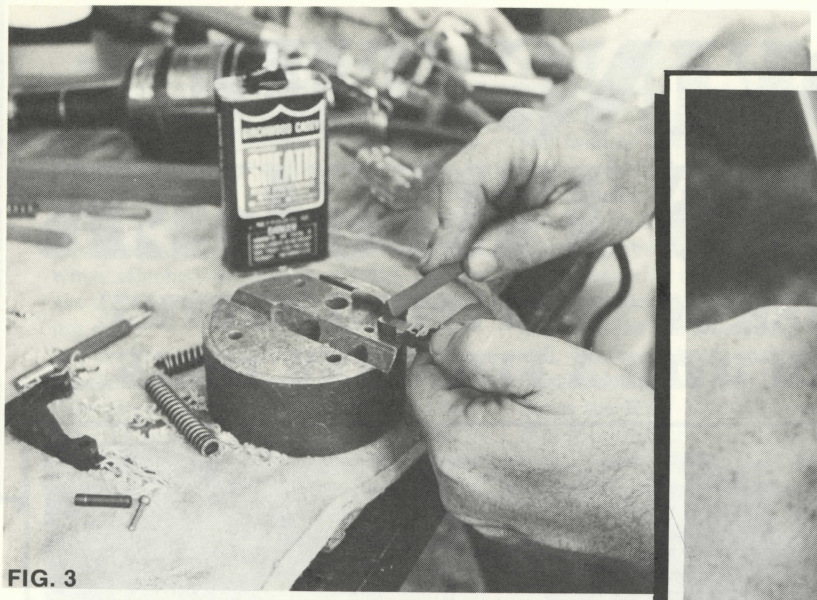


FIG. 3

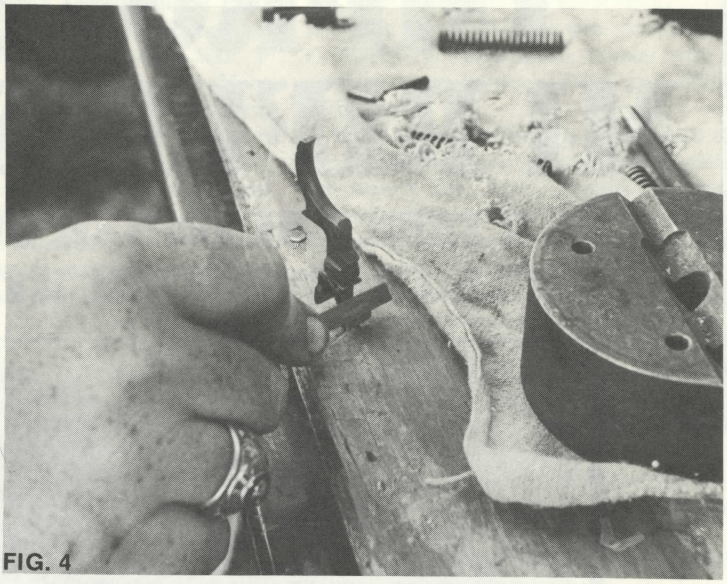


FIG. 4

The answer, happily, is "something." Short of locating a retired service-team armorer who has a large supply of parts and expertise and having him rework the trigger, an M1 rifle owner can do something about the gritty-grindy pull of its trigger. He can do it with three tools, a little patience, and about 45 minutes of thoughtful working time. Best of all, he incurs only a minimum risk of ruining the trigger or, worse, rendering it dangerous.

The technique discussed here is that used by U.S. Marine Reserve team armorer Mike Gingher for smoothing up an M1 or M14 trigger. While this technique will not decrease the weight of pull, it will shift the effort somewhat to give a lighter final stage. It also removes the bumps and shuffles ofttimes felt in that final stage, and thus yields a better trigger pull.

Begin by removing the trigger housing group from the rifle. Set the assembled stock group and barrel and receiver group aside. Weigh the trigger pull. It must be at least 4½ lbs. If it is not, it will be necessary to *increase* the weight of pull (for safety reasons, even if you don't plan to shoot your M1 in competition). That, however, is the last step in the procedure.

Begin disassembling the trigger housing group by letting the hammer down to the uncocked position. Then press forward on the rear of the trigger to take hammer spring pressure off the trigger pin and drift the trigger pin from left to right out of the trigger housing. Remove the trigger and the hammer spring housing, hammer spring and hammer spring plunger and set them aside. Now drive the hammer pin from left to right out of the trigger housing and remove the hammer.

Inspect the parts you have removed. Check the trigger carefully to make sure the notches that hold both the sear and disconnector hooks on the hammer are intact and free of nicks, chipped spots and gouges. Check, too, to insure that the area around the trigger pin hole is not cracked.

Inspect the hammer, particularly the

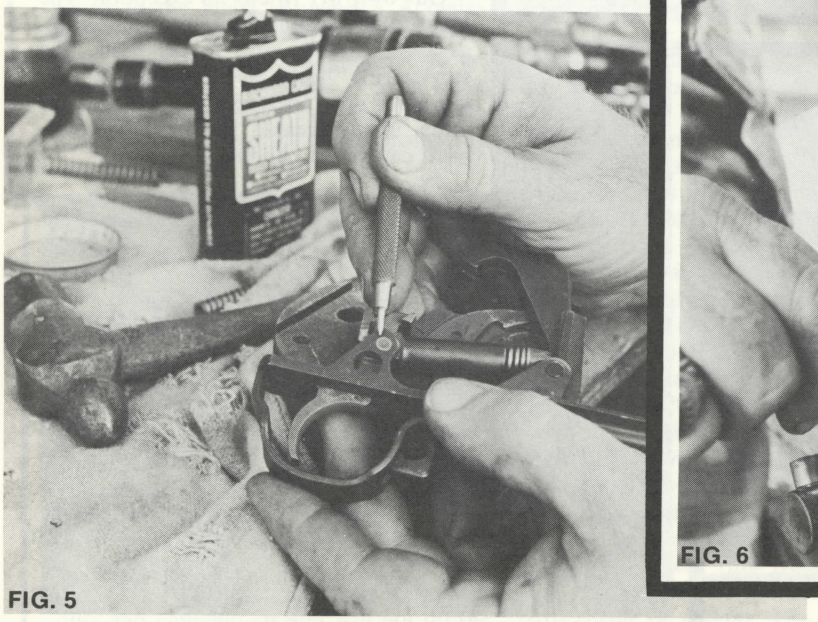


FIG. 5

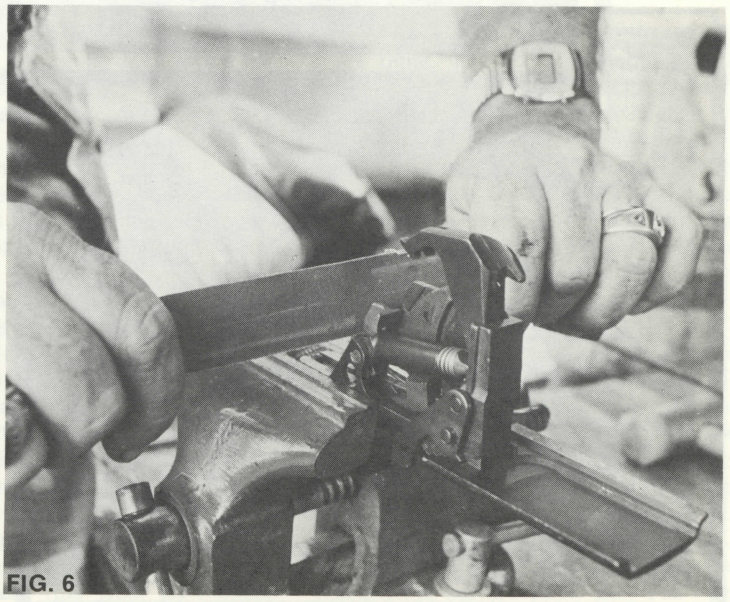


FIG. 6

Improving M1 Trigger

hammer hooks that engage the disconnector and sear surfaces, for wear and for breakage or other damage. Check also to make sure the hammer spring housing is free of cracks and dents, and that the hammer spring plunger is straight.

One advantage to this method of smoothing up an M1 trigger is that it does not depend on parts swapping. However, should any part of the trigger housing group be unserviceable, it will have to be replaced. Trigger parts are readily available from surplus dealers such as Federal Ordnance, Numrich, SARCO, or Sherwood Distributors. Or, these parts may be ordered through the DCM. DCM prices are lower, but delivery takes longer.

When all the trigger parts have been inspected, it's time to begin the smoothing-up operation. Start with the trigger housing clamped in a vise. Use a fine triangular India stone to remove the finish and flatten the rough edges of the tool marks on the surfaces around the hammer pivot point. Then move back and do the same thing to the trigger pivot points (**Fig. 1**). Do not remove too much metal: all that is necessary is to even up the rough spots. And, if you take off too much, you will wind up with sideplay in the hammer or trigger making the mechanism unsafe.

When the trigger housing is done, turn to the hammer. Using the same stone, polish the sides of the hammer in the area around the hammer pin hole. Then strike the finish from the flat surface in the middle of the left side of the hammer that the safety catch engages (**Fig. 2**). Set the hammer aside and pick up the trigger. Lay the trigger flat, on a hard, square surface — a bench block is ideal — and use the stone to smooth the side of the trigger where it passes through the trigger guard (**Fig. 3**). Turn the trigger over and repeat the operation. Take care that the stone is kept square with the work and not tipped at the beginning or end of the stroke. Remember the object — remove finish and high spots, not metal.

The only other operation performed on the trigger is the polishing of the bottom surface of the sear. Extreme care must be taken during this step to insure that only a negligible amount of the metal surface of the sear is removed — we're after finish, remember, not metal — and that the polishing leaves the bottom surface of the sear square, so that when reassembled the sear will bear evenly against the sear hooks on the hammer.

Mike Gingher's technique for accomplishing both these goals is to hold the trigger upside down on a hard surface such as an unpadded portion of a work bench. Place one surface of the India stone flush against the bottom flat of the sear, and press down firmly. Let go of the trigger so that only the pressure of the stone holds the trigger upright, and, maintaining pressure on the stone, slide it straight back and forth across the sear (**Fig. 4**). In this manner any tendency to tip the stone will result in tipping of the trigger, and the stone and sear surface will remain parallel. Check the sear every two or three strokes, and stop when the surface is evenly bright.

Through all the stoning, keep the stone clean and well lubricated. Gingher uses Birchwood Casey's "Sheath" for this purpose despite the availability of commercial honing oils, because he maintains that Sheath is an effective cleaner as well as being a good lubricant.

With all appropriate surfaces polished, reassemble the trigger housing group. Lubricate the pivot points that you polished with a good grade of gun grease — Rig, Hoppe's, Lubriplate, Plastilube, or the like — or use a Teflon-bearing spray such as Break-Free. Be sure to get a coat of lube on the hammer spring and plunger, and put a dab of grease on the nose of the plunger where it bears against the hammer.

When the trigger housing group has been reassembled, check both the hammer and trigger pins, operating the mechanism by hand and looking for any rotation of the pins in their holes. If either pin does turn, stake it lightly in place (**Fig. 5**).

One last thing to do, check the weight of pull again. For use in both NRA and National Board-sponsored service rifle matches, the trigger must hold a 4½-lb. weight. That's also a minimum safe weight of pull. If your trigger won't hold that weight, there is one more step to be performed.

Take a 1"x8" strip of 220-grit, Wet or Dry or emery cloth and insert it between the rear of the trigger and the attached disconnector, abrasive side against the trigger. This is done with the trigger housing group assembled, the hammer uncocked. Hammer spring tension in the assembly will hold the cloth in place. Making sure the abrasive surface touches only the trigger, slide the cloth back and forth using about half the length of the strip. Check the weight of pull about every fourth stroke until the trigger will hold the 4½-lb. weight (**Fig. 6**). Now you're done.

The procedures described here will not make the M1 trigger pull lighter. They will make it smoother and easier to pull cleanly. The last technique changes weight of pull by changing the point at which the disconnector sear comes in contact with the disconnector hooks on the hammer. It increases the length of the first stage pull and increases the weight of the second stage. It also yields a shorter, crisper final stage.

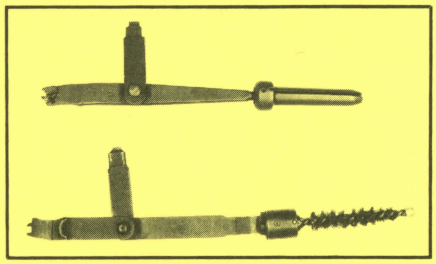
Carefully and thoughtfully done, the operation described will result in a safe, reliable, easily managed trigger pull for your M1 rifle. ■

M1 Combination Tool

After receiving my DCM M1 rifle, I purchased a GI combination tool for it. Will you tell me how the various parts of this tool are used?

Answer: To learn the uses of all the implements built in or onto the M1 rifle combination tool, one must go back to an edition of FM 23-5, the basic field manual for the M1 rifle, dated July, 1940, or earlier. This is because one function of the tool was done away with by production changes in the rifle made in 1940. The several functions of the tool are listed below.

The chamber cleaning implement—a slotted rod on early tools, a chamber brush on later versions—is used to clean the chamber. Patches are folded through the slot in the early tool or wrapped over the brush in the later model. In the later model, the rear of the fitting that holds the chamber brush may be used to disassemble the extractor/ejector without removing the bolt from the rifle.



The many differences of the older (top) and newer M1 tools are most evident in substitution of brush for the slotted tip.

The folding screwdriver, pivoting in the middle of the tool handle, has two blades, a small one ground onto the tip of a larger one. The larger blade fits the gas cylinder lock screw. The smaller blade fits the buttplate screws, the sling and stacking swivel screws, and the elevating pinion tension screw on the most recent type of rear sight (post-1947, and used on the M14 rifle as well).

The tools built onto the end of the tool handle opposite the chamber cleaning tool include a pin drift, used to drive or start the clip latch pin, follower arm pin, trigger pin, and hammer pin; an ejector guide, used in conjunction with the pin drift to reassemble the ejector and its spring; a manual cartridge extractor, and a spanner for adjusting tension on the rear sight elevating pinion on M1 rifle sights used only through about 1940 or '41. The spanner has no use on sights of the most recent type or on those common during World War II.

In addition to the combination tool, the handle of the M10 cleaning rod serves as a multi-purpose disassembly/assembly tool for the M1 rifle.—J.B.R.

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