THE M1 GARAND

LEROY THOMPSON

WEAPON

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Series Editor Martin Pegler

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INTRODUCTION

General George Patton called the M1 Garand rifle "the greatest battle implement ever devised." Bear in mind that Patton was a tanker who had commanded the first US tank school during World War I – he understood that the job of a military force is to kill the enemy, and the M1 Garand was good at that. In an age when other major armies were still armed with bolt-action rifles, the self-loading Garand gave US troops a distinct advantage. In fact, the "US Rifle, Caliber .30, M1" – as the Garand was officially designated – was the first semi-automatic rifle in general issue to any army. The M1 Garand rifle replaced the M1903 Springfield as the US service rifle in 1936 and would remain the standard until supplanted by the M14 rifle in 1957, though Garands continued to see limited US service well into the 1960s. It served with some Garand-supplied US allies for even longer periods. In total, the M1 Garand was used by more than 30 countries.

The Garand rifle was known by various names, and it is worth commenting here on nomenclature within this work. The term "Garand" is widely used today among US collectors, but among World War II and Korean War troops it was usually referred to as the "M1" or "M1 rifle." There was little confusion with the M1 Carbine, as troops just referred to the latter as the "Carbine." In this work "Garand," "M1 Garand," "M1 rifle," and "M1 service rifle" will normally be used interchangeably, while the designation "US Rifle, Caliber .30, M1," or the variation in use during the period under discussion, will be given when referring to official documentation or testing.

The US Army had shown interest in a semi-automatic rifle before World War I, and during that war had produced the Pederson Device, which turned the M1903 Springfield rifle into a semi-auto, though using a pistol-caliber cartridge. The impetus for the Garand can be traced to the belief that future wars would avoid the stalemate of trench warfare through mobility and maneuver, combined with overwhelming small-arms

fire. To some extent, the Thompson submachine gun was developed based on the same assumptions, and many countries opted for submachine guns rather than self-loading infantry rifles. The Soviet Union, however, did develop a semi-auto rifle in the form of the SVT-38, then the SVT-40, the latter seeing substantial service during World War II. The United States created and adopted the M1 Garand.

Development and testing of the M1, discussed in detail below, continued throughout the 1920s, with a design by John C. Garand being considered the best; early examples were produced during 1933 and prototypes were sent for field trials in May 1935. It took more than two more years before manufacturing problems were overcome, and the US Army received its first deliveries in September 1937.

Two years later, production had reached 100 M1 rifles per day, but there were still some outstanding design issues that resulted in further changes. Output continued to increase, however, reaching 600 units per day by January 1941. By the end of 1941, the Army was fully equipped with the M1, just in time for US entry into World War II. At least some Garands saw combat during the defense of the Philippines early in 1942, but it was their effectiveness in the hands of US Army personnel on Guadalcanal that helped convince skeptics – including the US Marine Corps, which had continued to use the M1903 Springfield rifle – of the rifle's utility.

During World War II, two manufacturers – Springfield Armory and Winchester – produced all of the M1 rifles. After 1945, during the Korean War and the early Cold War, International Harvester and Harrington & Richardson produced M1s, as did Springfield Armory, which re-opened its production line. So effective was the Garand in combat that US enemies and allies alike were prompted to develop self-loading rifles of their own. US troops liked the semi-automatic operation of the M1, not least because it allowed them to stay low while firing and precluded the need to operate

Garand-armed US infantrymen of the 3rd Division hold their line above the 38th Parallel, June 1, 1951. The M1 Garand served through World War II and Korea, before being replaced by the M14, a 7.62mm NATO derivative of the Garand with a box magazine. (NARA)

the bolt after each shot. The eight-round magazine capacity – considered low for a semi-automatic weapon – along with the distinctive sound made by the empty M1 clip when ejected from the empty rifle (thus alerting any enemy nearby that the US soldier had to reload), were considered imperfections. The inability to top off the magazine when it was partially empty made the eight-round magazine even more problematic. Yet compared to other infantry rifles in use at the time, the eight-round capacity was greater than that of the German K98 Mauser, Japanese Arisaka Type 99, or Italian Carcano M91 rifles.

The M1 rifle had a very sound reputation for reliability in the Pacific, Mediterranean, and European theaters in World War II. Range and striking power made the Garand especially popular in Europe, though many soldiers and Marines in the Pacific appreciated the ability of the Garand to stop Japanese troops instantly during a *banzai* charge as well. The author has always been impressed with how World War II veterans who were armed with the M1 rifle overwhelmingly considered it an excellent weapon. Some preferred the lighter M1 Carbine for fighting in jungles or heavy forests, but they never lost appreciation of the Garand's effectiveness. During the Korean War, once again, veterans found its range, striking power, and reliability exactly what they wanted in a combat rifle.

The M1 was officially replaced by the M14 in 1957, but it continued in service with some units until well into the 1960s or even later. The author has friends who served on US Navy ships who report that Garands (generally converted to take 7.62×51mm NATO ammunition) were still in the ship's armory certainly into the 1970s, if not later. Sniping versions such as the M1C or M1D were used even later. The M14 was in reality a Garand upgraded to assault-rifle configuration with select-fire capability, detachable 20-round box magazine, flash-suppressor, and a few other features. It was still based on the Garand, and is rated by at least some as the best battle rifle ever to enter US service. In fact, the M14, and the M21 derived from the M14, have seen a resurgence in use in Afghanistan and Iraq as designated marksman rifles.

The M1 Garand also proved very popular in service rifle competitions; a limited number of Garands were specifically selected for competitive use. The M1 continued to appear in service rifle matches well into the 1960s, when it was replaced by the M14.

Among military weapons sold through the US Civilian Marksmanship Program, the M1 Garand ranks with the M1 Carbine and M1911A1 pistol among the most popular weapons ever offered. In fact, it was through the Director of Civilian Marksmanship (DCM) that US World War II veterans finally had a chance to acquire the kind of rifle they had carried throughout the war. Furthermore, many firearms enthusiasts who were too young to have used the Garand during military service (such as the author) now have had a chance to appreciate the Garand, thanks to the rifles made available through the DCM. As this book is published, 85 years have passed since the introduction of the Garand, but the M1 is still widely appreciated, both by those who understand its historical significance and those who continue to value it as an excellent rifle.

DEVELOPMENT

The switch to semi-auto

Within a decade of adopting the M1903 Springfield rifle, the US Army was already interested in a semi-automatic rifle chambered for the .30-06 service round. The semi-automatic rifle was viewed as desirable for many reasons, including that it allowed a round to be chambered while the soldier retained his sight picture and finger on the trigger. In combat, the semi-auto allowed each soldier to fire more rounds more rapidly, thus increasing his lethality. The basic criteria were that it be chambered for the .30-06 service cartridge and that it weighed no more than the M1903 rifle. Whether stated or implied, the new weapon would also require an action that could stand up to the pressures of the .30-06 round.

In basic terms, a semi-automatic rifle uses the energy of the fired cartridge to feed, chamber, and eject the spent cartridge mechanically. The M1903 rifle and other contemporary military rifles used a bolt action, which required manual operation to perform these functions. Because of the pressures generated by the service cartridge, the desired semi-auto design would require a locked breech at the time of firing. The locked breech allowed pressures to drop enough prior to the bolt being allowed to recoil rearward to ensure safe functioning.

PRECURSORS TO THE M1 GARAND

Prior to World War I, there were successful semi-automatic rifle designs such as the Winchester 1907 and Remington Model 8 being produced in the United States, but neither had an action capable of handling the .30-06 service round's pressures. There were other designs as well, such as the Mondragon, which had been adopted by Mexico and manufactured in

Switzerland by SIG. This rifle was important to the future development of the Garand and other semi-auto military rifles as it was gas operated, using a cylinder and piston and a rotating bolt. It was chambered for the 7mm Mauser round and had an eight-round box magazine. By 1901 SIG had shipped some Mondragon rifles to Mexico, and by 1908 it was being manufactured in Mexico and issued to the Mexican Army. Production would continue until 1943. Generally considered the first semi-auto rifle adopted for military service, the Mondragon saw limited service in World War I with the German Army, which had purchased the remaining stock of those produced at SIG.

Although US ordnance officers at Springfield Armory were aware of the Mondragon, prior to World War I they showed more interest in an experimental Danish design known as the Bang rifle. Two examples were received at the Armory in 1911. The Bang used a system in which gas released from the muzzle would pull a cap forward to transmit force to a wire, which in turn would cam open the rotating bolt and push it to the rear. Although the system sounds complicated, apparently it worked well enough for the Ordnance Department to remain interested in it. A major problem, however, was that to meet the weight requirements set forth by the Ordnance Department, the Bang had its stock hollowed out and its barrel turned down to lessen its external diameter, so that it was very thin. As a result, the heat generated by the rifle in operation caused the barrel to twist and the stock to char. Yet the Bang was the first semi-automatic design submitted to the US Ordnance Department, which retained some interest in it until 1927, when the designer Søren Hansen Bang submitted the rifle once again but with a few improvements. Although not adopted, the Bang did influence John Garand in his design.

In 1916, before the US entered World War I, there were attempts made to convert the 1903 Springfield rifle to semi-automatic operation, but once wartime production of the M1903 began these experiments made little progress. The most interesting development was the Pederson Device, in which a semi-automatic mechanism with a short barrel replaced the M1903's bolt, turning the M1903 into a semi-auto rifle firing what was in effect a pistol cartridge. The Pederson was not produced until late 1918, and it is questionable whether any of them made it into combat, though it is possible that prototypes were tested in France.

Also during World War I, the French developed the St Etienne M1917 semi-auto rifle, which used a gas-operated rotating bolt. Chambered for the French service 8mm Lebel round, the M1917 saw service late in the war. Since it used many components from the standard Lebel bolt-action rifle, the M1917 was relatively easy to produce, with 85,000 delivered to French forces by the end of the war. It did not, however, prove popular with the troops, who found it hard to maintain in the trenches, as well as being too heavy and too long. An improved version, the M1918, addressed most of the issues with the M1917, but only about 10,000 were produced. These two models used a gas port beneath the barrel near the muzzle to power the action, and this design would be carried over into the Garand rifle.

THE M1'S PREDECESSORS AND TRIALS COMPETITORS

M1903 Springfield

Garand Model T1920

Pre-M1 rifle prototype T26

Pre-M1 rifle prototype T27

Garand T1922

Thompson MPC

.276 Garand T3

.276 Pederson T1

(All images courtesy Springfield Armory NHS)

One other design that generated some interest at Springfield Armory was the Swiss Rychiger, which was a semi-auto based on the high-quality and accurate series of Schmidt-Rubin rifles that served the Swiss armed forces from 1889 to 1953 in various configurations. The bolt-action Model 1911, which was used for the semi-auto conversion, was especially renowned for its accuracy. The Rychiger was recoil operated, with the barrel moving backwards under recoil to unlock the bolt. The rifle was deemed to be of enough interest that at the outset of World War I the Ordnance Department hired an arms designer named Elder from Savage Arms, and commissioned him as a major with the assignment to develop the Rychiger design. His goals were to give it a box magazine and make it simpler and sturdier. As was to be expected of a Swiss-made rifle, the Rychiger was well made and nicely finished, but it was found to need constant oiling to function, and it was decided that if a beautifully made test-rifle type would not function reliably, a mass-production version would have even more problems.

ENTER JOHN GARAND

After World War I, when the Ordnance Department turned its attention to a semi-auto rifle design once again, John Garand came on the scene. He had impressed the Ordnance Department with his design for a machine gun, and although the machine gun was not adopted Garand was sent to Springfield Armory in March 1919 to work on a semi-auto rifle. In July 1919, the Ordnance Committee established specifications for a semi-auto rifle for the infantry and cavalry. Both the Infantry Board and the Cavalry Board had examined the various semi-auto designs available at Springfield Armory during 1919 and had deemed a gas-operated design most promising.

The Danish Bang design, which had been deemed worthy of more attention at an earlier stage, was worked on by Major James Hatcher. It was tested in May 1920, along with a rotating-bolt, primer-activated design from John Garand, a French Berthier, and a Thompson delayed-blowback design. In the primer-activated system employed by Garand, the primer set back (moved rearward) in the cartridge case to strike a tappet, which caused an actuator to push the bolt sharply to the rear. This system required a cylindrical firing pin, which fitted over the primer.

The Bang and Garand designs were deemed very promising. In his *Book of the Garand*, Major General Julian S. Hatcher quotes May 14, 1920, instructions to the Ordnance Department that resulted from the tests:

> There exists a need for a light shoulder rifle with a high rate of fire. The Browning Automatic Rifle [BAR] is too heavy. It should be clip fed, and so arranged as to be fired by manual action if desired, or in case the automatic action fails. Recommends that the Ordnance Department continue development of the Garand and Bang rifles. Experiments should include barrels 24, 22, and 20 inches long. The Adjutant General directs that the work be done along the lines laid down by the Infantry and Cavalry Board.

John Garand aiming one of the M1 rifles he invented. (Library of Congress)

One point noted during the tests and after was that it would be difficult to develop a rifle chambered for the .30 Government Cartridge (.30-06) that would weigh less than 10lb.

On February 11, 1921, the Adjutant General approved the publication of "Information for Inventors Desiring to Submit Semiautomatic Shoulder Rifles for Test to the Ordnance Department." This document covered the requirements for the rifle as well as the tests it would have to pass for acceptance. The introduction stated:

> The rifle must be of a self-loading type, adapted to function with the U.S. Cartridge, Caliber .30, Model of 1906. It must be simple and rugged in construction and easy of manufacture. It should require but little more attention than the regular service rifle when placed in the hands of the average soldier.

Among the many requirements set forth were: a magazine that could be fed from clips or chargers; a breech designed to prevent injury due to premature unlocking; a safety that would allow the rifle to be carried cocked with a round chambered; and accuracy comparable to the then-current service rifle, the M1903.

Among the tests the rifle would have to undergo were: time and number of tools for disassembling and assembling the rifle; 100 rounds fired in semi-auto mode to check handling and functioning; timed tests at different ranges and firing from different positions; two rounds loaded to 30 percent overpressure to be fired; firing a mix of cartridges with varying loads of powder; 5,000 rounds fired in semi-auto mode with all malfunctions and breakages recorded; and exposure to dust, among other tests.

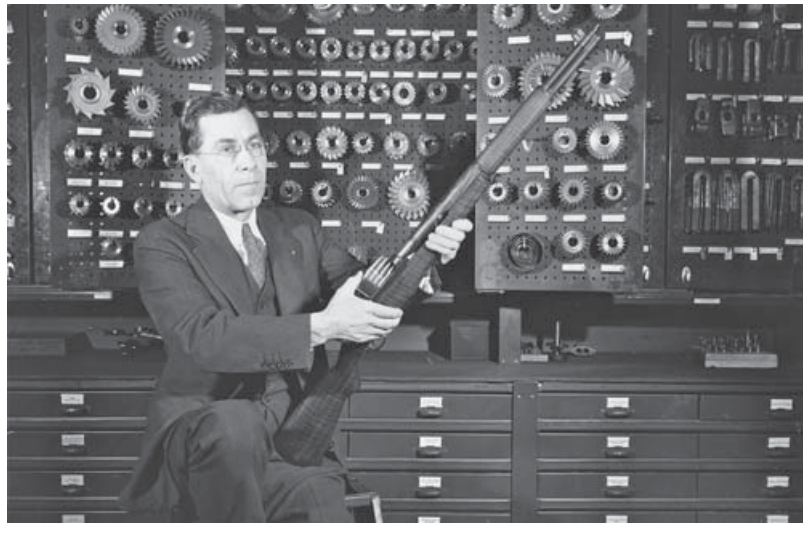
THE FIRST TESTS

On November 28, 1921, an order was issued for the conduct of tests of semi-auto rifle designs. The US Machine Company submitted the Berthier design and Colt submitted a version of the Thompson Autorifle. The Berthier design was unreliable and the placement of the magazine atop the receiver blocked the normal line of sight. Problems with the Colt included malfunctions and the need to have oiled pads over which the cartridges passed to ensure reliable feeding. Neither was deemed suitable, as they were inferior to the M1903 bolt-action rifle already in service.

John Garand had an improved model that was not submitted for the trials, though it was ready to be demonstrated at that time. The new model, designated the M1921, no longer used a rotating bolt, but still employed a primer-actuated system. Also incorporated into the M1921 was an internal magazine. Twenty-four of the new Garand design and a number of Thompson Autorifles were ordered for testing by the Infantry and Cavalry. As a result of Infantry Board tests of the Garand M1922, which incorporated additional changes, and the Thompson Autorifle, a report was issued on June 9, 1925, which deemed both rifles unsuitable for service at that time, but which did recommend their continued development.

Another development path was followed by J.D. Pederson, as the Ordnance Committee had also expressed interest in a semi-automatic service rifle of smaller caliber than .30. As a result, funded by the Ordnance Department, Pederson developed a 7mm (.276) cartridge he deemed optimal for service use. Not only would the smaller cartridge allow a lighter and more compact semi-auto rifle, but it would also have less heat buildup when fired, generate less recoil, and would use lighter cartridges – which would allow a soldier to carry more rounds. Pederson's design used a variation of the toggle system found in the Luger pistol.

By 1925, Pederson had a prototype rifle ready. An especially noteworthy feature was the ten-round clip, which could be inserted into the magazine as a unit, with the empty clip being ejected when empty. This clip-loading



John Garand demonstrating the technique for inserting a clip of eight cartridges into the M1 rifle. (NARA)

The .30 M1 (T35) with side-loading integral magazine. (Springfield Armory NHS)

system was a feature that would later be incorporated into the M1 Garand. Cartridges for the Pederson design, however, did need to be treated with a thin film of hard wax to ensure reliable feed, although this system was nowhere near the problem that the necessity for oiling each cartridge presented for Colt's Thompson Autorifle. On May 10, 1926, the Pederson rifle was tested and performed well enough that the Ordnance Department requested that 20 be manufactured with 24in barrels; at the request of the Cavalry Board a further five were manufactured with 21in barrels.

The M1 (T35) with side-loading integral magazine stripped. (Springfield Armory NHS)

Colonel Townsend Whelan, commander of Frankford Arsenal during the 1920s and an expert rifleman, in kneeling position with a Garand T1. (Springfield Armory NHS)

Meanwhile, the Infantry Board had continued to test the Garand and Thompson semi-auto rifles. Ten examples of each rifle had been modified based on requested improvements after the 1925 tests. This Garand was designated the M1924 to indicate the improvements – these included a receiver-mounted sight, a modified stock, and a 21.5in barrel. The Thompson Autorifle had a modified stock and 21.5in barrel as well.

On June 15, 1926, there were additional tests of the Thompson and the M1924 Garand. These tests were carried out in comparison with the M1903 Springfield and the BAR. The Infantry Board concluded that the Garand was more satisfactory than the Thompson, except in trigger pull and accuracy. Once these defects were corrected, the Garand was to be resubmitted. Among the problems cited with the Thompson was its use of pads to oil the cartridges. This issue and other defects were to be corrected and an improved version submitted. At this point, the Infantry Board had been sufficiently impressed with the trials of the Pederson rifle that they asked for examples of the Garand and Thompson in .276 to be submitted for tests along with a perfected version of the Pederson.

On July 29, 1926, the Ordnance Committee stated that tactical tests were necessary to determine proper combat employment of the semi-automatic rifle and to determine whether the .276- or .30-caliber round was desirable. The Committee also recommended construction of one .30 semi-automatic rifle of the Garand design.

A NEW CARTRIDGE

An event that would dramatically influence the development of the M1 Garand occurred in 1925, when a new .30-caliber M1 cartridge was adopted that had a different pressure curve than the previous .30-06

round. Garand's primer-activated design did not work as well with the new cartridge. Additionally, Frankford Arsenal started crimping in primers, which prevented them from setting back to operate Garand's system. As a result of these two developments, Garand turned his attention to a gas-operated design, a change approved by the Ordnance Department.

The system Garand chose for his 1926 T1 and T3 models employed a piston on a rod inside a gas cylinder under the barrel. Gas travelling down the barrel behind the bullet was tapped off via a gap between the muzzle cap and the muzzle to actuate the piston. Originally, Garand was developing the gas-operated rifle for the .30 cartridge, but in December 1927 the Ordnance Committee recommended production of a .276 version.

On April 30, 1928, the Infantry Board reported on a test of the 20 Pederson rifles with the longer barrels as well as the five "carbines" that they had borrowed from the Cavalry Board. Conclusions were that the Pederson .276 T1 offered many advantages over the M1903, among which was the fact that soldiers with less skill in marksmanship could achieve better results with it. The recoil of the .276 round fired from the Pederson T1, plus the energy saved by not having to operate a bolt action, meant that those carrying out firing tests felt markedly less fatigued after shooting. Marksmanship training was also easier.

These positive results, along with similar ones during the Cavalry Board tests, resulted in the recommendation to adopt a semi-auto rifle as soon as possible, with the Pederson T1 to be adopted for the Infantry after some minor modifications. However, despite some apparent advantages to the .276 cartridge, the Army was not ready to abandon the .30 cartridge, which was also used in the M1903 Springfield, BAR, and M1919 machine gun. As a result, the Army appointed a board to test the actual wounding effect of the .30-06 flat-base, .30 M1 boat-tail, .276 flat-base, .276 boat-tail, and .256 flat-base bullets. Also appointed was a combined Army, Navy, and Marine Corps Board to determine what caliber should be chosen for a semi-auto service rifle.

The cartridge tests (carried out on live pigs) determined that all five cartridges had sufficient lethality at 1,200yd, though at the longer range the .30 M1 round was best. At closer ranges, the .256 round did the most tissue damage, at least partially due to its tumbling effect. The board charged with recommending a cartridge for adoption for the auto-loading rifle recommended the .276.

A NEW ROUND OF TESTS

On October 1, 1928, the War Department issued an invitation to inventors interested in submitting a semi-auto rifle design for testing. It was specified that the rifle must be of self-loading type adapted to function with the .276 cartridge to be furnished by the War Department. This cartridge employed a 125-grain bullet with a gilding-metal jacket fired from a rimless case at a muzzle velocity of 2,700 feet per second (fps). Power pressure was stipulated as approximately 48,000lb per square inch (psi). It was

An M1 rifle along with a clip of eight .30-06 cartridges. During World War II, creative GIs learned that an empty clip could be used as a field-expedient handcuff for captured prisoners. The prisoner's hands could be pulled behind his back, a finger from each hand thrust through holes in the clip, and the clip slapped on the back with the palm of the hand, driving it tight against the fingers. (NARA)

emphasized that the rifle had to be simple and rugged and easy to manufacture. Potential inventors were informed that tests of the designs would be held "about" July 1, 1929. They were also given a list of characteristics desired and a description of the tests that would be performed. The former were very similar to those given in 1921, except 8lb 12oz was now given as the maximum weight. On February 21, 1929, the Ordnance Department was ordered to discontinue development of the .30 Garand self-loading rifle as all emphasis was now to be on designs chambered for the .276 round.

On July 1, 1929, six rifles were submitted to the Test Board, but due to requests by some designers for an extension, final date of submission was extended to August 15. The Brauning, a Dutch recoil-operated design that was not properly chambered for the .276 round, had so many problems it was withdrawn from the tests on the first day. Colt submitted a design from John Browning's brother J. Edmund. The firearm was recoil operated and employed 108 parts; it had a ten-round detachable box magazine and weighed just over 9.5lb. The Holek rifle was the brainchild of Czech engineer Václav Holek, who designed the Bren gun; the rifle was gas operated, had a detachable box magazine (five or ten rounds), and 86 parts.

The Thompson Autorifle was also submitted; this was the retarded-blowback design that had been extensively tested previously, and which required lubricated cartridges. The inventor, John T. Thompson, now proposed using pasteboard clips of the type used in the Schmidt-Rubin M1911 rifle. As submitted in July 1929, the rifle weighed 11lb, but the Board suggested it be withdrawn and an improved design of lighter weight be pursued. An improved design was submitted by August 15.

The US Rifle, Caliber .276 T1 (Pederson design) was the same toggle-breech design already tested and reported upon favorably; cartridges still required the wax coating for reliable operation. The US Rifle, Caliber .276 T3 (Garand design) was the gas-operated, rotating-bolt rifle upon which John Garand had been working. It could take ten rounds, which were fed into the magazine as a unit in expendable sheet-steel clips. Weight was 8lb 9oz; there were only 67 parts.

A seventh rifle, from Rheinmetall, was submitted on August 12, just before the deadline. It used a gas system with a sliding muzzle cap somewhat like the Bang previously tested, but worked from a toggle breech closure similar to the Luger pistol. The toggle opened to the side and was fed from the left rather than the bottom.

Without going into detail about the various problems encountered with the designs, what the Test Board concluded was that the semi-automatic

This photograph, from a 1938 magazine article on the M1 rifle, illustrates loading the M1 with a clip while in the prone position. At least some World War II veterans preferred to load their Garands from bandoleers. Gerald Cosgrove, a Marine who discusses his World War II experiences with the 24th Marine Regiment in Mark Goodwin's *US Infantry Weapons in Combat*, mentions that on Iwo Jima he carried his cartridge belt full of M1 clips plus carried two or three bandoleers. He retained the clips in his cartridge belt for emergencies and worked out of his bandoleers, replacing them at night. (NARA)

rifle had reached the point of development where it could replace the service rifle. Two of the rifles tested – the T1 Pederson design and the T3 Garand design – were deemed far superior to the other designs. Even so, the report listed defects for each of these two rifles that needed to be corrected.

The T1 Pederson design was deemed to have had an excessive number of malfunctions, and the ejection of the tenth cartridge and clip was seen as a problem. The failure of the bolt to close, breakage of the crank, misfires, the breakage of the sear bar, the fact that the bolt over-rode cartridges, and the weapon's lubricated cartridge requirement were also listed as defects. The T3 Garand design was also marked out as having had an excessive number of malfunctions, and the ejection of the tenth cartridge unfired was listed as a defect. The report's list also noted the failures to extract, the breakage of the extractor, the failure to eject cartridges, the breakage of the piston rod, and the malfunction of the driving spring.

The Board concluded that they found the Garand design superior to the Pederson design for six reasons: it did not require lubricated cartridges; it was lighter; it had fewer parts; it was simpler; it would be easier to manufacture; and the mechanism would operate with a greater range of cartridge loads. It was recommended that 20 .276 Garand T3 rifles be manufactured by the Ordnance Department for tests by the Infantry and Cavalry Boards for comparison with the Pederson rifles already manufactured. The Board also recommended that work be resumed on a .30 version of the Garand and an example be submitted to the Test Board when completed.

A further indication that the choice of .276 as the new semi-auto rifle caliber was not a done deal was a new series of tests of bullet effect on

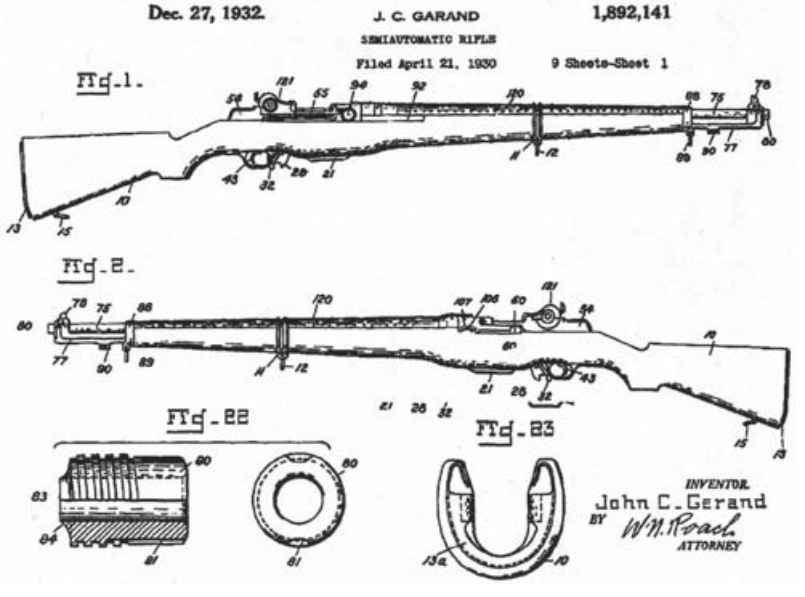
goats. As with the tests on pigs, they indicated that the .30 M1 round retained its killing or wounding effect better at longer ranges while smaller-caliber bullets performed well at shorter ranges.

In 1930, the Ordnance Department tested two examples of a gas-operated .276 semi-auto rifle designed by J.C. White. This rifle had not been ready for the earlier trials, but performed relatively well when tested and especially impressed the Test Board with lightness and compactness. However, it proved too fragile for service use, and the inventor attempted to correct its deficiencies.

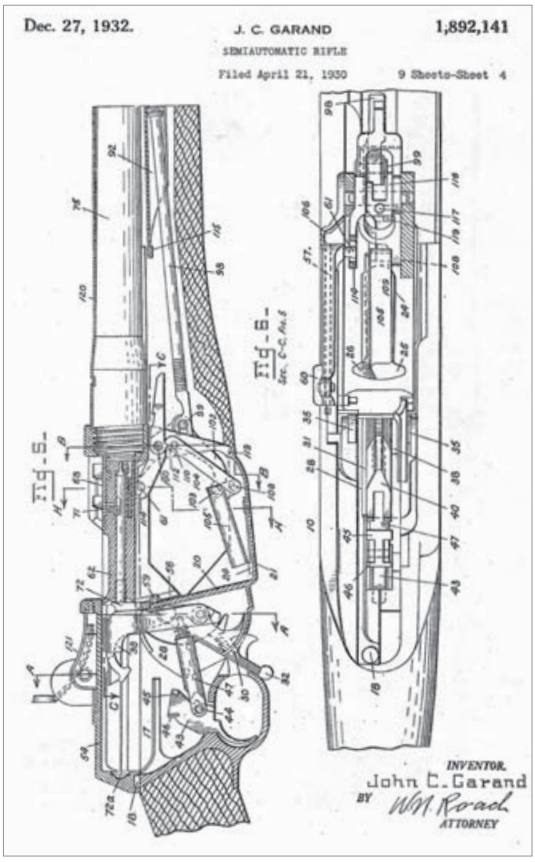
By spring 1931, the 20 Garand T3E2 rifles for Infantry and Cavalry tests were ready and plans were made to test the Pederson and Garand designs against each other. Along with the 20 rifles, 2,000 clips were manufactured. Cost per rifle averaged $2,351.56.

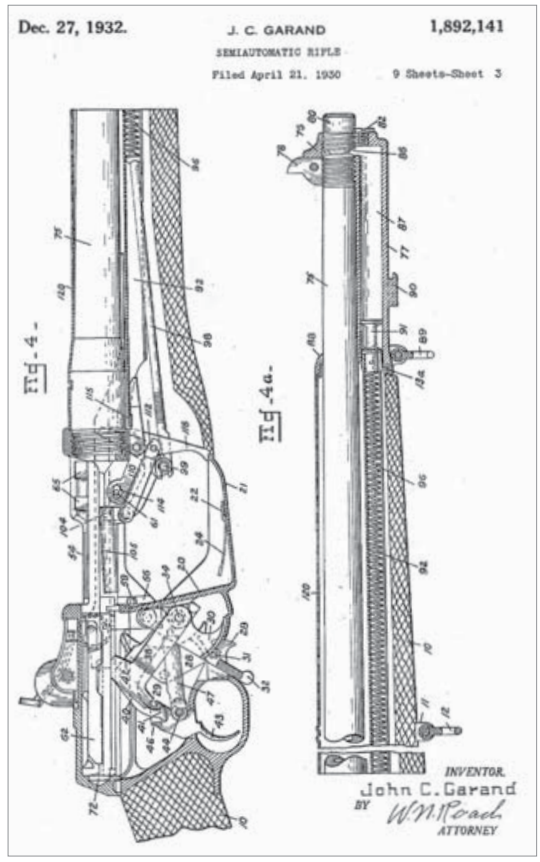
Tests of the .276-caliber Garand T3E2 by the Infantry Board resulted in a favorable report. The Garand was rated superior to the M1903 Springfield rifle in rate of fire, hits per minute, and hits per rounds fired. The Garand's small number of parts and simplicity of operation were rated as important positives. Accuracy was better with the Garand than with the M1903, the BAR, or the Pederson. Durability also proved good, for the Garand was still operating after 2,140 rounds had been fired within 55 minutes. As previously, it was concluded that the semi-auto operation eliminated the fatigue inherent in rapid operation of the bolt-action Springfield and that the semi-auto allowed soldiers to develop an acceptable level of skill faster than with the M1903. Overall, the Infantry Board rated the T3E2 Garand the best rifle tested to that point and expressed a preference for the .276 round over the .30 round. However, the Chief of Infantry preferred that the .30 M1 round be retained. The Cavalry Board had also recommended that the .276 be adopted.

The Semiautomatic Rifle Board met again between October 9, 1931, and January 4, 1932. Rifles to be examined and tested included the Garand



Garand patent drawing offering the external view of the Garand and its major parts. This drawing shows the Garand in what was close to its final form. (US Patent Office)





ABOVE
Patent drawing of receiver internals of the M1 Garand, including top view. (US Patent Office)

.30-caliber semi-automatic T1E1, Garand .276 T3E2 rifle, and Pederson .276 T1. The .30-caliber Garand was virtually identical to the .276 one except for caliber. The White .276 rifle was submitted once again as well. A comparison study of .276 versus .30 caliber was presented to the Board.

A document of December 9, 1931, goes into some detail about the advantages and disadvantages of the Garand design and the Pederson design. To summarize the conclusions as concisely as possible, the Pederson's advantages were: it was easy to handle; it had a fixed barrel, which aided accuracy; it was easier to load than the Garand and employed a hold-open device after the last round was fired; the mechanism was unexposed when the breech closed; and it offered good reliability, as shown in the Infantry and Cavalry tests. The report broke disadvantages into two groups: those inherent to the design and difficult to correct, and those that appeared correctible. Inherent disadvantages in the Pederson design included: the use of lubricated ammunition; the fact that the upward motion of the toggle operation of the breech-block could strike hat or helmet; there was some difficulty in producing the design with interchangeable parts; the mechanism was exposed after the last round had been fired; there was poor trigger pull due to the complicated mechanism; and the bolt handle moved during operation. Disadvantages of the Pederson design that might be corrected included: the sights were not

completely satisfactory; the safety did not work directly on the trigger mechanism and did not allow the rifle to be unloaded when on "safe"; the mechanism was complicated; and the partly fired clip could not be removed without running remaining cartridges through the action.

The advantages of the Garand included: a simple design with minimal number of parts and simple disassembly; the rotating bolt gave great safety in breech closure; the firing mechanism offered good trigger pull and a sound method of applying the safety; the gas was taken from muzzle, thus eliminating a port in the barrel;[1] the clip release meant the gun could be quickly unloaded if desired; and excellent sights. Disadvantages inherent in the Garand design included: the gas operating system with piston under the barrel (which made cleaning difficult and also made a weak attachment point for a bayonet); the length of the operating rod and the fact it was non-symmetrical, causing the bolt to be turned by power applied to only one side; the exposure of the operating rod near the receiver; and movement of the bolt handle during operation. The report noted that none of these disadvantages was considered serious enough to affect the practical operation of the rifle. Those correctible disadvantages of the Garand included: malfunctions caused by insufficient power applied to the actuator; feed problems due to the lips on the clips; it was hard to push the clip into the magazine; the method of mounting the stock for ease of disassembly adversely affected accuracy; and the firing pin dented cartridges when the breech was closed.

Among other points noted that applied to both rifles were the need for a wooden handguard that covered the barrel, and that the block-clip loading system made it difficult to top off a magazine with individual cartridges during a lull in combat, to replace those expended.

As the result of a meeting on January 4, 1932, the Test Board made the following recommendations: the caliber of the Semiautomatic Rifle should be .276; the Garand .276 T3E2 with latest improvements should be approved for limited procurement; and approximately 125 Garand T3E2 rifles should be acquired along with necessary ammunition and issued for service use for not less than one year. After this period of service the War Department Semiautomatic Rifle Board would consider final adoption; but pending service trials of the .276 rifles, development of the "Garand .30 caliber semiautomatic rifle" should continue.

MacARTHUR INTERVENES

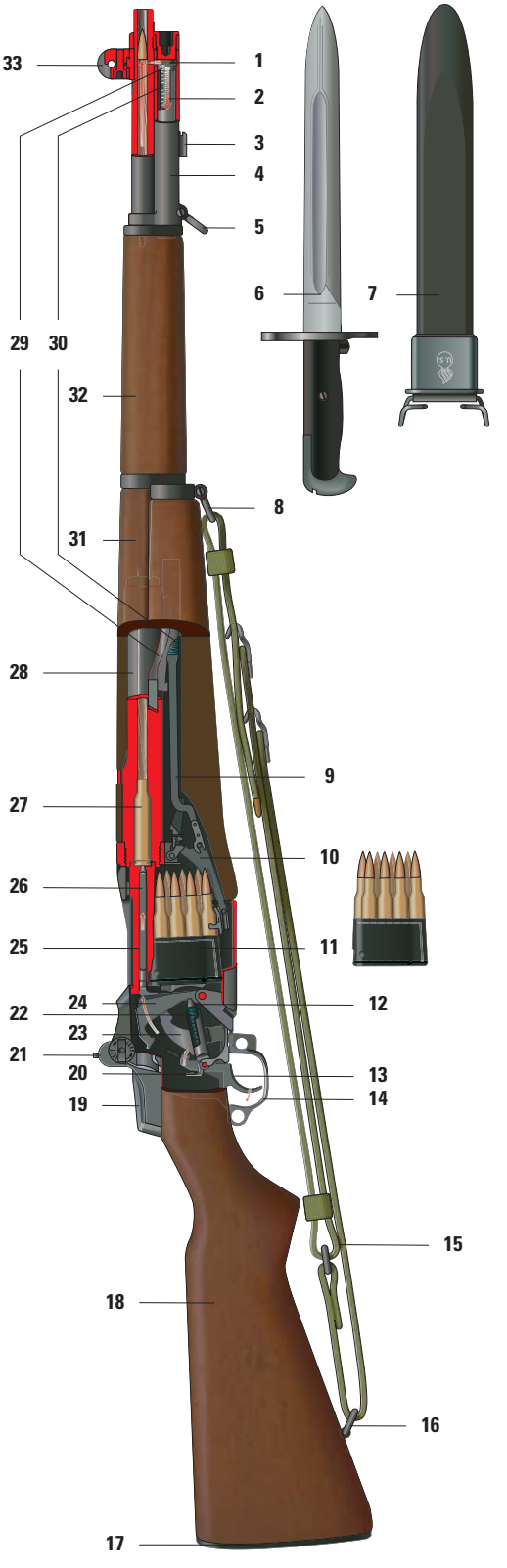
The Test Board's recommendations were not acted upon because General Douglas MacArthur, the Chief of Staff of the Army, did not approve the recommendation to change to a .276 rifle. Instead, he ordered that work on the .30 semi-automatic service rifle be intensified. The chaos and confusion caused in replacing the .30 round was cited as the primary consideration. As a result, all efforts were directed towards getting the

[1] The "gas trap" system would later be abandoned in favor of a gas port (see page 25)

THE GARAND EXPOSED

.30 M1 Garand rifle

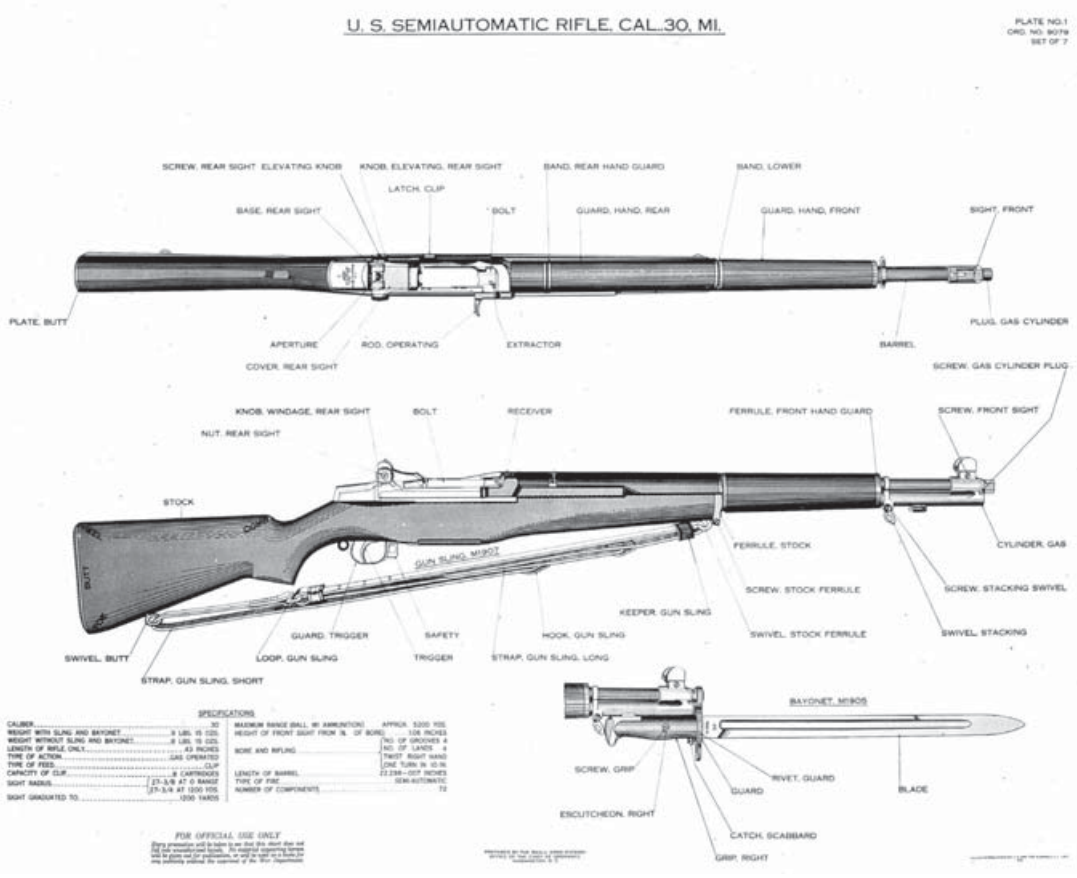
1. Gas chamber
2. Recoil of operating rod
3. Bayonet stud
4. Gas cylinder
5. Stacking swivel
6. M1905 bayonet
7. Bayonet scabbard
8. Stock ferrule swivel
9. Follower rod
10. Follower arm
11. Cartridge clip
12. Hammer spring plunger
13. Trigger
14. Trigger guard
15. M1 sling
16. Butt swivel
17. Butt plate
18. Stock
19. Receiver
20. Sear
21. Rear sight
22. Hammer spring
23. Safety
24. Hammer
25. Bolt
26. Firing pin
27. Cartridge case in chamber
28. Barrel
29. Operating rod
30. Operating rod spring
31. Rear hand guard
32. Front hand guard
33. Front sight



redesigned .30 Garand. It had been worked over at Springfield Armory after the bolt had cracked during the previous testing.

The rifle, with all design changes incorporated, was tested at Aberdeen Proving Ground on March 21 and 22, 1932, and performed very well. As a result, Springfield Armory was ordered to produce 80 of what was then known as the "US Semiautomatic Rifle, Caliber .30, T1E2." It took more than two years to produce the 80 rifles, because the tooling was being designed and tested so that the rifles could be as close to production guns as possible. Attempts were made to use the most cost-effective manufacturing techniques, but each rifle still cost $1,831 to produce. However, technicians estimated that with new machinery and fixtures, the cost per rifle could be reduced to $64, which would include parts and accessories. During the process of producing the rifles, on August 3, 1933, their designation was changed to "US Semiautomatic Rifle, Caliber .30, M1."

In May 1934, the rifles were finished, with 50 sent to the Infantry and 25 to the Cavalry for rigorous testing under field conditions. A wide range of soldiers, both experienced and recruits, were issued the M1 rifles and their comments on them noted. One problem that arose in the testing was weakness in the operating rods, which were crooked as manufactured and appeared to need straightening. In August 1934, the field tests were put



Official M1 Garand diagram designed for use in training and familiarization with the new rifle. (NARA)

on hold while the rifles were returned to Springfield Armory to have the operating-rod problem corrected and for some other minor changes.

In May 1935, the rifles were returned to the Infantry and the Cavalry for completion of field tests. These tests were completed by October 1935, with both branches recommending the adoption of the M1 to replace the M1903 Springfield. After the Ordnance Committee recommended the M1 Garand for standardization, it was cleared for procurement by the Assistant Secretary of War, and on January 9, 1936, it was approved for standardization by the Adjutant General.

THE M1 GARAND IS ADOPTED

The M1 Garand was now the new US Army rifle. The Chief of Infantry recommended that the first unit to be equipped with the new firearm would be the 29th Infantry Regiment, which served as the Demonstration Regiment for the Infantry School at Fort Benning, GA.

As is normal with a new weapons system when it goes into production, some manufacturing problems arose. After World War I, production of the M1903 Springfield service rifle continued at Springfield Arsenal, as did that of spare parts. However, in 1936 production ceased. At this point, many machines at the Armory were aging, as were many staff members; retirement claimed large numbers of skilled personnel.

The 80 M1 Garands made for the final Army tests had been "semi-production" guns. For actual production of the M1, new equipment as well as tooling was needed. John Garand had designed the parts for the M1 based on his experience with machine tools and had striven for parts that would be easy to produce. In some cases, parts were designed to perform multiple functions, thus keeping the number of parts low. Nevertheless, Springfield Armory hoped that the acquisition of new machinery would allow the 1,100 machine operations originally foreseen to produce an M1 rifle to be reduced by 50 percent.

The first production Garands were leaving the line by September 1937, at the rate of ten per day. As is generally the case, production was low at the beginning, as start-up problems were encountered and overcome. Daily output rose steadily, however, and was given a boost in 1939 by the beginning of war in Europe:

- March 1938 – 20 rifles per day
- July 1939 – 80 per day
- September 1939 – 100 per day
- January 1940 – 200 per day

Note, too, that had the United States been at war at this time, these figures could have increased dramatically. On March 25, 1936, it had been estimated that it would take 145,832 M1 Garand rifles to replace every M1903 Springfield rifle in the US Army and the National Guard. Of course, hundreds of thousands more rifles would be needed if the United States went to war.

Designed to motivate war workers, this is perhaps the best-known World War II poster of the M1 Garand. (NARA)

Tooling up to produce the M1 rifle had been a major impetus in the modernization of Springfield Armory. Congress had appropriated enough money between 1936 and 1939 to allow extensive modernization. As a result, by 1939, installation of new tooling and introduction of the latest mass-production techniques had given Springfield Armory one of the most advanced production systems in the United States for the M1 rifle.

INITIAL PROBLEMS AND CHANGES

Problems encountered with early production rifles could almost all be traced to attempts to make machining easier, by subtly changing the shape of John Garand's original parts or their dimensions. Given Garand's

ABOVE
An early M1 Garand of the "gas trap" type. (Martin Floyd)

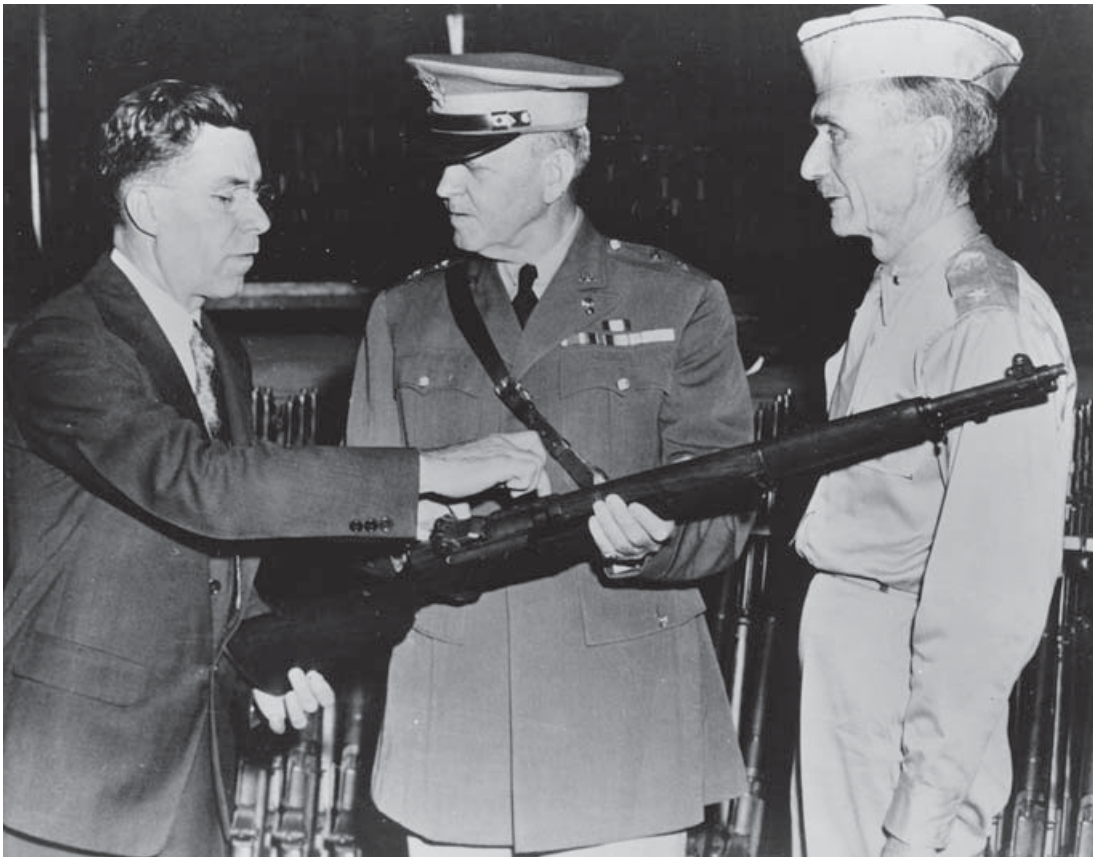
LEFT
Close-up of the muzzle of the "gas trap" Garand.The hexagonal muzzle cap is placed over the barrel. (Martin Floyd)

understanding of production techniques and his attempt to make the parts as readily machinable as possible, the fact the Armory staff did not consult him before making these changes is hard to understand.

One of the first problems to arise was stoppages when the seventh round in the clip was positioned on the right side of the magazine. These malfunctions were fixed when vertical guide rods inside the magazine were added, as they had been in Garand's original design. (A note about Garand clips: they were designed so that they could be inserted into the rifle with either side up. This was a major advantage in combat when a soldier might be fumbling to load a clip quickly at night.)

Another problem arose with clips jumping out of the rifle after the seventh round had been fired, with one round remaining in the clip. Once again the problem was traced to a change in the design of the part that released the operating-rod catch when the clip was inserted. Once the part as Garand originally had designed it was used, the problem was solved. Among other early troubles were the fact that the cam that turned the rotating bolt tended to stick if not lubricated correctly; also, rear sights would not hold their elevation adjustments. These problems were readily corrected.

The major change made during early production was the elimination of the system that used a gap between the muzzle and barrel to allow gas to reach the gas cylinder. Among the problems with this system – actual or hypothetical – was the fact that it offered a weak attachment point for the bayonet. Also, the space between muzzle and barrel made cleaning difficult, and this space allowed carbon build-up, which could cause inconsistency in the operation of the gas piston and hence adversely affect accuracy. In his book *The Gas Trap Garand*, Billy Pyle notes that despite these oft-mentioned reasons for eliminating the "gas trap" system, in one case during test-firing of a hot rifle the screw holding the gas-cylinder plug loosened and fell out, which allowed the plug to pop out of position. When the next round was fired it struck the plug, thus blowing the entire



John Garand explaining the features of the M1 rifle to Army Major General Charles M. Wesson. At right is Brigadier General Gilbert H. Stewart, commanding officer of Springfield Armory. (Library of Congress)

gas-cylinder assembly from the end of the barrel. This event was also influential in dooming the "gas trap" system.

This design was changed to a more standard system using a new gas-cylinder assembly that tapped gas into the cylinder through a port in the bottom of the barrel. Note that this port was always drilled through a rifling groove (the cut area) rather than a rifling land (the raised area). This new gas-cylinder design is generally designated the "Spline Type." The original design, generally known as the "Gas Trap Design," was used for the production of the first 51,000-plus M1 rifles.

When the change was made to "gas port" Garand rifles, the barrel length was increased from 22in to 24in, which also increased weight from 8lb 14oz to 9lb 6oz. After July, 1940, if earlier "gas trap" M1 rifles came in for maintenance, they were converted to "gas port" configuration. Nevertheless, some "gas trap" M1s that were shipped early to units deployed overseas did see combat. Reportedly, some were used during the defense of the Philippines during the first months of 1942.

For a collector, an original unaltered "gas trap" Garand would be the find of a lifetime. However, as a result of overhauls that converted early rifles to later "gas port" design, and an Army order in 1947 that any remaining rifles with the old-style "front end" be destroyed, only about two dozen true "gas trap" M1 Garands are in private collections.

GEARING UP FOR WAR

Because of the high priority given to production of the M1 rifle, in January 1939 Winchester Repeating Arms was given an "Educational Order" to produce 500 M1 rifles using mass-production methods. Fiscal Year 1940 estimates for M1 production suggested that Springfield Armory would be able to produce 101,000 rifles by December 31, 1941. This was a shortfall of 55,000 from the target number of 156,000. As war raged in Europe and China, the US "Protective Mobilization Plan" called for a total of 240,000 M1 rifles. In July 1939, proposals were sought from the firearms industry for the production of between 25,000 and 65,000 M1 rifles for delivery by July 1, 1942. Winchester and Remington responded, with Winchester receiving a contract for 65,000 rifles on September 20, 1939, based on Winchester's low bid and the experience that company gained from the "Educational Order." None of the Winchester M1s were of the "gas trap" type, as that system had been phased out of production by the time the Winchester rifles were delivered.

As with many new weapons, problems were encountered during early production of the Garand and corrected. Yet there were some articles in the press – including the influential *American Rifleman* magazine, the publication of the National Rifle Association (NRA) – raising questions about the effectiveness of the Garand.

Adding to questions about the Garand design was the existence of another design, which according to its supporters was better than the Garand. Captain Melvin M. Johnson, US Marine Corps Reserve, had begun work on a recoil-operated self-loading rifle in 1936. He progressed rapidly enough with his design that he delivered an example for demonstration to the Army at Fort Benning, GA, in June 1938. Between August and October 1938, the design was tested at Aberdeen Proving Grounds and the Ordnance Department.

Based on these tests, the Johnson rifle was redesigned and an improved model was tested by the Ordnance Department in December 1939. Although the Department acknowledged positive features in the Johnson design, they also felt that it did not lend itself well to attachment of a bayonet, showed weakness in the magazine body, and had a receiver that was too long. It was also not a production gun, so they could not determine what problems would arise in manufacturing it.

On the positive side, the Johnson held ten rounds, which could be easily topped off if the magazine were partially emptied, it had a quick-detach barrel, and it was quite accurate. In addition, Johnson had designed the rifle so that many parts could be subcontracted to small workshops. However, the Ordnance Department concluded that the design was not better than the Garand.

Some supporters of the Johnson design were not satisfied that it had had a fair trial. Citing early problems with the Garand and the fact that it had been necessary to re-work the gas system, they argued that the Johnson should be considered as a replacement. Resulting complaints to Congress appeared as if they might even affect funding for production of the M1 rifle.

To demonstrate the falsity of these criticisms, a demonstration of the Garand and Johnson rifles was scheduled at Fort Belvoir, VA, near Washington, DC, for May 9, 1940. Influential Senators and Representatives attended, as well as Army officers and members of the press. Both rifles performed well, but since the Garand was already in production and was proving satisfactory to troops using it, no reason was seen to discontinue production and issue of the Garand.

THE MARINES CONSIDER THE GARAND

Although the US Army now seemed to be well on its way to being completely equipped with a semi-automatic rifle, the US Marine Corps (USMC) was still testing semi-auto designs at the Marine Base at San Diego, CA. A Winchester rifle using a gas short-stroke piston system had been tested at Aberdeen Proving Ground in October 1940, but due to the Garand acquisition program being well under way, little was done about it, though most comments on it were positive. The Winchester weapon was, however, involved in the Marine Corps trials. It should be noted that the Marines were not completely committed to replacing the M1903 Springfield. A substantial number of Marine officers felt that if a semi-auto design were to be adopted, the Johnson should be given serious

A US Marine rifleman fires his Garand at Camp Pendleton, CA, 1959. The Marine Corps would not adopt the M1 until late 1941. The Marines frequently kept their bayonets fixed in combat, hence they would fire their weapons with bayonets affixed in training to see how this affected barrel harmonics, which in turn affected point of impact. (NARA)

consideration. No doubt the fact that the Johnson had been designed by a Marine Reserve officer had some impact on this view.

Beginning on November 12, 1940, a test of accuracy was held at ranges up to 1,000yd, in which the M1903 Springfield, the M1 Garand, the Johnson, and the Winchester rifles were fired. The conclusion was that the M1903 was most desirable for service based on an array of criteria. Among the semi-auto designs, the Garand was rated the best. One notable disadvantage of the Johnson rifle was that it had 140 parts, almost twice the 71 of the M1 Garand. The Springfield had a weight advantage in that it weighed just over 8lb 10oz, while all of the semi-auto designs were between 9lb and 10lb.

An array of other tests took place, beginning on November 18 and continuing for four weeks. Thirty-seven separate tests involving 12,000 rounds fired were carried out with each of the rifles. Accuracy tests were repeated at intervals after the rifles had completed various other field and "abuse" tests. The M1903 definitely performed better than the semi-automatic designs when chambers or ammunition were dirty, or corroded ammunition was used. One interesting test of rate of fire was against "flying aircraft."

Exposure to adverse elements such as dust, mud, fresh water (the rifle then being left to sit), salt water (then dragged through the sand) and others were designed to simulate conditions a US Marine rifleman might face in

An M1 clip partially inserted into the magazine of the M1 rifle. During World War II experienced soldiers, who were mostly right-handed, learned that the top round should be on the right as the bullets faced forward, so that the clip would be easier to insert into the rifle. (Author)

A side view of a partially inserted M1 clip. (Author)

combat. Generally, the M1903 outperformed the semi-automatics in all of these tests. Various degrees of cleaning and/or lubrication were necessary to keep the semi-automatic rifles functioning in some of these conditions.

Endurance of the rifles was measured by the number of malfunctions and the number of broken, repaired or replaced ("B, R, or R") parts per weapon during the 12,000-round endurance tests. Results were as follows: M1903, 53 malfunctions and 3 B, R, or R parts; M1 Garand, 370 malfunctions and 12.25 B, R, or R parts; Johnson, 773.5 malfunctions and 36 B, R, or R parts, and Winchester, 892 malfunctions and 36 B, R, or R parts.

After this extensive evaluation, the Marine Test Board concluded that the semi-automatic rifles gave a greater volume of fire and more hits in a given length of time and caused less fatigue to the shooter. On the other hand, the M1903 Springfield was more dependable under adverse conditions. It was concluded that the M1 was the most satisfactory semi-automatic rifle then available. The reputation of the Marines as riflemen meant that this positive evaluation of the M1 helped dampen public criticism of the Garand, even though the Marine Corps did not adopt the rifle at the time.

REFINING PRODUCTION TECHNIQUES

As wartime production of the M1 rifle increased, Springfield Armory strove to improve its production techniques. One major change was from the use of forgings to stampings for parts such as the trigger guard. Another change that took place in 1940 was the use of broaching (removing material with a toothed tool) instead of milling (removing material with a rotating cutter) on many parts. Scott Duff in *The M1 Garand: World War II* offers the example of eight operators on eight broaching machines being able to produce as many M1 receivers in an eight-hour shift as 23 operators on 63 milling machines. A further innovation that increased production in 1940 was the change from hand-finishing small parts to remove burrs to the use of tumbling machines, which removed burrs by tumbling the parts along with some type of polishing "media." Improved metallurgy and heat-treating allowed production of improved rifles as well. The heat treatment was especially important when the M7 grenade launcher (see page 36) was adopted for the Garand rifle in March 1943, to prevent receivers from cracking under the additional stress of the bolt coming back from a grenade-launching cartridge. Throughout M1 production, whenever possible, improved production methods were applied.

As reports came back from the battlefield, Springfield Armory wanted to be prepared to make corrections to any problems the M1 rifle suffered in combat. To speed any necessary changes, late in 1941, the Armory's Engineering Department was restructured so that any research on improvements to the M1 rifle would fall under the Experimental Division. Among projects tackled by this division was development of a method for mounting a telescopic sight on the M1 rifle.

ABOVE LEFT
In 1942, a factory worker checks an M1 rifle barrel for straightness. (NARA)

ABOVE
Factory test-firing Garands, 1942. Test-firing was carried out before final approval of M1 rifles to ensure acceptable accuracy and reliable functioning. (NARA)

A look at the records of Springfield Armory as reported in William Brophy's *Arsenal of Freedom* gives an interesting snapshot of production of the M1 rifle in 1943. The cost to produce M1s during 1943 was $26.60 each. With increased efficiency of production that cost dropped to $23.27 during 1944. As M1 rifles were already seeing combat, during 1943, the Armory also received 25,070 M1s for overhaul or alterations at an average cost of $5 each.

Springfield Armory reached its peak production in January 1944, when it was producing an average of 4,600 M1 rifles per day. For the entire year of 1944, Springfield Armory produced 1,155,792 M1 rifles. Total Springfield Armory production between 1934 and 1946 was 3,526,922. Winchester also reached its peak output in 1944, with 178,810 rifles coming off the assembly line. Total Winchester production between 1941 and 1945 was 513,880.

"CLEAN AND REPAIR"

Wartime production of the M1 rifle ceased at Winchester Repeating Arms in June 1945, and at Springfield Armory in September 1945. As GIs turned in their much-used M1 rifles when they mustered out, the rifles were returned to Springfield Armory for rebuild as part of the "Clean and Repair" program. More than 500,000 M1 rifles were rebuilt under this program before the start of the Korean War. Because so many of the M1s coming in for "Clean and Repair" had corroded barrels, during 1946–47 Springfield Armory produced 331,854 new barrels. With more than enough Garands to arm the "peacetime" Army, Springfield Armory sealed M1 rifles in batches of ten into containers for storage in case of future need.

M1 Garand accessories: slings, bayonets, scabbards, and belts

Because the Garand was heavy, a good sling was important to the infantryman who carried the rifle. Many World War II Garands were fitted with the M1907 leather sling originally used on the M1903 Springfield rifle – those used on early M1s were left over World War I production for the M1903 and employed brass hardware, while M1907 slings produced during World War II had steel hardware. A later sling designated the M1 (as a model designation, rather than denoting its use only on the M1 rifle) was for use on the M1, M1903, and M1917 rifles, and was manufactured from canvas with stamped-steel hardware. M1 slings continued in production after World War II.

When the M1 Garand was first adopted, the M1905 bayonet with 16in blade (as used on the M1903 Springfield rifle) was used in its pre-World War II form with wood grips, but during the war it was modified with plastic grips and a plastic M3 scabbard to replace the original canvas M1910 scabbard. Beginning in April 1943, the M1 bayonet was manufactured for the Garand. This bayonet was similar to the M1905 but with a shorter 10in blade – the reduced blade was viewed as handier and also a way to save steel. Many M1905 bayonets were shortened and modified to M1 bayonet specs. Shortened versions of the M3 sheath designated "M7" were used with the shorter M1 bayonet. After World War II, the M5 (M5A1) bayonet was adopted for use on the Garand. It had a 6.75in blade and was carried in the M8 composite sheath.

ABOVE A Garand cartridge belt of the type designed to hold two M1903 stripper clips or one M1 Garand clip in each pocket. (Author)

Among other accessories was the leather scabbard originally intended to carry the M1 rifle affixed to a cavalryman's saddle, but used more during World War II on jeeps or motorcycles. To carry Garand clips, troops had the M1923 dismounted belt constructed of khaki or olive-drab canvas and with ten pockets, each of which would carry one eight-round M1 clip. The same belt was used with the M1903A3 rifle and would carry two Springfield five-round chargers. For the Navy, a version of this belt was produced in blue.

The storage procedure was quite efficient. Known as "canning," the method entailed placing rebuilt and combat-ready M1 rifles in hermetically sealed drums. Rifles so stored would be preserved ready for immediate use for up to 50 years. In addition, the drums were watertight and buoyant. Atmosphere within the drums was controlled by the inclusion of several pounds of desiccant, thus keeping humidity low and preventing rusting, mildew, or fungus. Prior to canning, wood stocks and hand guards were placed in a kiln to remove excess moisture and web slings were dehydrated. Before placement in the drum, rifles were immersed in a solvent to remove any grease remaining and then immersed in a tank of rust-preventative compound that deposited a film only .0005in thick. As this compound was designed not to turn "gummy," rifles could be removed from the drum and immediately fired. Once prepared, the rifles were placed in a rack designed to fit inside the drum, with padding between each rifle and rack, and they were lowered into the drum. Slings and desiccant were then added, and the top cover of the drum was welded in place. After being leak-tested in a water tank, the rifles were ready for long-term storage.

Various types of can openers were developed to allow the storage drums to be quickly opened if the M1 rifles were needed, including both

hand-cranked and motorized versions. Drums could also be opened with an acetylene cutting torch or even a hammer and chisel if the openers were not available. Canning of M1 rifles began at Springfield Armory in November 1946. During Fiscal Year 1948, 220,310 M1 rifles were canned for storage. Other weapons also undergoing the same storage process were M1911 .45 pistols, M3 "Grease Gun" submachine guns, M1 and M2 Carbines, M1918A2 BARs, M2 Browning .50 machine guns, and M2 HB Browning .50 machine guns.

POSTWAR PRODUCTION

Of course, the need for weapons came sooner than expected with the start of the Korean War. Despite taking M1 rifles out of storage, it was deemed necessary to restart production at Springfield Armory in January 1952. Additional contracts to produce M1 rifles had been awarded to International Harvester Corporation in June 1951, and to Harrington & Richardson Arms in April 1952. Remington Arms was also scheduled to begin production of the M1 rifle, but soaring costs caused cancellation of the contract. Reportedly, the quality of the M1 Garands produced by International Harvester was not as good as for those produced by Springfield Armory and Harrington & Richardson during this period.

Between 1952 and 1956, Springfield Armory produced 661,747 M1 rifles; International Harvester made 337,623; and Harrington & Richardson manufactured 428,600. The total from all three manufacturers was 1,427,970, which with World War II production meant that a total of 5,468,772 M1 Garands had been produced.

Winter triggers

Reflecting the combat conditions in Korea, Springfield Armory had received a rush order for winter triggers for the M1 Garand and BAR on December 10, 1952. Delivery of 20,000 winter triggers for each weapon was called for by January 1953. Designated "Trigger Group, Auxiliary, Winter-D7266326 Rifle, US Cal .30, M1, M1C, & M1D," this device employed a crossbar that operated the trigger when a lever protruding behind the trigger guard was depressed by the gloved fingers. The system did not provide precise trigger let-off, but did keep the soldier or Marine from getting frostbite. As this trigger system could inadvertently operate the trigger when the hand grasped the stock, for safety it was better to install it only for use in extreme cold and not leave it affixed permanently. It was also important that the safety was applied with particular care.

The winter trigger was cleverly designed to fit either the milled trigger guard, which had a hole at the rear for a rod to pull down the guard when disassembling the rifle, or the stamped type that lacked the hole. For trigger guards with a hole, the winter trigger was installed using a pin through the hole, while for those without, a spring clip was slid over the trigger guard and the trigger guard snapped back in place.

LEFT The winter trigger developed for use on the M1 rifle during the Korean War. (Author)

EXPERIMENTAL MODELS AND SNIPER VARIANTS

During World War II and in the decades after, Springfield Armory experimented with improved versions of the Garand. Many experimental models were built as part of the "E" series. These included the M1E5 carbine version of the Garand rifle, which was intended for use in jungle warfare and by airborne troops. Although an Ordnance Unit in the Philippines built some shortened Garands and reportedly sent two to the Ordnance Department, only a prototype carbine was built at Springfield Armory. In testing, muzzle blast from its 18in barrel was quite excessive. All of the "E" models were semi-autos and used the eight-round Garand clip. Other models that fell in the "T" series addressed the calls for a larger magazine and the capacity to switch to full-auto when necessary. The T20, T20E1, and T20E2, therefore, used BAR 20-round magazines and had select-fire capability. Procurement of 100,000 T20E2 rifles was actually approved in 1945, but once Japan surrendered after the dropping of the atomic bomb, they were no longer needed.

During World War II, there was an attempt to create an M1 sniper rifle. Because the M1 was loaded from the top, and ejected spent clips from the top, traditional mounting of the telescopic sight above the

1. The M1D sniper version of the Garand; the example shown was used by US Special Forces in Vietnam and illustrates the late prong-type flash-suppressor and later cheek pad. (Author)

2. A close-up of the M84 telescopic sight most commonly used on the M1D rifle. (Author)

3. A view of the lace-on cheek pad for use on the M1D rifle. (Author)

4. The cone flash-suppressor used on both the M1C and M1D rifles. (Author)

5. A close-up of the prong flash-suppressor on the M1D rifle. (Author)

Aiming through the scope of an M1C or M1D sniper rifle with cone flash-hider; the red dirt in the flash-hider is not good. (NARA)

receiver was not feasible; hence, experiments to find workable ways of mounting a Weaver 330 or Lyman Alaskan scope were carried out. On July 27, 1944, the M1C version of the M1 was adopted as standard. This rifle used military versions of the Alaskan telescope designated the M81 (with crosshair reticle) or M82 (with tapered post reticle, which Frankford Arsenal studies had determined was the preferable type). These scopes used a mount designed by Griffin & Howe that positioned the scope on the left of the receiver. Theoretically, these mounts allowed the scope to be removed and re-mounted without losing its zero, but any sniper would want to shoot the rifle to check the zero.

In addition to the telescopic sight, these rifles were equipped with the M2 cone-shaped flash-suppressor, which attached in much the same way as the M7 grenade launcher, and a T4 leather cheek pad, which helped position the shooter's eye for the offset scope. The M2 flash-suppressor reportedly reduced muzzle flash by up to 90 percent, but due to looseness inherent in the mounting system accuracy was often degraded. The cheek

The M7 grenade launcher

Prior to early 1943, M1903 rifles were used to launch rifle grenades, but a rifle-grenade launcher for the M1 rifle was standardized on February 11, 1943, as the M7. This launcher attached to the M1's bayonet lug via a hinged clamp. Along with the launcher, a special gas-cylinder lock screw was necessary – this allowed excess gas to be bled off on firing. However, when the M7 with lock screw was installed, the Garand would not function as a semi-automatic. As a result, many M7 launchers were lost in combat as troops, after firing a grenade or grenades, would detach them and toss them to the side so they could use their rifle effectively in its regular mode. In July 1945, the M7A1 was adopted, which allowed the M1 rifle to fire ball ammunition with the launcher attached. Improved versions were produced after the war as the M7A2 and M7A3.

A special blank cartridge, the "Cartridge, Rifle Grenade, Caliber .30 M3," was used with the M1 to launch grenades. The M7 auxiliary cartridge was also developed for when increased range was needed for the grenade, although it increased recoil noticeably. It took about a year, until February 1944, for M7 grenade launchers to reach the frontlines in quantity, but by August 1944, 795,699 had been manufactured. In March 1944, the M15 grenade-launching sight was adopted for use with the M7 grenade launcher.

LEFT An infantryman launches a rifle grenade from his M1 during fighting in France on July 18, 1944. (NARA)

pad contained three removable felt inserts, which allowed the shooter to adjust the thickness to suit him.

By the end of World War II, 7,971 M1C sniping rifles had been produced. The M1C saw little if any use during World War II, but it was used along with the Springfield M1903A4 sniper rifle during the Korean War. Another version of the M1 designed for sniping, the M1D, was adopted as substitute standard in September 1944 – although reportedly none were produced during World War II, a substantial number were manufactured during the 1950s and 1960s. The only real difference between the M1C and the M1D was that the scope mount used on the M1C required drilling and tapping the hardened receiver, while the M1D's mount used a base that fitted around the chamber of the barrel. Normally, barrels with the base attached were supplied for conversion to M1D configuration.

Generally, existing M1 rifles were fitted with special barrels which would take a scope mount, designed by John Garand for the M84 telescope – although some had the Weaver K4 scope. The M84 2.2× sight was manufactured primarily by the Libby-Owens-Ford Corporation and Leupold & Stevens early in 1945. It was originally for the M1903 sniping rifle, but was adapted for the M1D. The first major order for conversion of M1s to M1D configuration was a December 1951 requisition for 14,325 M1s to be converted. Springfield produced enough of the special M1D barrels during 1951–53 to meet existing and much future demand

for conversions. M1D rifles also had the M2 cone flash-suppressor and the leather cheek pad.

M1D sniper rifles saw little service in Korea, but a substantial number were used in Vietnam, especially with the US Special Forces and the Vietnamese troops they advised. Later versions encountered in Vietnam often had the T37 pronged flash-suppressor, which allowed more accurate shooting than the cone-shaped model. A variation of the M1C, generally designated the M1C 1952, was adopted for use by the Marine Corps. Rebuilt between 1952 and 1962, these M1Cs used a 4× Stith-Kollmorgen telescopic sight.

By the late 1950s, development of the Garand had ceased as the US Army moved toward a battle rifle designed for the NATO mission in Europe, and a few years later the war in Vietnam. As production of the M1 ceased, Springfield Armory was also developing a rifle to replace the M1. Yet manufacture of parts for the Garand continued for some time. The last Garand barrel made at Springfield Armory, for example, was dated "3-67."

A US Army sniper uses his M1C rifle in December 1951; note that there is no flash-hider and the bayonet is attached. (NARA)

MOVING TO 7.62MM NATO

Once the US Army adopted the M14 rifle (see page 70) in 7.62mm NATO caliber, the US Navy, which had a large number of M1s in .30-06 chambering, sought a method of converting its Garands for the new service round. This was initially accomplished through use of a bushing in the chamber and enlargement of the gas port to allow more gas from the weaker 7.62×51mm round to power the action. These rifles were designated "US Rifle, Navy, Mk 2, Mod 0." These conversions were not deemed optimal, however, and the Navy established a contract with Springfield Armory to produce 30,000 barrels chambered for the 7.62mm cartridge. These barrels were delivered in 1965 and 1966 and those M1 rifles re-barreled with them were designated Mk 2, Mod 1. Reportedly, at least some of these converted rifles remained in US Navy armories up the time of the First Gulf War in 1990–91.

The National Match rifle

Another marksman's version of the M1 rifle was designed for the US National Matches held at Camp Perry, OH, in which military and civilian competitors shot in a series of competitions using service rifles and pistols, and was known as the National Match Rifle. The Ordnance Department ordered Springfield Armory to build the first 800 National Match rifles in March 1953. The order continued the practice of producing rifles specifically for the National Matches at Camp Perry, which had begun before World War II with special M1903 Springfield National Match rifles. Since the rifles for use in the matches had to be "as issued" to the services, only limited modification could take place – on the original production National Match rifles, this just consisted of some "tuning" by Armory gunsmiths. As later batches of National Match Rifles were produced, however, they received National Match gas cylinders with an oversized rear ring to avoid contact with the barrel, special sights, other special "NM" marked parts, and a glass-bedded barrel. Many of these rifles were legally sold by the government to competitors and are highly sought today by Garand collectors.

In his *Book of the Garand*, Major General Julian Hatcher quotes from an *American Rifleman* article in which John Garand was interviewed about the Garand as a match rifle. Garand notes two key elements to making an accurate M1. First, he states that, "nothing should touch the barrel at all except objects that are attached immovably to it, such as the gas cylinder and the lower band." His second point is that, "the wood and metal pieces that are positioned along the barrel should have sufficiently generous clearances to prevent any chance of binding as the barrel heats up from firing." Experienced armorers preparing an M1 match rifle were aware of these two points, but also learned many other "tricks" to getting an accurate Garand. Marine Corps armorers, for example, found that a rifle with the operating rod closer to the left side of the stock would likely be more accurate, so they chose match rifles in which the operating rod lay to the left of center. Experienced armorers also learned how to work on the Garand's two-stage trigger pull to get the final stage down to about 4lb 8oz without causing ignition problems.

Between 1953 and 1963, over 40,000 National March M1 Garands were built; however, this number may be misleading as some were overhauls/rebuilds of previously built rifles.

ABOVE A Garand Type II National Match Rifle. (National Firearms Museum, NRAmuseum.com)

FAR LEFT A view of the special National Match front sight for Garand rifles. (Author)

LEFT A view of the rear National Match sight for Garand rifles. (Author)

USE

The M1 rifle on the battlefield

EARLY REPORTS

An article in the September/October 1938 issue of *Infantry Journal* offered an early report on the reactions of troops who had used the M1 rifle. Much of the article describes the experiences of troops of "the Regular Class of the Infantry School." Soldiers firing the weapon reportedly could fire more accurately and more rapidly with less fatigue than with the M1903 Springfield. It was also noted that the M1 is "staunch mechanically and that malfunctions can be expected to be few." Based on the tests performed by recruits "the M1 rifle will realize a firepower two and a half times greater than the Springfield." Further tests at Fort Benning indicated that the average soldier was capable of attaining "a sustained cadence fire" of 30 shots a minute with the M1 rifle. (Sustained cadence fire is a rate at which the infantryman can consistently fire the rifle for a sustained time period.)

The M1 Garand's aperture rear sight and the large foresight blade were well received by troops converting from the M1903 Springfield. (Author/National Firearms Museum, NRAmuseum.com)

Especially lauded in the article were the M1's sights, which increased accuracy and reduced training time compared to the M1903. "The big, broad front sight never blurs, the rear peep is close to the eye, and the elevation drum on the rear sight can be zeroed and set in such a manner that if the soldier wishes to fire at a range of 300 yards he sets 300 yards on his sight." Proper lubrication was emphasized, which if carried out should preclude malfunctions until around 400 rounds had been fired. As with many new rifles, the *Infantry Journal* concluded that parts needed to wear in with shooting, and if the rifles were properly lubricated the action would get smoother with use and malfunctions would decrease. The article concluded: "Thus, on all counts, the M1 rifle appears to be a great advance on the basic shoulder weapon of the infantry soldier."

To get an idea of who used the M1 rifle during World War II, Shelby L. Stanton's definitive *Order of Battle: US Army World War II* offers Tables of Organization and Equipment (TO&E) information on issue of the M1 rifle. After July 15, 1943, the 13,688-man infantry division TO&E called for 6,761 M1 rifles, with each infantry regiment having 1,990 Garands, while 562 were allotted to the engineer battalion. The remainder went to other units. In an 8,203-man airborne division (TO&E October 15, 1942) more M1 Carbines were issued than M1 rifles, but the TO&E still called for 3,046 Garands. For a 13,464-man US mountain division (TO&E November 4, 1944) the TO&E called for substantial numbers of both M1 Carbines (5,556) and M1 rifles (6,790); as with a standard infantry division, the M1 rifles were assigned primarily to the three infantry regiments and the engineer battalion. In a 10,610-man armored division (TO&E September 15, 1943) most of the 2,063 M1 rifles were assigned to the three armored infantry battalions and the armored engineer battalion. By comparison, an armored division had 5,228 M1 Carbines on the TO&E. An 11,661-man cavalry division was assigned 4,745 M1s, mostly to the two cavalry brigades and the engineer squadron. Once the M1 Carbine became available, the general philosophy behind infantry small-arms issue was that frontline units would receive the M1 rifle while support units would receive the M1 Carbine.

THE M1 IN TRAINING AND COMBAT

When Army troops started receiving the Garand in large numbers, many older soldiers who had served their entire career with the M1903 Springfield were skeptical about the reliability, accuracy, and maintainability of the M1. In combat, however, most men were won over. Once they learned how easy the Garand was to disassemble for cleaning, many of their worries about it were dispelled. One problem found with the Garand during training was that it did not function well with blanks, hence in some units firecrackers were used to simulate fire. Also, a shortage of dummy rounds made learning the loading drill in barracks difficult. Instead, before live-fire exercises on the range, troops would practice loading clips with the muzzle pointing down range. When loading the Garand, the proper technique had to be learned. If the thumb were left in the way of the bolt coming forward when the clip

was pressed home, it could be pinched quite painfully between the bolt and the chamber or receiver, resulting in "Garand Thumb." Generally, once a soldier was trained properly in loading the clip, this was not an issue.

The standard method of loading a clip into the M1 rifle, taught during World War II, first instructed the soldier to apply the safety, lock the operating rod to the rear, then place the right hand against the operating-rod handle while inserting the clip and pressing downward with the right hand, then move the hand aside to let the operating rod run forward and chamber a round. This operation could be performed very quickly, but took practice so that the operating rod was not released before the thumb was clear. Experience in the field taught many troops to hit the operating-rod handle with the palm of their hand to make sure that the bolt had gone all the way into battery (i.e. the bolt was firmly seated on the breech), especially if the gun was dirty.

At left is the early M3 combination tool for the M1 rifle. The M3 began production in 1939 and was superseded by the M3A1 version (right), which entered production in 1943 and included a chamber brush. (Author)

When training in actual shooting, troops found that the rear-sight aperture was too large for precise shot placement, but it was explained that, though a disadvantage on bullseyes, the sighting configuration would be a plus in combat for rapidly engaging the enemy. Troops also liked the fact that the Garand had much less recoil than the Springfield, and that they could operate the Garand much more easily during rapid-fire practice. On the parade-ground, it was also found that troops should not pound the butt of the M1 rifle into the ground when coming to Order Arms, as this was detrimental to the action.

In training and later combat in the sandy environments of North Africa, experience showed that the Garand had to be lubricated very sparingly to avoid stoppages. When possible, too, it was advisable to

An officer of the 45th Division demonstrates correct use of the sling for the M1 rifle during training in 1941. (NARA)

A soldier demonstrates use of the M1 rifle from behind the cover of a halftrack at Fort Knox, KY, during 1942. (NARA)

disassemble and clean rifles twice a day in such conditions. Although rifle covers were later available to protect the rifles from sand, salt water, etc., troops did not normally use them when they foresaw the need to be ready to engage an enemy immediately. A more common measure was the use of a condom stretched over the muzzle to protect the bore. If necessary, a bullet could be fired through the condom, so the rifle remained ready for action. For the D-Day landings, it seems most troops did use covers for their Garands until reaching the actual beaches.

Because US troops were in combat against the Japanese shortly after the attack on Pearl Harbor in December 1941, the M1 first saw combat in the Pacific, while its first combat use in the Mediterranean theater was during Operation *Torch* in November 1942. From then until the end of World War II, the Garand was in combat almost constantly somewhere in the world.

Few officers had a better chance to evaluate the combat performance of the Garand than Major General Julian S. Hatcher, who had been involved in the M1's development (including of its ammunition), maintenance, and deployment. As Commanding General of the Ordnance Training Center 1941–42, Chief of the Ordnance Training Service from 1942 to 1943, and Chief of Field Service 1943–45, Hatcher had every opportunity to evaluate the M1's performance during World War II. In *The Book of the Garand*, Hatcher notes that very early in the conflict the Ordnance Department was already receiving positive reports about the

Garand's performance in the defense of the Philippines. Among those who praised it was former Chief of Staff General Douglas MacArthur, whose opinion was highly valued.

The Garand also proved itself on Guadalcanal between August 1942 and February 1943, where Army troops who followed the Marines ashore were armed with Garands. The Marines, still armed with M1903 Springfields, quickly realized that the Garand's additional three rounds, fast reload, rapid fire, and durability all made it an excellent jungle weapon. Among the first Marines to use Garands on Guadalcanal were scouts, who carried it instead of the heavier BAR.

Despite their M1 rifles getting doused in salt water and covered in sand during assault landings, the Marines found them highly reliable. Further ashore, volcanic ash and mud, as well as pouring rain that removed lubrication, sometimes threatened to stop the Garand, but the Marines found that if treated with reasonable care when not in actual combat, the Garand kept working.

Although highly reliable, the Garand did need regular maintenance, such as disassembly and a good oiling after heavy rain. For most infantrymen, such care for their constant companion – their rifle – is second nature. In freezing conditions, as occurred during the Battle of the Bulge in 1944–45, it was found that care had to be taken to prevent snow or freezing rain getting into the operating-handle slot and freezing up the action. The most common preventative measure was wrapping a bandage or something else around the slot to keep out the snow or rain, as well as disassembling, cleaning, and oiling the rifle whenever possible.

Aiming the M1 rifle from cover at Fort Knox, 1942. The soldier rests the rifle on his palm on the sill, rather than directly on the sill itself. Resting directly on a hard surface could adversely affect accuracy, and, more to the point (since this photograph has been taken during training), it could scuff his stock on firing, possibly resulting in a "discussion" with his sergeant. (NARA)

This training photograph demonstrates the correct kneeling firing position with the M1 Garand. It is not clear from the photo whether the shooter has wrapped the sling around his arm to help "lock in" or not. (NARA)

One US Army officer noted that German troops interviewed after capture, or after the war, found that the firepower that US infantrymen could deliver with the M1 rifle was overwhelming. They even described a general belief among German infantrymen that each US soldier was armed with a machine gun. Another advantage of the Garand noted by some US soldiers was that it could be brought quickly into action and fired multiple times, sometimes from the hip, when suddenly encountering an enemy at close range.

Despite the claim of skeptics that the semi-auto action of the Garand would cause troops to fire wildly and expend ammunition, Hatcher's research did not seem to bear this out. One officer he quotes, however, did mention that an effort had to be made to stop men firing wildly at aircraft passing overhead – even friendly ones! Otherwise, US troops conserved ammunition and only fired rapidly when facing an attack.

THE .30-06 CARTRIDGE EVOLVES

The .30-06 cartridge used in the M1 rifle itself evolved during its years of service. Initially, the Garand was designed to use the .30 M1 ball cartridge with a 172-grain boat-tail bullet having a muzzle velocity of 2,640fps. Although some sources state that the M1 ball round caused reliability problems in the M1 rifle, resulting in the replacement of the M1 ball by the M2 ball, Major General Hatcher states that this was not the case. In fact, John Garand had designed the rifle to function with this cartridge, and feared a switch would affect reliability. According to Hatcher, the range of the M1 ball round – up to 5,000yd – was considered excessive for training. As a result, the .30 M2 ball cartridge was adopted; it contained a 150-grain flat-based bullet traveling at a muzzle velocity of 2,700fps and had an extreme range of 3,500yd. For combat purposes, this range differential was

not considered critical and, in fact, Infantry Board tests found that the M2 round was better for arcing fire on reverse slopes at ranges up to 2,000yd. In 1940, the muzzle velocity of the M2 round was raised to 2,800fps, so that it matched the ballistics of the 168-grain armor-piercing round.

Among other rounds used in the M1 rifle were: M1909 blank; M1906 guard round (with a plain tip used for garrison guard duty); gallery practice round (loaded with a lead ball); dummy training round; tracer (with a red tip in early use and an orange tip in late use); armor-piercing (black tip); incendiary (light blue tip); armor-piercing/incendiary (aluminum tip), and rifle grenade launching (with a crimped tip). During World War II, the armor-piercing round became the standard instead of the M2 ball round, as it offered better penetration against vehicles or cover. Military-contract .30-06 cartridge-case heads were stamped with the manufacturer's code and the year of manufacture. For example, "WRA 44" would indicate that Winchester Repeating Arms produced the cartridge during 1944.

FROM TRAINING TO COMBAT

In Mark Goodwin's outstanding *US Infantry Weapons in Combat*, Darrell "Shorty" Powers, who served in the 506th Parachute Infantry Regiment, 101st Airborne Division, offers insights into World War II infantry training with the M1 rifle. He notes that recruits were shown how to shoot using the six o'clock hold (sights on the bottom of the bullseye) rather than the center hold. They were instructed to lay the right thumb along the stock rather than around it, a technique still taught to snipers by many instructors today. Powers also notes that they were taught to fire from the standing, prone, and kneeling positions, and learnt how to use the sling to

A 1943 photo of an infantryman with his Garand; note the bayonet tucked into his pack and the cartridge belt around his waist. (NARA)

gain a steadier hold. Later in England prior to D-Day, Powers trained in shooting at pop-up targets and known-distance targets, and noted that both forms of instruction proved valuable when he went into combat.

It is also interesting to note Powers' comments on jumping with his rifle on D-Day: "I jumped with my rifle loaded and the safety on. I carried it down under the harness that goes across your chest. When you jumped you wrapped your arms around it." According to Powers, he only jumped with the ten clips (80 rounds) he carried in his belt, plus the clip in his rifle and one more clip in a pocket on his shoulder.

Training on the M1 rifle was thorough enough that troops felt confident in their ability to disassemble and reassemble the rifle even in less than optimal conditions. In *US Infantry Weapons in Combat*, Clinton Riddle, a glider infantryman in the 82nd Airborne Division during World War II, relates an experience in which he replaced the bolt on his M1 while advancing on the enemy during combat – he placed the small parts in his pocket and put the bolt together while moving forward. In the same book, Bill Trexler who served in Europe with the 9th Infantry Division, offers an example of why the good-sized cocking handle on the Garand was an advantage in combat. He writes:

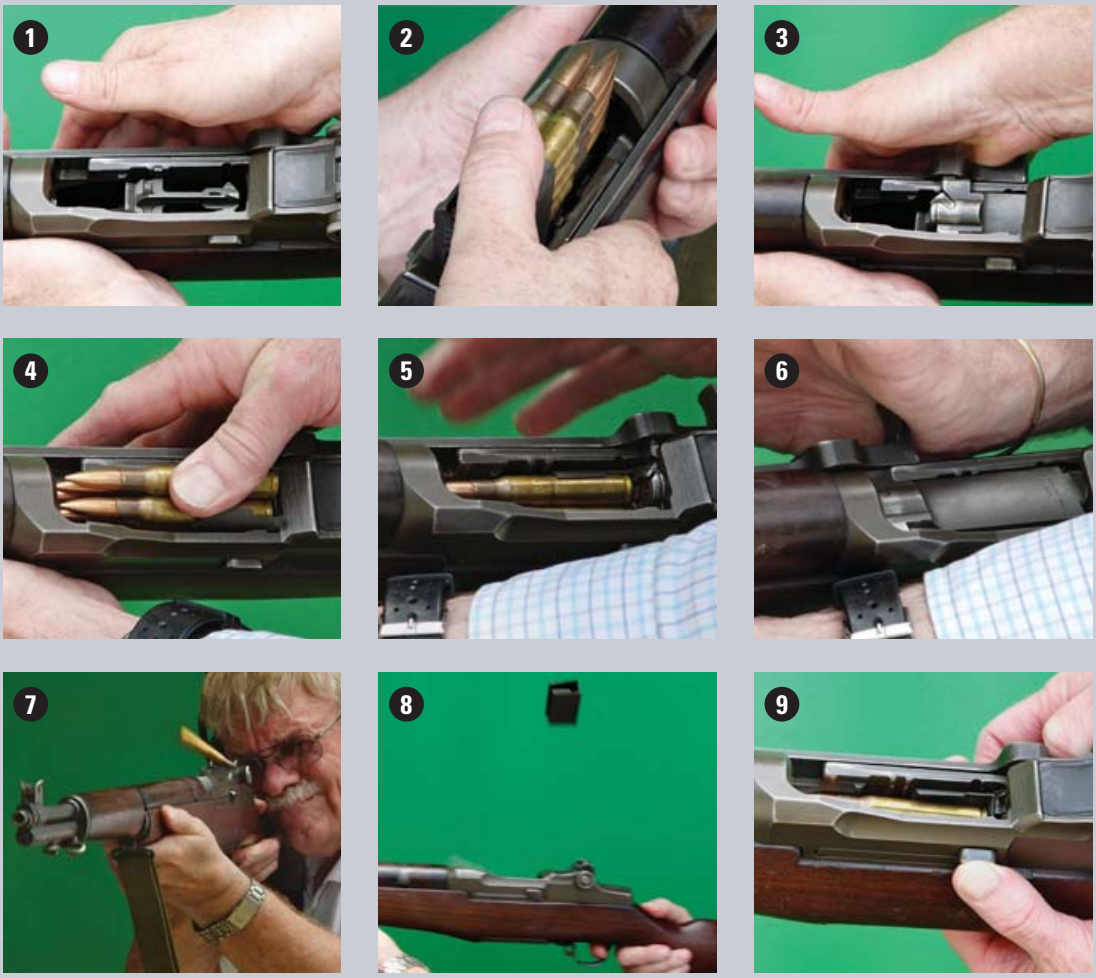
> I remember one day in Normandy, our sergeant crept on a hedgerow and stuck his head up. He saw three Germans walking down a trail with a machinegun; they were going to set it up on the corner of the hedgerow. He went to fire at them with his rifle and it went "click" and there he was standing there staring at the three Germans. He had to use his foot on the op rod to cock his M1 again. He finally got it cocked and bang, bang, bang, the three Germans went down. It was the only time I saw an M1 hang up.

In *The Ranger Force: Darby's Rangers in World War II*, Robert W. Black narrates some interesting incidents relating to Rangers and their M1 rifles. In the first one he gives an example of the M1's accuracy, even though it was not known for pinpoint shooting. On the Dieppe raid of August 19, 1942:

> Ranger Alex Szima had fired all of his armor-piercing ammunition and removed the troublesome paper shields from around the ammunition in his bandoleers in preparation for the withdrawal. On his way to the beach, he had an additional duty of serving as rear guard and number-two man to Commando McDonough on the long-barreled Boys .55 caliber antitank rifle. Szima felt he owed this duty to his accurate shooting back on the rifle range. When Mills-Roberts saw Szima put a tight group of shots into the target the first time he fired his M1 rifle, Mills-Roberts had asked, "Sergeant, are you a member of the American rifle team?" Szima replied, "No sir, I'm just a bartender from Dayton, Ohio."

Later when discussing the landings by the Rangers in North Africa as part of Operation *Torch*, Black offers an example of why the Rangers chose the M1 for reliability:

LOADING AND FIRING THE GARAND



US soldiers and Marines in combat during World War II and after 1945 greatly appreciated the qualities of the Garand rifle. A key advantage over the M1903 Springfield was the Garand's eight-round clip capacity, and the user's ability to fire as soon as a target was acquired without having to operate a bolt action. Once the operating handle was pulled to the rear and locked back in position (**1**), a loaded clip could be inserted and pushed downward with the thumb of the right hand (**2**). As the clip neared complete insertion, soldiers and Marines had to take care that the bolt did not come forward, catching the thumb. The technique of pushing back the operating-rod handle with the edge of the right hand (**3**) also positioned that hand to block the operating-rod handle, thus keeping the bolt from running forward prematurely (**4**).

Once the clip was thrust fully into the receiver, the right hand was pulled clear and the bolt was allowed to come forward, chambering the first round (**5**). When the M1 was loaded and locked and ready for action, many soldiers learned that it was a good idea to give the operating-rod handle an extra push to make sure that the bolt was fully seated. This action compensated for the chamber having become dirty, or for a sluggish bolt movement in freezing weather (**6**).

Generally, troops who had used both the Springfield M1903 and the Garand felt that recoil when fired (**7**) was less noticeable with the Garand, as the semi-automatic operation dissipated some of the backward thrust of the rifle. When the eighth and final round was fired, the empty clip would be ejected from the rifle (**8**) with a distinctive sound. Some veterans felt this noise allowed the enemy to know when their rifle was empty. The inability to replenish a partly fired clip easily was also considered a disadvantage by most users. If it was necessary to unload the M1 rifle, the operating-rod handle could be held back and the release on the left side of the receiver pressed down to eject a full or partially full clip (**9**).

> The Rangers then moved down over the hill to capture Fort Du Nord, the French Foreign Legion fort being used as a convalescent facility. Ranger Ed Dean of Easy Company kicked in a door and charged in with his Thompson submachine gun at the ready, but the drum magazine fell off in the process. Dean remembered the French soldiers standing there, grinning. Later Dean turned in the submachine gun and armed himself with a dependable M1 rifle…

James Gavin, who commanded the 82nd Airborne Division during World War II, made some interesting comments about the M1 rifle and its employment by his paratroopers during the D-Day jump in his book *On to Berlin*. In discussing preparation for the jump, Gavin mentions the amount of ammunition and equipment carried by the paratroopers:

> The exit was probably the moment of greatest danger. To begin with, the troopers were all heavily overloaded. Most of them carried an M-1 rifle loaded and ready to use, 156 rounds of rifle ammunition, a pistol with three clips of ammunition, an entrenching shovel, a knife, a water canteen, a first-aid packet, usually four grenades, reserve rations, some maps, and a raincoat. All this was secured, where necessary, with leather thongs to keep it from flying out from the body during the first few seconds of the jump.

Later in his narrative Gavin discusses the problems jumping with the M1 rifle:

> The rifle was a complicated affair. The Army had developed what the troopers called a "violin case," in which the rifle could be carried broken down into two parts. After Sicily all the survivors wanted to jump with the rifle right on their person and ready to use. We therefore put the rifle underneath the reserve parachute against the trooper's body and moved it into a vertical position to get out of the door. The muzzle was near his face and the butt of the rifle between his knees. Once the parachute opened and the vertical descent began, he maneuvered the rifle into a horizontal position so it did not interfere with the landing. We knew if the trooper survived the exit without difficulty, he was usually in pretty good shape for a landing, with a high probability of survival.

Hand-to-hand combat (opposite)

During the advance into Germany, in the fighting for Aachen in October 1944, a US infantryman clearing a bombed-out building has come upon a German soldier. Because of the suddenness of the encounter and the close quarters, the US soldier buttstrokes the German with his Garand, prior to bayoneting or shooting him once he gains a little distance. In circumstances this close, the US infantryman could have brought the butt up in a rotational manner to strike under the chin or pulled straight back to deliver the blow with the butt to the face.

Hand-to-hand combat training, July 1951. One soldier practices disarming another soldier of his M1 rifle. (NARA)

Not all paratroopers on D-Day jumped with their Garands tucked into their parachute harness. In *If Chaos Reigns*, Flint Whitlock quotes Jack Agnew who was with the HQ Company of the 506th Parachute Infantry Regiment, 101st Airborne Division:

> "We were supposed to store our rifle in a bag," he said, "which we would open after we hit the ground and got out of our 'Mae West' lifejackets. The rifle was in three pieces, which had to be put together and loaded before we could fire back at the enemy. I knew a little bit about shooting and wanted no part of having to go through all of this, so I managed to get hold of an M3 submachine gun."

Whitlock also relates the experience of Sergeant Spencer Wurst of the 505th Parachute Infantry, 82nd Airborne Division, who was armed with an M1903 Springfield for launching rifle grenades. He is obviously one of those men who would have appreciated the M1's grenade launcher, which apparently had not reached his unit prior to the D-Day jump. Commenting on the M1903, Wurst makes some interesting observations:

> "It could only load five rounds of ammunition," he said, "and it took some time to do this… If I ran out of clips I could not replace them as easily as I could for an M-1, simply because there were far fewer '03s around." He added, "The '03 rifle also presented me with the very immediate problem of how to get out of the plane. We jumped with our M-1s field-stripped into three main pieces. We carried the rifle in a well-padded jump case, worn across our fronts, which permitted us to jump without hampering us. But I had to jump with my '03 in one piece. If I held it crosswise, I wouldn't be able to get out the door, so I had to mount it intact almost parallel to my body. The mind boggles at what would happen when landing with a rifle sticking up in one long piece."

Private W.E. Brady in his foxhole at Bardenburg, Germany, on October 16, 1944, with his Garand "ready to do his talking." Note the ubiquitous Lucky Strike cigarette pack. (NARA)

Lieutenant Colonel John George was a pre-World War II competitive rifleman who served in the Pacific as an infantry officer and made many salient comments about weapons used in that theater in his book *Shots Fired in Anger*. George rates the M1 Garand very highly:

> This rifle [the M1] was probably the very best in the war, and the best military hand weapon ever placed on the battlefield in appreciable numbers. Its employment had the very desirable effect of doubling the strength of our frontline platoons, in either defense or attack. It gave an American squad the ability to slug it out on the trail with a Japanese company, and hold for a long time. The gun was amply accurate, powerful, and it was quite reliable.

George used a scoped Springfield rifle for sniping, but during a *banzai* charge he found he could not reload the Springfield fast enough to deal with Japanese who were attacking his foxhole, especially one about to bayonet an American soldier. Fortunately, the soldiers with him were armed with M1 Garands:

> Both of the riflemen saw him now as their last remaining (and greatest) danger. They pointed their Garands, still holding more than half-magazine capacity, at his chest. Then they pumped the triggers until both clips were ringingly ejected from the receivers. They lowered aim to keep the stream of metal pouring through him as he fell to his knees, then to his haunches, then on his face, clutching his rifle tightly to the last. This continued fire was not hysterical – not a waste of ammunition. That Jap was alive and dangerous until perhaps the last two rounds were fired.

Since George was with one of the first US Army units on Guadalcanal, he offers first-hand commentary on the US Marines' reaction to the Garand, since they had been fighting previously with the Springfield M1903 rifle:

On February 3, 1945, US troops return Japanese fire with their Garands from within a Burmese village hut. (NARA)

Nearly all of the Marine personnel had been armed with the Springfield, reportedly because of Corps preference – not because of unavailability of Garands. So the first "allied aggressive effort" of World War II was made with a World War I rifle.

The mistake was soon realized. From almost the first minutes of combat on Guadalcanal the Marines began wishing for a basic semi-auto rifle. By the time we landed we had to keep ours tied down with wire. Leathernecks were appropriating all they could lay hands on by "moonlight requisition." In daylight, they would come over to our areas to barter souvenirs with the freshly landed doughboy units; any crooked supply sergeant who had an extra M1 rifle could get all the loot he wanted.

When the Marines began to get a few Garands up to the front the demand proportionally increased. They quickly learned that the Garand did not jam more often than the Springfield, and that it was equally easy to maintain. The disassembly system, especially, made the M1 much easier to clean and oil.

Facing a *banzai* charge (previous pages)

US Marines on New Britain have dug in for the night and are facing a Japanese *banzai* charge. Although the Garand's self-loading action and eight-round capacity gave the Marines a distinct edge, in heavy combat it was necessary to reload frequently. One Marine's rifle has just emptied and the ejected clip is in the air. Another Marine is thrusting home a loaded clip, preparing to bring his Garand back into action. Meanwhile, another Marine armed with a Garand and one armed with a BAR keep firing while their buddies reload. Bayonets are fixed in case the Japanese reach the entrenchment.

George relates one instance of a joint Army/Marines patrol. One of the Marines, a member of the famed 2nd Marine Raiders, positioned himself behind one of the Army sergeants, who eventually asked the Raider what he was up to. The Raider replied, "You'll probably get yours on the first burst, Mac. Before you hit the ground I'll throw this damned Springfield away and grab your rifle!"

Late in 1941, the Marine Corps had officially adopted the M1 rifle. Although the Army did not receive enough Garands to arm most frontline soldiers until 1943, it took a bit longer to fully equip the Marines.

George found that the soldier armed with the Garand could remain more alert to targets and could engage a moving target more quickly due to the Garand's semi-automatic operation. In addition, the soldier found it easier to put a few shots quickly into the approximate area where an enemy was located without having to work the bolt action of the M1903. Most of all, though, George believed that numerous American soldiers were saved by the semi-auto mechanism in a close-quarters life-or-death encounter. They just had to point at the target and pull the trigger.

George did observe some problems with the Garand. One of the most notable was the reflective surface of the gas-chamber/front-sight base,

A Marine exits a dugout with his M1 rifle; he has the short Garand bayonet stuck into his pack. (NARA)

These two M1 Garand muzzles illustrate the tendency of the black coating to wear away from the stainless-steel gas tube, creating a bright surface that could give the rifleman away. (Author)

which was a non-corrosive bright stainless steel. Stove blackening would cover it for a short time but would wear away or wash off quickly. Black paint was also used, but George still believed that infantrymen armed with the M1 Garand on Guadalcanal were killed because of Japanese soldiers picking up the reflection from the front of their rifles. He also felt that the Garand was too heavy, as was its sling, the swivels for which were excessively large. The rifle's balance was not good either, and the M1 was a very thick weapon, making it hard to carry comfortably. George saw a major problem in the Garand's clip system, which did not allow the rifle to be topped off with additional ammunition during a lull in the fighting. Instead, it was necessary to shoot the M1 to empty then reload a new clip, or to carry out a relatively complicated procedure to remove the partially empty clip and insert a new one.

Another astute observer of small arms during World War II was Roy F. Dunlap, who related his experiences with an array of weapons in the Pacific in *Ordnance Went Up Front*. Dunlap notes that most problems with the M1 resulted from lack of proper maintenance:

> Any gas-operated arm must be kept reasonably clean to reliably operate and the majority of malfunctions in the field proved due to either worn gas cylinders or worn (undersize) pistons on the end of the operating rods. The cylinders are rust proof, but the pistons rusted if not cleaned daily, wearing undersize rapidly and allowing gas to leak so that the operating rod would not move far enough to the rear to correctly function the action. Barrels did not last long. Non-corrosive ammunition would have been a godsend in the Pacific war. I never saw an M1 barrel shot out but saw thousands rusted out.

Dunlap also noted the same two major problems with the Garand as George – its weight and that the fact that its magazine couldn't be topped up with individual rounds. As a result, he stated that in his experience soldiers would either release or eject partially emptied clips during lulls in action, so they could be ready again with a full magazine, or when down to one or two rounds they would shoot the rifle dry even if no enemy were around. On the positive side, the Garand's weight, which was around 10lb without sling and bayonet, helped dampen recoil and allowed troops to fire fast repeat shots. The inability to top off the Garand's clip was a disadvantage, but on the other hand, the system that kept the action closed over the clip until it was empty and ejected also helped keep out dirt, sand, and debris, and was one reason the M1 rifle kept firing under adverse conditions.

Dunlap also mentioned the "pinging" sound made by the Garand clip when ejected, and offers his opinion that some US troops died because the Japanese would wait for the sound – indicating the rifle was empty – before attacking. As a result, he states that Aberdeen Proving Ground tried

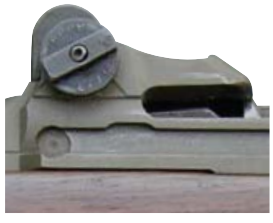
to develop plastic clips and other methods to silence the ejection noise. Reportedly, some soldiers in the Pacific retained one or two spent clips, and in an attempt to provoke a *banzai* charge would fire a couple of rounds then throw the clip as if it had just ejected. This criticism of the clip system is considered myth by many World War II combat veterans, who argue that the noise level on the battlefield usually made it impossible to hear the clip being ejected. In any case, a skilled user could reload very quickly, and there were normally other soldiers nearby with loaded weapons.

Dunlap did see a lot of positives in the Garand. For example, he felt that it was easier to teach the typical recruit to shoot with the Garand than with the Springfield. Something that Dunlap notes that other commentators do not is that the Garand could be operated by left-handed shooters almost as well as by right-handed shooters. As a member of an ordnance unit, Dunlap was also uniquely qualified to comment on the durability of the Garand. He commented that it worked well with only minimal maintenance. Most repair jobs, according to Dunlap, resulted from the M1 receiving insufficient gas and thus operating only as a single-shot weapon. Normally, this problem was rectified by a replacement

Troops on the Aleutian Islands keep their Garands well maintained against the damp conditions. Combat in the Aleutians during World War II is often forgotten, but after the Japanese occupied Attu and Kiska in June 1942, the US sent troops to retake the islands, though it took until August 15, 1943, to completely drive the Japanese from the islands. (NARA)

In February 1945, a soldier with the 8th Infantry Division takes shelter from an artillery barrage near Düren, Germany, while clutching his M1 rifle. (NARA)

Two variations of the M1 rifle's rear-sight adjustment knob; note the locking bar on the top sight, which was a fix to keep the sight's windage adjustment knob from working loose. (Author)



gas cylinder or possibly a new operating rod. When replacement parts were not available, Dunlop notes that they could usually get the rifle working by cutting up to 2in off the operating spring, thus lowering resistance to the backward movement of the piston. One way that Dunlap found the Garand was not "soldier-proof" was that troops would remove the windage knob lock to make it easier to adjust, thus resulting in the sight working itself apart and needing repair. A later rectangular bar lock nut on the outside of the windage lock nut made it more difficult to remove.

In his history of the 11th Airborne Division, *The Angels*, Lieutenant General E.M. Flanagan quotes one paratrooper who offers a good description of the experience of being issued their Garands for the first time. A Private Jacobs states:

> When it [the M1 rifle] first came to us, it was packed in Cosmoline, which had to be removed completely. When we thought we had finished cleaning our guns, there was twice as much goo on us as ever there had been on the weapon, and still the same amount on the gun as before. The new parts worked stiffly – screws resisted all efforts to loosen them and springs came to life, grew, bounced, hid, and buckled. Out to the inspection we went, exhausted but triumphant, with extra parts that wouldn't fit stuffed in our pockets. At least it was clean, we said. Those that didn't fall apart in the captain's hands when he smacked them, released clouds of dust and rust… At one inspection, rifles were supposed to be dry; at the next one they were supposed to be oily. If the piece was oily, it picked up the sand of the sand hills country; if dry, it got rusty. When we took it to the field, it picked up sand which meant another cleaning. We hated to take it out, preferring to enshrine it, clean and oiled, in the rifle rack, and borrow someone else's for the trip. Little tricks of the trade such as using Blitz Cleaning Cloth as a rifle patch, steel wool to remove pits, or pencil lead to cover rust spots, soon boomeranged, but what was a burdensome task stretching into hours finally became a chore which could be attended to in a brisk ten minutes.

It is important in reading Private Jacobs' narrative to note the final sentence, as all of this drill enabled the GI to quickly disassemble and maintain his M1 rifle, a skill that would be invaluable in combat. Private Jacobs reflects the GI theory that Cosmoline was invented not just to preserve weapons but to make the soldier's life miserable. Many GIs have historically also believed that there must be a quick way to remove Cosmoline, but that sergeants have always preferred to keep GIs busy

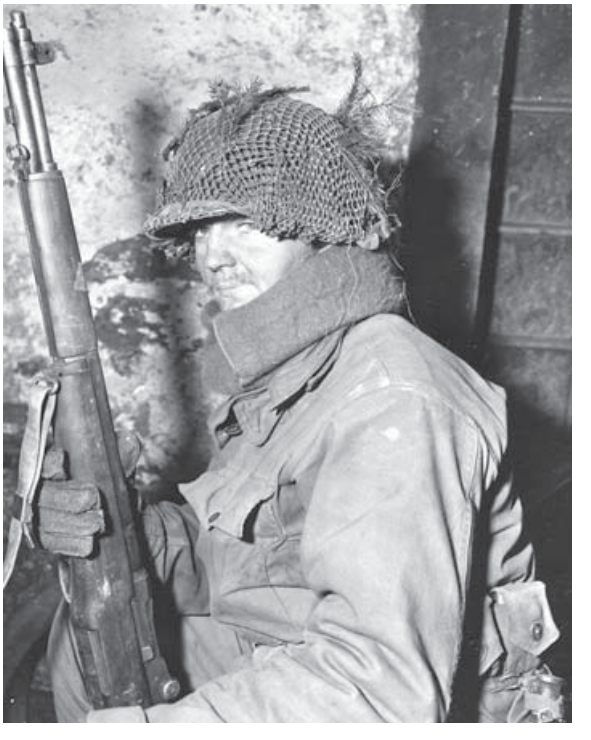
removing it. In actuality, pouring boiling water over the disassembled weapon will remove Cosomoline rapidly, though parts then need to be wiped off and oiled. A steamer also works quickly.

GARANDS IN BRITISH SERVICE IN WORLD WAR II

An example of the M1 rifle had been obtained by British ordnance personnel in 1939, and it was designated the YSL ("Yankee Self-Loader"). Trials were carried out during May 1939, resulting in a recommendation that a British service rifle be developed based on the Garand design. There were also experiments carried out by the British in converting the M1 rifle to full-auto for use as a light machine gun. However, on January 17, 1940, it was decided that under wartime conditions conversion from the Lee-Enfield bolt-action rifle was not desirable, as Birmingham Small Arms (BSA), a major British arms manufacturer that would produce a variety of weapons from the Sten submachine gun to the Oerlikon cannon, was already tooled up for the new Lee-Enfield No. 4.

Some Garands were sent to the UK as part of the Lend-Lease Program, however. The first appropriation of such Garands was made on March 27, 1941, and a second one on October 28, 1941. Later, a percentage of M1 rifle production was allocated to Lend-Lease until transfers were terminated in June 1942. M1903 Springfield and M1917 rifles were also sent as part of the Lend-Lease Program, and to avoid confusion of ammunition these two bolt-action rifles were marked with "3006," "30" or "300" on a red band painted around the front handguard to differentiate them from rifles chambered for the .303 round. Reportedly, at least some Garands also had the red band.

It appears that few of the UK Garands were actually issued, as when they came back into the USA during the late 1950s and early 1960s they were in quite good condition with the original features of *c.*1941–42. Ironically, the Home Guard would have likely received the Garands, resulting in their being armed with a more advanced rifle than the one in use with the British Army. As it transpired, many of the Home Guard were eventually armed with the Sten, which suited their mission quite well. Of the total of about 38,000 Lend-Lease Garands, more than 18,000 came back to the United States and were sold to civilian collectors. Reportedly, 10,000 former British Lend-Lease Garands were later sold by arms dealer Sam Cummings to Cuban dictator Fulgencio Batista for use against Castro's guerrillas.



A soldier in Germany during 1945 with his Garand. From his attire it is obviously winter, so he would take precautions to keep his Garand working, such as slapping the operating handle to make sure the bolt was closed after a clip was loaded. (NARA)

GARANDS IN KOREA

Noted military historian S.L.A. Marshall offered some interesting comments on the M1 Garand in Korea in his *Infantry Operations and Weapons Usage in Korea, Winter 1950–51*. He found that troops in Korea, both Army and Marines, had great affection for the M1. In particular, they found it stood up to the tests of extreme weather or terrain and rough handling. He notes, too, that of all weapons carried by the infantry, the M1 rifle was least sensitive to extreme cold, heavy frost, and icing. When other weapons were stopped by the weather, troops could still rely on their Garands.

Marshall analyzed M1 rifle malfunctions from all causes and found that the malfunctions occurred in 2–4 percent of those rifles used during the winter fighting. According to Marshall, the chief causes of misfires were frost lock, broken firing pins, and fouled chambers. He notes that frost lock was most likely to occur just below freezing, which is logical since moisture might have accumulated from snow or rain, then frozen as the temperatures dropped. The development in 1943 of a special lubricant, Lubriplate, helped reduce the problem of freezing substantially. The Lubriplate container was designed so that it would fit into the butt of the M1 rifle along with the cleaning kit, but for it to work the soldier had to have it, and in combat it was not always available. Since fouling of the chamber contributed to a number of types of malfunction, Marshall concluded that increasing the diameter of the brush on the Garand's Universal Tool would allow troops to keep the chamber cleaner.

In his *The History of Sniping and Sharpshooting*, John L. Plaster discusses the career of Technical Sergeant John Boitnott, who is considered by some the best USMC sniper of the Korean War. He eventually instructed at the 5th Marine Regiment's sniper school, but he had already accounted for a substantial number of Communist soldiers, including nine in two days, with one kill at 1,250yd. Generally, however, Marine snipers in Korea considered 600yd about the maximum range for the M1C. According to Plaster, USMC battalions in Korea were authorized 15 of the M1C 1952 rifles per scout-sniper platoon, and an additional 30 for regimental-level scout-snipers. An interesting point made in Peter R. Senich's *US Marine Corps Scout-Sniper: World War II and Korea* is that in the freezing Korean winter, it was very difficult for the sniper to keep his cheek against the cold gun stock for any length of time. As a result, snipers often covered the cheek pad with GI socks to prevent the cheek freezing to the stock.

A Marine rifleman of the 1st Marine Division fires at Chinese regulars in the Chosin Reservoir area, Korea, 1950. (NARA)

Frank Fulford, who served with the 2nd Division in Korea, mentions in *US Infantry Weapons in Combat* that when he was promoted to assistant squad leader he was given a scoped M1 sniping rifle. He does

A USMC M1C sniper rifle of the type used by the Marines during the Korean War. (Martin Floyd)

A close-up of the M1C's Kollmorgen scope. (Martin Floyd)

not mention whether it was an M1C or M1D, but notes that even though he was not a trained sniper he killed quite a few of the enemy with it, including a one-shot 500yd kill of an enemy soldier across a valley. Yet during the fighting at Kunu-ri, combat was so heavy that Fulford did not have time to clean his rifle for days, despite having fired hundreds or even thousands of rounds. When carbon built up in the gas system to the point that the rifle could only be manually operated, and even then with difficulty, he discarded it for a cleaner rifle. He points out that this was the only time he had problems with an M1 rifle.

At least some soldiers in Korea continued to feel that the distinctive sound of a clip ejecting from the Garand alerted enemy troops when the weapon was empty. Nevertheless, the GIs thought highly of the rifle. In *US Infantry Weapons in Combat*, Wayne Stephens, who was with the 2nd Division in Korea, states:

> One of the defects with the M1 was the noise it made when the clip ejected after you fired the last round. The Chinese knew what that sound was and if they were close enough, they'd rush you. Again, that's one of the reasons I liked having the bayonet mounted. But, with the ammo in bandoleers we could reload pretty quickly. Even with that defect, I had a real faith in that rifle. It could get all dirtied up, muddy or full of dust and you could shake it out and it would work. It never failed me; it was a very durable weapon. We did our best to keep them clean. Normally we had two men in a hole and we never cleaned our rifles at the same time. If one rifle was broken down for cleaning, the other was available to fight with if something happened. We'd clean them at every opportunity.

Especially in Korea, numerous veterans mention carrying multiple bandoleers of M1 clips, eight clips in each bandoleer. It seems many of the

A Marine in Korea, 1950, attempts to spot a sniper. (NARA)

users felt that they could get better access to the clips when carried in a bandoleer. Other veterans who used the M1 in Korea mention that it sometimes took two hands to push the clip into the rifle during winter conditions. Nevertheless, although the author has read dozens of memoirs of using the M1 rifle in Korea, there were few critics: the troops were overwhelmingly fond of the rifle for its range, striking power, and reliability.

In his book *Notes From an Airborne Rifle Company 1951–1952*, Robert T. Brown has some further interesting comments on the M1 rifle's service in Korea. Brown had been with the 11th Airborne Division on occupation duty, but then made two combat jumps in Korea, presumably with the 187th Airborne Regimental Combat Team. Although airborne units had been using the M1A1 paratrooper carbine since World War II, Brown comments on jumping with the M1 rifle using the Griswold container, a padded canvas jump bag that would carry an M1A1 Carbine or a disassembled standard M1 Carbine or M1 rifle. According to Brown:

> Some of the men in the airplane carried Griswold containers, but they did not have their rifles in them. The padded, quilted containers, designed for carrying an M1 rifle broken down into largest component structures, were almost never used for that. They were instead used for

Sniping in Korea (previous pages)

A USMC sniper and observer team in Korea occupy the high ground and attempt to eliminate North Korean or Chinese soldiers carrying supplies along a trail on the opposite slope of the valley. The Marine is using an M1C Garand with the Kollmorgen telescopic sight used by Marine snipers. As the Marines felt the cone flash-suppressor adversely affected accuracy, it is not used. He does use the cheek pad to correctly position his face to look through the 4× scope.

carrying a few extra rounds of 60mm mortar or 57mm recoilless or 3.5 inch rocket ammunition, or an extra belt for the .30-caliber machine guns. It was much better to have the rifle already assembled. Ready to be used immediately on landing. And it was also much better to have at least some ammunition for the crew-served weapons immediately available, in addition to what was separately dropped in cargo bundles that had to be retrieved somewhere on the ground after landing.

Reliable ammunition resupply is always critical in combat, but just getting the correct caliber of ammunition wasn't always enough. Despite the fact that the M1903 Springfield rifle was not normally encountered in Korea except for M1903A4 sniper rifles, Brown notes a supply problem encountered with ammo for the M1 Garand:

> Earlier in the day, the battalion A and P [ammunition and pioneer] platoon had managed to get through with a truckload of ammunition. However, when the wooden cases of rifle ammunition were opened and the bandoleers pulled out the men found that each pocket of the bandoleers held not a single eight-round clip for the M1 rifle, but two five-round clips for the M1903 rifle…
>
> So with the delivery of the wrong ammunition, or the right ammunition in the wrong packages, four men had spent a large part of the afternoon on the reverse side of the hill repackaging the several cases of rifle ammunition, laboriously taking each round out of each of the five-round clips and reloading eight-round clips one cartridge at a time. There were plenty of empty eight-round M1 clips available. There had been an unsuccessful attack on the hill the night before, and there was sporadic firing going on the north side of the hill throughout the afternoon, so even more empty clips were becoming available.

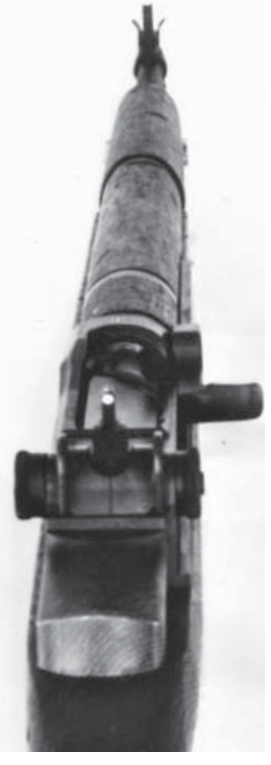
Another Korea veteran, Jack Walentine, mentions in *US Infantry Weapons in Combat* a variation of the problem with ammunition supply cited above. He was a BAR man. For the BAR, five-round stripper clips allowed ammo to be stripped into the BAR magazine, but most of the time Walentine states that they had to pull the rounds from M1 clips or from the belts for .30 machine guns. Both Brown's and Walentine's experiences highlight the advantage of having the infantry rifle, squad automatic weapon (the BAR), and medium machine gun chambered for the same .30-06 round, even if different feed devices were used. In an emergency, ammunition intended for one of the weapons could be used for another.

A view showing how the M84 telescope was offset to allow loading of clips into the M1D rifle. (Author)

Walentine also offers an example of the M1's durability. During one night engagement against the Chinese, he fired his Garand so

During May 1956, a soldier uses the T1 infrared weapons sight on his M1 rifle; note the T6A infrared binoculars attached to his helmet. (NARA)

A rear view of the Multilite luminous night-sight mounted on an M1 Garand. (NARA)



continuously that it "was actually on fire a few times." The front of the handguard and front of the stock were burnt away after a night of virtually continuous shooting. He replaced the M1 the next day, but it had kept working throughout the fighting at ranges of as close as 15ft. Since the M1 is a semi-automatic weapon, it can only be imagined how fast he was having to load and fire to cause the stock and handguard to catch fire.

Reportedly, a few M1D sniper rifles were experimentally equipped with infrared night scopes during the Korean War, but the author has not found any accounts of their actual use in combat. Instead, the "Sniper Scope"-equipped M3 Carbine, developed late in World War II, was used for most operations requiring night-vision capability. During the late 1950s, the US Army also considered the possibility of installing a luminous night-sight on the Garand, but other than experimental use, such sights never entered service.

In Bruce N. Canfield's *Complete Guide to the M1 Carbine and the M1 Garand*, the author quotes from a US Army report that summarizes the effectiveness of the rifle in Korea:

> In infantry company data from Korean operations there are numerous examples wherein the retention of the position depended finally on fire from the M1… The M1 works equally well in bitter or moderate cold. In fact, it is the "old reliable" of infantry fighting during winter operations, and is not less dependable in other seasons. There are occasional mechanical failures for one reason or another. But outside of a broken firing pin, the rifle stands the gaff phenomenally well.

POST-KOREA US M1 USE

Some US forces in Vietnam used the M1D in limited numbers, including the Marine Corps, which had M1Ds that had been assembled by Marine armorers at larger Marine bases in the United States, and possibly on Okinawa or even in South Vietnam. At least some of these USMC M1Ds had accurizing performed by Marine armorers. ("Accurizing" entails carefully fitting and polishing parts and checking tolerances to enhance accuracy.) Early in the Vietnam War, it is likely as well that some M1Ds were used by US Army infantrymen. Since they normally did not have special match .30-06 ammunition, snipers who used the M1D generally found that the heavier armor-piercing ammo stabilized better and hence was more accurate.

M1 rifles remained in some National Guard armories into the 1970s and even possibly the 1980s. Some were also used aboard US Navy ships

until the 1970s. M1 Garands also remained in use for ceremonial purposes for many years after they had been superseded as a standard infantry weapon. According to Peter Senich, M1D rifles still in base armories in Europe were issued for use during the 1991 Gulf War.

GARANDS IN OTHER HANDS

Garand rifles were widely furnished to US allies during and after the Korean War. South Korean forces received a large number of M1s, some of which have come back into the United States for civilian sales. In fact, as this book was being written, the US State Department banned import of a new batch of M1 rifles from South Korea.

The Army of the Republic of Vietnam (ARVN) also received a large number of Garand rifles, though the small Vietnamese soldiers generally found its length and weight unwieldy and preferred the M1 or M2 Carbine. Both Republic of Korea (ROK) and ARVN forces were furnished with M1D sniper rifles in addition to standard M1 weapons. The South Koreans received just under 300,000 M1 rifles, while the South Vietnamese took 220,300 M1s and 520 M1Ds. In addition, US Special Forces working with ARVN and irregular troops had a number of M1Ds, as did some CIA advisors operating alongside irregulars. During the

Armed with an M1 Garand, an ROK soldier guards the Panmunjom Road near the UN delegates' base camp, March 15, 1952. (NARA)

In February 1968, an ARVN soldier guards a bridge destroyed by the Viet Cong north of Quang Tri. He is armed with an M1 Garand. (NARA)

Vietnam War, the US worked closely with the Royal Thai Army, which supplied troops for that conflict. Records show that 460 M1D sniper rifles were furnished to Thai forces.

More than two dozen other US allies were supplied with M1 Garands. France received 232,500 M1 rifles; Iran 165,490; Italy 232,000 (plus a further 100,000 license-built in Italy); Pakistan up to 150,000; Turkey 312,430; and Greece 186,090 M1s and 1,880 M1Ds. Other allies received lesser numbers of M1s.

There is no doubt that Garands remain in the armories of some countries today, though a substantial number have come back to the United States and been sold on the civilian market. One long-term user that continued use of the Garand at least until the 1970s and 1980s was the Irish Republican Army (IRA) and its various offshoots. Some Garands were probably supplied from the United States over the years, but many may have come from the large number of US Army troops who passed through Northern Ireland during World War II, many of Irish heritage.

In his book *Killing Zone*, former British soldier Harry McCallion mentions two encounters with Provisional IRA (PIRA) men armed with Garands during his tours in Northern Ireland with The Parachute Regiment. In one case, McCallion remembers moving into the New Lodge area of Belfast for a raid on the PIRA when:

> Five high-velocity rounds cracked from the roof of the building ahead; the terrible coughing roar of a Garand rifle. One of them smashed into the wall beside me and sprayed brick dust over my head. I fired back. The paras returned fire, then others opened up above us, one with a long burst. My eyes strained to locate the gunman. From the top of Artillery Flats a second burst of automatic fire echoed off the narrow walls. I saw this one. As I returned fire the whole area seemed to disintegrate. At least thirty men concentrated their fire on the gunman; nothing could have survived. Once we had fought our way into the flats, we found a discarded Garand rifle, two pistols, and blood everywhere.

Recalling the same tour, McCallion notes that:

> On one patrol I became suspicious of a man standing watching us from an open doorway and the sergeant in charge decided on an immediate search. We detained him and rushed into the house. Upstairs we found a stripped-down Garand rifle and ammunition. It turned out to be the man's first mission for the Provos. His brother had been killed by us during internment and he was looking for revenge.

IMPACT

Loved by infantry, feared by enemies

A HARD-WON REPUTATION

No doubt the most notable impact of the M1 Garand rifle was its success in combat, proving that virtually every other infantry rifle in the world was outmoded by comparison. The M1 gave a US infantry squad the firepower to take on and overcome an enemy platoon armed with bolt-action rifles. Although the M1 was not renowned for its accuracy, most troops felt confident of their ability to hit an enemy at some distance with one, and they were definitely confident of its ability to put an enemy down.

A friend of the author who was formerly a US Army officer related the story of a World War II veteran he encountered as a youth. The veteran had been hit five times by 9×19mm rounds from a German soldier's submachine gun. As he told the author's friend, while showing him the five entrance and exit wounds, he still managed to shoot the German with his M1 rifle. The German soldier stayed under French soil while the US soldier recovered from his wounds. The veteran remained a great believer in the M1 rifle for the remainder of his life.

This confidence in the M1 was typical of many US Army and Marine infantry veterans of World War II and Korea. They felt the M1 rifle gave them the range, reliability, and stopping power that helped them come home alive. It was the rifle that had helped win the "Big War." This legacy would affect the reception of the M14 rifle and especially that of the M16 rifle, particularly since many senior NCOs and officers at the time the M14 and M16 were adopted had fought the battles of World War II and Korea with the Garand. The impact of the Garand on the psyche of US veterans and troops for the next three decades would be marked and would affect perceptions of any new infantry rifle.

THE M14, M21, M25, AND M39

The M1 Garand was the basis for the M14, which replaced the M1 in US service in 1957. Proceeding from various experimental models developed from the M1, the M14 owed a lot to the T25, which was created for the .30 caliber "Light Rifle Cartridge" based on a cut-down .30-06 round. This cartridge would in turn evolve into the 7.62mm NATO round. A design designated the T44 used the T25's short-stroke gas-piston system rather than the M1's longer operating-rod/piston system and was chambered for the 7.62mm NATO cartridge. Many features of the M1 were retained, including the safety, which protruded into the trigger guard when applied.

The T44 was adopted by the US armed forces as the M14. Among its features were select-fire capability and a 20-round detachable box magazine. Between 1959 and 1964, a total of about 1.5 million M14 rifles were built. The AR-15, forerunner of the M16, was initially adopted at the behest of General Curtis LeMay for the US Air Force as its handiness and firepower suited the needs of Air Force base security personnel. Jungle warfare in Vietnam had substantial influence on the Army's adoption

During Operation *Junction City* in Vietnam during 1967, a US soldier armed with an M14 rifle watches a supply drop. (US Army)

The author shooting the M21 sniper rifle in standing position. (Author)

of the M16, which was lighter and handier than the M14, and fired a cartridge that allowed infantrymen to carry a larger basic combat load of ammunition. Though the M16 entered service in 1963, it did not really replace the M14 in Vietnam until 1966/67, while the M14 remained on issue to US troops in Europe until 1970.

The M14 was the standard-issue US service rifle from 1959 to 1970, but since that date the M14 and its descendants have continued to see widespread use as dedicated sniper rifles. In 1969 the Rock Island Arsenal started converting 1,435 National Match M14s to sniper rifles by mounting the Leatherwood 3–9× Adjustable Ranging Telescope. National Match-grade ammunition was provided for the rifles. As of 1975 it was designated the M21 Sniper Weapon System. In addition to its telescopic sight, the M21 was equipped with National Match iron sights as backups. The M21 would serve as the US Army's principal sniper rifle until 1988, when it was replaced by the M24 Sniper Weapon System, which is based on the Remington 700 bolt-action rifle.

An upgraded variant of the M21 was developed by armorers of the 10th Special Forces Group (Airborne) for use by Army Special Forces and US Navy SEALs. Designated the M25, this rifle incorporates an M14 National Match action, a McMillan M1A fiberglass stock, a Bausch & Lomb 10×40mm scope or, alternatively, a Leupold 10× tactical scope. A Harris bipod is normally affixed. Reportedly, the M25 saw combat use during Operation *Desert Storm* and on some other special ops missions.

The M14 and its descendants have also seen use as "designated marksman" weapons with US forces. Designated marksmen are assigned to infantry units to give more range and accuracy than available with the standard M4 carbine or M16 rifle. Though not classified as snipers, designated marksmen perform that role when dedicated snipers are not available. M21 sniper rifles still in the inventory have been issued to designated marksmen and new M21s have been built.

Although initially many M14s were simply pulled from arsenals and issued for the designated marksman role, battlefield experience showed that an enhanced version of the M14 was needed. The result was the M14 Enhanced Battle Rifle (EBR). Beginning in 2010, each US Army infantry squad deploying to Afghanistan was issued two M14 EBRs. Among the features of the EBR are a telescoping Sage International stock of lightweight aircraft alloy, pistol grip, Harris bipod, Picatinny rails, muzzle brake, and Leupold Mk 4 LR/T 3.5–10×40mm scope. Most internal parts including operating rod, guide-rod springs, piston assembly, etc., are replaced and fitted to enhance accuracy. Each rifle is issued with six magazines and a sling.

Another variation of the M14 used as a designated marksman rifle is the USMC's United States Rifle 7.62mm, M14, DMR. The DMR is semi-automatic and was built at the Precision Weapons Shop at the USMC Base Quantico, VA. Features of the DMR included a 22in stainless, match-grade barrel, a McMillan Tactical M2A fiberglass stock with pistol grip and adjustable cheek piece, and a Picatinny rail to mount a wide array of optics – Leupold Mk 4 or Unertl 10× scopes are commonly used along with AN/PVS-10 or AN/PVS-17 night-vision optics. Although the traditional M14 muzzle brake is used, some DMRs have had suppressors mounted. A Harris bipod is normally fitted as well.

As of 2008, the DMR, though continuing in use, was replaced by the M39 Enhanced Marksman Rifle (EMR). Also an accurized M14, the M39

The Enhanced Battle Rifle version of the M14 used by US special operators. (USAF)

uses a metal stock that is adjustable to fit the shooter and incorporates a pistol grip. The M8541 Scout Sniper Day Scope is normally issued with the rifle.

Folding-stock *Alpini* version of the Beretta BM-59. (Courtesy of Rock Island Auction Company)

THE GARAND'S INFLUENCE OVERSEAS

US allies and enemies alike in World War II took note of the Garand's advantages and coveted a semi-automatic (or select-fire) battle rifle for their own forces. In the postwar world, many of those allies and former enemies got that rifle in the form of US M1s.

The Japanese who had faced the Garand in the Pacific from 1941, much to their detriment, attempted to copy the design during World War II. Prior to that the Japanese had attempted to re-chamber captured Garands for the 7.7×58mm Arisaka round, but the conversions would not function reliably. The copy was designated the Type 4 Rifle and, reportedly, was developed by the Imperial Japanese Navy. It had a ten-round internal magazine and was chambered for the 7.7×58mm Arisaka round. Rather than using an en bloc clip as did the Garand, the Type 4 was loaded from two five-round stripper clips. Sights were Japanese-type tangent. The Garand copy was one of various semi-auto rifles tested by the Japanese and was developed in 1944, though few if any saw combat due to problems with unreliable feeding. Reportedly, approximately 125 were manufactured.

Following World War II, one foreign manufacturer of the Garand that developed a sound reputation for quality rifles is Beretta of Italy. Many Garand fans actually consider those from Beretta among the best ever made. Garands remained in service in the Italian armed forces until the late 1950s or early 1960s. However, a Garand-based battle rifle from Beretta was officially adopted in 1959.

This rifle, the BM-59, resembles a Garand and retains many of its features, which allowed the Italians to use much of the same machinery they had used to produce the Garand, but it is chambered for the 7.62mm NATO round, takes a detachable 20-round magazine, has a flash-hider/grenade launcher, and is select-fire. Adopted in 1959, as its designation indicates, the BM-59 remained in Italian service until 1997, though by the 1970s the AR70/90 rifle had begun to replace it.

Among the variants of the BM-59 were the BM-59 Mk II, which had a pistol-grip stock; the BM-59 Mk III, also known as the *Alpini* model, which was designed with a pistol grip and folding butt stock for use by Alpine troops; and the BM-59 Mk IV, which was designed as a squad automatic weapon and had a heavier barrel and a plastic stock. A variant of the Mk III *Alpini* model was a Para model for paratroops with the folding stock plus a shorter barrel and flash-hider. Semi-auto versions of the BM-59 with the other military features were sold in the United States on the civilian market. There were also the BM-62 and BM-69 versions designed specifically for civilian sales without the grenade launcher and grenade-launcher sights.

Other than Italy, most users of the BM-59 were in Africa, including Algeria, Eritrea, Ethiopia, Libya, Morocco, and Nigeria. Other countries using the BM-59 included Argentina, Bahrain, and Indonesia (rifles were manufactured under license in Indonesia).

US troops in Korea recalled facing Chinese troops armed with Thompson submachine guns and M1 Garands. These were in most cases captured from Nationalist Chinese, US, or South Korean forces, but there seem to have been some copies made by the Nationalist Chinese themselves. Later, Norinco in the People's Republic of China produced the M305, a semi-auto "M1A"-type copy of the M14 for commercial export to the United States. It is quite possible that some of the captured tooling to make Garands was used to produce the M1As.

COMMERCIAL VERSIONS

Commercial versions of the M1 Garand were manufactured for sale to the US civilian market, in many cases using mostly surplus US government parts with commercially produced receivers. The best-known of these commercial Garands – and the highest-quality ones – were from Springfield Armory. Note, however, that this is not the US Government Arsenal at Springfield, MA, but a private firm located in Geneseo, IL. These M1 Garands were built to US GI specifications and available chambered in either .30-06 or .308 caliber. Some Springfield Armory M1 rifles were produced as commemorative models. A popular variant is the "Tanker's Garand," which has an 18in barrel. Springfield Armory stopped producing the Garand, possibly because of the availability of Civilian Marksmanship Garands, and now just makes their semi-auto versions of the M14.

The Springfield Armory (IL) M1A is a very high-quality semi-automatic version of the M14, and is popular with US law-enforcement agencies and civilian shooters. Since most M14s were locked in the semi-auto mode when issued, shooters get virtually the same rifle that was issued during the period that the M14 was in use with US forces. Springfield Armory also continues to produce a semi-auto version of the M21 sniper rifle as the M21 Tactical. A version of the M25 sniper rifle has also been produced. Though not Garands, these high-quality Springfield Armory M14 copies allow an array of shooters to use a descendant of the Garand.

An M1A rifle, the semi-automatic version of the M14 rifle designed for the civilian market, though it is used in some cases by law-enforcement agencies as well. (Springfield Armory)

CONCLUSION

It would be overstating the M1 rifle's importance in World War II to say that it was as influential for World War II tactics as the machine gun was for World War I tactics. Nevertheless, it did have a marked effect on the outcome of the war. As with most wars that last more than a few weeks or months, World War II was a war of attrition. And, in a war of attrition, firepower is a major advantage. The M1 rifle gave US infantrymen enhanced firepower on the level of the individual soldier or Marine.

Battles in the Pacific offer an excellent example of the effect of the Garand. The Japanese had a limited pool of human resources from which to draw – a total population of 71,380,000 in 1939. Imperial Japan suffered 2,120,000 casualties during World War II; casualties were especially high among frontline troops, pilots, and ship's crews. Other than in the battles at the beginning of World War II against unprepared foes, the Japanese lost a disproportionate number of troops when facing US forces. Even in the most hard-fought battles against entrenched Japanese forces, the US forces inflicted far more casualties than did the Japanese. On Iwo Jima, for example, the US lost 6,812 killed or missing compared to 21,844 Japanese killed. Losses were even more disproportionate on Saipan, where the US lost 2,949 killed compared to Japanese losses of 24,000 killed.

Obviously, all of this imbalance cannot be attributed solely to the M1 Garand. The United States had greater air power and naval gunfire support in the later battles. Japanese tactics were often costly as well, as they would throw waves of troops against US entrenched positions in *banzai* attacks. Nevertheless, the M1 rifle inflicted a lot of casualties because it gave the US infantryman greater range, better magazine capacity, faster reload capability, and more rapid weapon operation than bolt-action infantry rifles could offer their opponents.

There was also an intangible effect of the M1 rifle that became evident to the author while reading veteran's accounts and talking with

World War II veterans over the years. Those using the Garand had great confidence in their rifle. As a result, they were willing to hold at Bastogne during the Battle of the Bulge and stand against massed Japanese attacks in the Pacific theater. Later, in Korea, the M1 rifle's reliability under harsh winter conditions and against massed Chinese attacks gave US troops that same confidence – they could defeat the enemy because they had a weapon that could keep shooting and knock down those it hit.

Despite the fact that US troops often faced highly trained German units in the Mediterranean and European theaters in World War II, the Garand gave the US infantryman the advantage over the K98 Mauser bolt-action rifle. Though an excellent rifle, the Mauser was not capable of delivering the amount of fire that the M1 rifle could lay down. The Germans realized this and developed their own self-loading rifles, though they were not fielded in large enough numbers to affect the outcome of the war. These weapons included the G43 rifle and K43 carbine, of which more than 400,000 were produced including more than 50,000 sniper rifles; as well as the StG44, a true forerunner of the assault rifles of today, more than 400,000 of which were produced. As with many German weapons, the self-loading rifles were of high quality, but did not prove as durable as the Garand. The Soviets also developed a self-loading infantry rifle, the SVT-40, though most experts consider the M1 rifle superior.

The M1 and other World War II self-loading rifles would have a great influence on postwar rifle design, as many countries began working on semi-auto infantry firearms that would enter service during the 1950s and 1960s. The Soviet SKS retained a fixed magazine as did the Garand, but most others such as the AK-47, M14, FN FAL, and HK G3 incorporated

Training to shoot the M1 rifle from the kneeling position, which offers a more stable firing platform than firing "off hand" (standing). (NARA)

US troops armed with the M14 rifle. Generally troops liked the M14, though many World War II and Korea veterans still preferred the Garand. Opinions varied about the M14's replacement by the M16 – infantrymen slogging through rice paddies appreciated the lighter weight of the M16, while others missed the longer range and greater striking power of the M14. (US Army)

a high-capacity, detachable box magazine. As we have already seen, two postwar "assault rifles" – the M14 and the BM-59 – were directly developed from the M1 Garand.

As the first generally issued semi-automatic rifle, the M1 had a lot to prove. Reliability, maintainability, and durability were all questioned during its development and early issue. Many troops who had previously been using M1903 Springfield rifles were reluctant to change. However, rigorous testing through combat during World War II and Korea convinced the skeptics and won over the GIs, many of whom felt the M1 rifle contributed to getting them home alive.

Although the M1 Garand has substantial appeal to younger shooters and collectors, it was especially venerated by members of the generation who actually fought battles with the M1. Many of those veterans have now passed away and more depart every day. For the author and many other collectors or shooters, owning and shooting a Garand rifle is a chance to handle and use an important piece of American military history, but it is also a salute to their grandfathers, fathers and uncles who fought on Saipan or Tarawa, landed on D-Day, held and broke out at the Chosin Reservoir, or did their national service in Germany during the 1950s.

The M16/M4 has served longer as the standard US military rifle than did the M1 Garand or any other rifle, but the M1 probably accounted for more enemy troops than any other US shoulder weapon since the Civil War. The author has written dozens of weapons-related books and hundreds of articles on weapons topics, but this book has been especially rewarding because of the importance of the M1 Garand in US military history. By understanding the Garand, he has developed a greater understanding of World War II.

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Editor's note

The measurements in this book are provided in US customary units. The following may be of use in converting into metric:

1 mile = 1.6km

1yd = 0.9m

1ft = 0.3m

1in. = 2.54cm/25.4mm

1 gallon (US) = 3.8 liters

1 ton (US) = 0.9 metric tons

1lb = 0.45kg