THE M-16: TRADITION, INNOVATION, AND CONTROVERSY

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ABSTRACT

THE M-16: TRADITION, INNOVATION, AND CONTROVERSY, by Dallas T. Durham, 136 pages.

Invented in 1957, the M-16 rifle represented a sharp break with tradition for the United States Army. It was made of revolutionary lightweight materials (aluminum and plastic), was a smaller caliber than any previous military rifle, featured a maximum effective range of 500 yards, and perhaps most importantly, was not invented within the Army's weapons procurement system. Each of these issues caused strong resistance in the pre-Vietnam US Army, which valued its long-standing commitment to long-range marksmanship. This resistance curtailed the development process normally given a new weapon. Ultimately, the M-16's troubled development would cause severe malfunctions in Vietnam and many deaths of infantrymen unable to return enemy fire. The resulting congressional investigation discovered near-criminal negligence by both the Army and the M-16's manufacturer, Colt.

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ACRONYMS

ARPA	Advanced Research Projects Agency
ARVN	Army of the Republic of Vietnam
BAR	Browning Automatic Rifle
BRL	Ballistics Research Laboratory
CDCEC	Combat Developments Command Experimentation Center
CDEC	Combat Developments Experimentation Center
FPAO	Force Planning and Analysis Office
IMR	Improved Military Rifle
NATO	North Atlantic Treaty Organization
ORO	Operations Research Office
OSD	Office of the Secretary of Defense
SAWS	Small Arms Weapons System
SPIW	Special Purpose Individual Weapon
TCC	Technical Coordinating Committee

CHAPTER 1

INTRODUCTION

In 1957, a firearms designer named Eugene Stoner developed a new rifle at the request of the United States Army. Originally known as the AR-15, Stoner's weapon was a radical departure from previous American firearms. Constructed largely of plastic and aluminum, the black rifle weighed just over half of the Army's infantry rifle at the time, the M-14. Its caliber was small, about one-third less than the .30 caliber M-14, and its effective range was substantially less than any previous infantry rifle. Perhaps most significantly, its inventor did not work for the Army. Unlike the designers of the famed M-14 and M-1 rifles who worked at the Army's Springfield Armory, Stoner was an employee of ArmaLite, a subsidiary of Fairchild Engine and Airplane Corporation. While this seems trivial in today's era of commercial military-industrial complex, it was anything but trivial to an Army who had obtained many millions of small arms through the military armory system since the American Revolution.

While the AR-15 initially performed well in Army tests, it soon faced challenges from those in the Army who felt threatened by this outsider rifle. Using justifications such as North Atlantic Treaty Organization (NATO) caliber agreements and the relatively limited power of the AR-15, naysayers claimed the AR-15 was not the right rifle for the United States infantryman. These naysayers almost prevailed over the AR-15 multiple times, but the coincidence of a determined rifle salesman, politics, the Vietnam War, and a bit of luck would see the AR-15 transformed into the United States Army's M-16. Indeed, descendants of the original M-16 are still in use throughout the world today.

But in the process of becoming the nation's new rifle, the M-16 became one of the most controversial weapons ever created. On the battlefields of Vietnam, some would call it a miracle weapon. It was lightweight and fully-automatic, meaning it would fire approximately 800 bullets per minute as long as the trigger was continuously pulled. It provided unprecedented firepower to the infantrymen locked in short-range firefights in the jungles of Vietnam. Others would refuse to carry it, having previously experienced its propensity to jam during firefights. For those who experienced the horror of a jammed rifle in the middle of combat, often with no means to clear the jam, the M-16 was a symbol of a failed bureaucratic process which caused untold numbers of American deaths.

Because of the conflict between the rifle's supporters and detractors, the M-16 did not undergo a typical evaluation process but was instead forced into abbreviated development by senior leaders as high as the Secretary of Defense. In an effort to understand the traditions, policies, and experiences which played into this flawed process, this thesis examines the development of the M-16 from its invention to the resolution of jamming problems in 1968.

While the story of the M-16 has been told many times and from many viewpoints, there exist several problems in current narratives. First and most glaringly, the vast majority of websites and firearm reference books give only vague, generic descriptions of the problems that plagued the M-16 in Vietnam. While this in itself is not necessarily problematic considering the nature of these sources, many also get the information wrong. The M-16 controversy was highly complex and lacked both a clear resolution and

solution, leading to much speculation about what actually happened. It is therefore very easy to get only part of the story, or the wrong story, from brief research.

Second, many narratives of the M-16's history are told from a biased point of view. For example, some veterans have written memoirs detailing their experiences with the M-16 in combat. Often, such accounts are strongly, emotionally-charged against the M-16. Soldiers watched friends die while trying to clear jammed M-16s, and the hatred felt by many toward the M-16 is quite understandable. However, this hatred also tends to overshadow or confuse any discussion of the underlying causes for the M-16's malfunctions. Thus, while recollections of the rifle's performance in combat are certainly valuable and used frequently in this thesis, the explanations provided in those sources for the M-16's developmental troubles often leave the reader with more questions than answers. This is certainly not a complete dismissal of such memoirs. Rather, it is simply stating that it is difficult to learn the truth behind the M-16's combat troubles by reading memoirs.

Third, many books and articles written during the last 30 years tend to cite three books from the 1980s written about the M-16. *The Great Rifle Controversy,* published by Edward Ezell in 1984, *The M16 Controversies,* also published in 1984 by Thomas L. McNaugher, and *The Black Rifle: M16 Retrospective* by R. Blake Stevens and Edward Ezell in 1992, together form the leading three authoritative narratives on the topic. The last book, *The Black Rifle,* is especially frequently cited, but is now out of print and unfortunately very difficult to find. The book is listed on Amazon.com for nearly 200 dollars, and few libraries hold copies.

Although these three authors extensively used sources not easily obtainable by the general public such as interviews and personal correspondence, much of their information also comes from sources readily available either online or through the library. Still, many modern authors continue to cite these three books rather than going back to source material. While this thesis does cite Ezell and McNaugher extensively, it strives to utilize the source material when possible so as to avoid changing the meaning or intent behind the original.

Although Ezell, Stevens, and McNaugher's three books form the original authorities on the matter, they are not perfect. As mentioned, *The Black Rifle* is difficult to obtain. The other two, while highly informative, can be confusing to read. Both have a tendency to leave out key dates and occasionally describe events out of chronological order, causing the reader to lose a sense of time or cause and effect. Additionally, both take the opposite approach of a veteran memoir, largely ignoring first-person vignettes from the battlefield and instead focusing solely on the organizational problems which created the controversy.

Thus, this thesis attempts to tell the story of the M-16's development by weaving together academic narratives, personal memoirs, and source material. It builds on the academic narratives already available by clarifying key dates and chronology, while incorporating the personal memoirs which are crucial to any story involving an infantryman's rifle.

CHAPTER 2

FOUNDATIONS OF THE ARMY'S MARKSMANSHIP TRADITION

The story of the M-16 starts long before its invention in the 1950s. To truly understand its story, it is important to understand the traditions which formed the paradigm of Army marksmanship. These traditions originated in the American Revolution, when the rifleman and marksmanship first impacted the Army. To be sure, marksmanship was a critical aspect of survival even before the Revolution, since putting meat on the table often rested with one's ability to bring down a deer. But the Revolution cemented the role of riflemen and their role in American lore from the earliest days of the war. Don Higginbotham notes that the rifle was a little-known concept in New England, but well-used in other colonies such as Virginia and Pennsylvania. Upon learning of the superb accuracy of the "finest marksmen in the world,"[1] the Continental Congress voted in June 1775 to create ten companies of riflemen from Pennsylvania, Maryland, and Virginia.[2] Long-range marksmanship was a requirement for membership in the rifle companies; the captains created various shooting competitions to ensure only those with superb accuracy were accepted. Higginbotham describes one such contest involving a one-foot square drawn on a board and placed at 150 yards as a target.[3] Serving as captain

[1] Charles F. Adams, "Familiar Letters of John Adams and His Wife Abigail Adams during the Revolution" (New York: 1876), quoted in Don Higginbotham, *Daniel Morgan: Revolutionary Rifleman* (New York: Van Rees Press, 1961), 22.

[2] Don Higginbotham, *Daniel Morgan: Revolutionary Rifleman* (New York: Van Rees Press, 1961), 22.

[3] Ibid., 23.

of one such Virginia rifle company, Daniel Morgan became legendary for his skill in utilizing his marksmen's long-range capabilities to harass British forces.

To those familiar with modern firearms, 150 yards seems quite ordinary. Almost every rifle is capable of shooting 150 yards and further. But in the day of muskets, a shot of 150 yards was rare. The average musket with its smoothbore barrel would be lucky to send a round ball projectile that far at all, much less accurately. Yet those frontiersmen wielding "Kentucky Rifles," shooting bullets through rifled barrels, were capable of hitting small targets at 150 yards and further.

Why, if such accuracy was possible, did all armies of the world not simply switch over to the rifle? For one, infantry doctrine was simply not developed to the point of individualism that aimed fire required. Such shots required time for aiming as well as contemplation of the selected target. In an era where drill reigned supreme and the average infantryman was taught to march, load, point (not aim), fire, and repeat by muscle memory alone, the idea of long-range accurate fire was simply ahead of its time for most of the world's armies.

Another drawback of the rifle was the excessive time required for loading. Rifles required more than twice that required of a musket, thus reducing overall volume of fire on the battlefield. Added to the fact that most rifles lacked capacity for mounting a bayonet, the rifle simply did not fit with the standard doctrine of the age.

Yet, for all its drawbacks, the rifle took its place as an American icon. Part of it was the dashing appearance and impressive records of Morgan's riflemen, who would be

described as "the pride of [George] Washington."[4] Higginbotham describes their clothing as if something from a Daniel Boone movie: "tall, rangy men, each equipped with a rifle, tomahawk, and scalping knife, and dressed in a long hunting shirt, leggins, and moccasins."[5] Throughout the war, they would take part in both skirmishes and large-scale actions, even earning praise from the Marquis de Lafayette himself.

During the American Revolution, the young country was faced with a lack of reliable suppliers for military weapons. Many of the muskets used by the Continental Army were supplied by the French, in addition to weapons captured from British troops. Clearly, a locally-sourced supplier was required in order to relieve dependence on finicky relationships with Europeans. This requirement resulted in the establishment of the small-arms factory in Springfield, Massachusetts, in 1777.[6]

During the 60 years preceding the Civil War, the Army adopted two main updates to the flintlock muskets of the Revolution. First, it incorporated the percussion cap system, which resulted in improved reliability. Additionally, it standardized the rifled barrel, greatly improving accuracy and range. Effective ranges increased from about 50 yards for the Revolutionary War's flintlock musket to several hundred yards for rifled muskets such as the US Model 1861, mass-produced during the Civil War.

As Ezell notes, some have criticized rifle developers of the Union Army for not capitalizing on available technology and simply using an "updated cousin" of the

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[4] Higginbotham, *Daniel Morgan,* 92.

[5] Ibid., 23.

[6] William H. Hallahan, *Misfire: The History of How America's Small Arms Have Failed Our Military* (New York: Scribner's, 1994), 16.

Revolutionary War flintlock.[7] However, this reliance on older equipment reflected a key tendency which would continue to play a major role in the Springfield Armory even through the 1960s and the development of the M-16: the Springfield Armory and the Army Ordnance Department focused primarily on efficiency of production, rather than innovation and research and development.[8] It was a tendency that made some sense during war years, when simply producing sufficient quantities of proven designs in the shortest time possible was paramount. But it was not a tendency that served the Springfield Armory well during peace years; it lagged behind available technology and often relied on foreign designs in order to provide small arms to the US Army.

In the post-Civil War years, the Army tried to balance dwindling budgets with large stockpiles of antiquated rifles. From 1865 to 1892, the Army utilized a series of conversions and modifications to its existing Civil War armory without purchasing large quantities of any standardized rifles. But while it did not standardize new revolutionary technologies, it did standardize marksmanship training for the Infantry. BVT Major-General Emory Upton's series of Infantry manuals outlined specific standards for shooting, including frequency of target practice, accuracy requirements, and prescribed distances at which the standard infantryman must be proficient. For example, in the 1875 manual, Upton specified target height and width for each range out to 800 yards, declaring that troopers would be classified as first, second, or third-class based on their

[7] Edward C. Ezell, *The Great Rifle Controversy* (Harrisburg, PA: Stackpole Books, 1984), 9.

[8] Ibid., 48.

abilities to shoot.[9] He also noted that Infantrymen should be taught the specifics of range estimation, and how the average human body appears from 100 yards out to 800 yards. Interestingly, his specified target sizes from 400 to 800 yards far exceeded that of any human being. For example, at 400 yards, the targets were 72 inches tall and 66 inches wide; at 800 yards, the width increased substantially to 242 inches wide.[10]

Upton did not say exactly how such enormous targets simulated actual combat conditions. The targets do, however, demonstrate that the prevailing attitudes of the time favored long-range shooting as the best training for Infantrymen. In addition to being considered essential to training, target practice was a way of life in the Army of the late 1800s. Capt. H. C. Hale described it as a "religion," and pointed out that "the target craze held the whole Army within its spell; it breathed target practice by day and dreamed it by night. To be a poor shot was a misfortune if not a disgrace."[11]

While the US Army emphasized long-range practice even out to 1,200 yards by 1879, European armies took a different approach to tactics which could exploit the rifle's extended ranges.[12] McNaugher observes that the British doubted the individual soldier's ability to shoot well under combat conditions; both the British and French trained their riflemen to operate as a collective rather than as individuals, capable of putting a "wall of

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[9] BVT. Major-General Emory Upton, *Infantry Tactics, Double and Single Rank* (New York: D. Appleton and Company, 1875), 72.

[10] Ibid., 71.

[11] Cpt. H. C. Hale, "New Firing Regulations for Small Arms," *Journal of the U.S. Infantry Association* (July 1904): 14.

[12] Thomas L. McNaugher. *The M16 Controversies: Military Organizations and Weapons Acquisition* (New York: Praeger Publishers, 1984), 18.

lead as far in front of advancing or defending soldiers as was possible."[13] The emphasis was therefore not on well-placed individual shots, but on sheer volume of fire.

In the meantime, the lore of the American frontiersman began growing and contributing to the nation's marksmanship tradition. From Daniel Boone to Davy Crockett, the image of the leather-clad rifleman grew to represent the American frontier. It is no coincidence that Disney's 1950s "Davy Crockett" movies were so successful; they simply built on the fame that surrounded Crocket even before his death at the Alamo in 1836. It is rare to see a painting of either Boone or Crockett without their rifles in hand.

The westward expansion of United States territory in the post-Civil War era firmly cemented the idea of marksmanship as an American phenomenon. This was due to several factors. First, the sheer size and distance of the American west made resupply for both soldiers and civilians difficult. Westbound pioneers might travel for days between supply stores, while American military expeditions against the Plains Indians faced the challenge of extended and vulnerable supply lines. These restrictions made conservation and effective use of ammunition critical, both for self-defense and for restocking food supplies with game. No one had the luxury of wasting ammunition, since a well-aimed shot might be the difference between life or death.

Second, the US Cavalry missions in the American West brought troopers face-to-face with a formidable foe: the American Plains Indian tribes. Highly skilled with bow-and-arrow, Indians could accurately shoot at least 50 yards. More importantly, the

[13] McNaugher, *The M16 Controversies*, 17.

rapidity with which they could reload and maintain sustained fire meant that any victim unlucky enough to get within archery range would face a storm of arrows. George Catlin, an author and painter who wrote extensively on his experiences with the Plains Indians during the 1830s and 40s, observed that an Indian could shoot 15 to 20 arrows per minute.[14] In fact, Indian youth held contests to see who could shoot the fastest: the shooter would launch one arrow, then see how many more arrows he could loose before the first arrow hit ground. An expert could get up to eight.[15] Therefore, a cavalry trooper's chances of survival hinged on his ability to shoot further than his Indian enemy. As Indians gradually accumulated more firearms, a trooper's ability to shoot longer and more accurately became even more important.

Another contributor to the American marksmanship tradition was the buffalo hunter. Motivated by the high value of buffalo hides during the late 1800s, these men generally shot heavy, powerful, black powder breech-loading rifles. Most common was the Sharps rifle in .50 caliber, well known for its power and ability to kill a buffalo even at several hundred yards. Perhaps the most famous incident involving a buffalo hunter and his rifle occurred during the Second Battle of Adobe Walls in 1874. Hundreds of Comanche warriors surrounded 28 buffalo hunters in the small supply depot northeast of Amarillo, Texas. After several days of fighting and still surrounded, a buffalo hunter named Billy Dixon used a Sharps rifle to shoot a Comanche warrior from his horse on a

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[14] George Catlin, *Letters and Notes on the Manners, Customs, and Condition of the North American Indians*, vol. 1 (London: Published by the Author at the Egyptian Hall, Piccadilly, 1841), 33, https://archive.org/details/cihm_32970/page/n5/mode/2up.

[15] Ibid., 141-142.

distant bluff. The exact range of the shot, not to mention whether it actually happened or was even possible, is highly debated; several estimates put the range somewhere between 1,000-1,500 yards. Regardless, it was an impressive shot, and one that Dixon himself admitted was highly lucky.[16]

Such legends fed into the success of shows such as Bill Cody's "Buffalo Bill's Wild West Show," which featured a microcosm of the American west. One of Cody's most famous attractions was Annie Oakley, known for her remarkable shooting skills. Though today she is perhaps the best remembered marksman of that era, she was by no means the only sharpshooter to draw crowds. The aura of the "crack shot" who could take down anything was certainly a tradition that Americans enjoyed.

Another outlet for Americans to participate in target shooting was the National Rifle Association (NRA), formed in 1870 by a group of National Guard officers concerned with the Army's poor marksmanship training immediately after the Civil War. The popular NRA annual matches included both civilian and military sharpshooters, and heavily influenced Army training.[17] But the U.S. Army struggled to recruit and train sufficient numbers of sharpshooting troopers during the Spanish-American War, causing concern over its ability to respond to future crises. Therefore, in 1903 Congress established the National Board for the Promotion of Rifle Practice, an organization

[16] Olive K. Dixon, *Life of Billy Dixon* (Abilene, TX: State House Press, 2005), 181.

[17] McNaugher, *The M16 Controversies*, 20.

dedicated to improving shooting skills throughout the civilian population with the goal of providing a base of talent from which the Army could draw.[18]

Yet for all its focus on training, the United States Army lagged well behind the rest of the world in small arms by the 1890s. In fact, most European countries had already adopted a magazine-fed rifle; the US was the only army still using a single-shot breech-loading weapon. European armies had already capitalized on benefits from the invention of smokeless powder which facilitated major improvements in rifle design, namely reduced size and weight. Smokeless powder provided more "bang for the buck," allowing bullets with less powder to be propelled even further than black-powder equivalents. Plus, smokeless powder was cleaner, causing less fouling in firing mechanisms and barrels, therefore allowing for more intricate actions. European examples of smokeless powder rifles included the German Gewehr 1888 and the Norwegian Krag-Jorgensen, both adopted in the late 1880s.

Not until 1892 did the United States finally adopt a repeating rifle capable of firing smokeless powder, and it was not even a US design. The Army adopted the bolt-action Model 1892 Krag-Jorgensen, which featured a magazine capable of holding five rounds. For an Army convinced that the ability to shoot rapidly would result in wasted ammunition, this was a significant step. Yet there was a catch: the Krag's magazine contained a cutoff lever which would prevent rounds from being fed into the receiver,

[18] United States General Accounting Office (GAO), *Military Preparedness: Army's Civilian Marksmanship Program is of Little Value,* Report to the Chairman, Committee on Armed Services, House of Representatives (Washington, DC: GAO, May 23, 1990), https://www.gao.gov/products/GAO/NSIAD-90-171.

thereby forcing the shooter to manually load each bullet. Only in event of emergency was the lever disengaged, allowing the magazine to be used.[19]

While the Krag was a major step forward for US Army small arms, it left much to be desired. It fared poorly during the Spanish-American War, and was far inferior to the Mauser rifles carried by the enemy in the two categories considered most sacred to Army Infantry doctrine: range and power.[20]

Instead of creating a new design to combat this deficiency, the Ordnance Department once again turned to a foreign rifle for inspiration: the German Mauser 98. The result was the Model 1903 rifle, commonly called the "Springfield." The Springfield soon gained a reputation as one of the best bolt-action rifles of all time, an opinion still shared by many today.[21]

Yet even the Springfield struggled with production issues for its first 14 years of existence. Specifically, a flawed heat-treating process at Springfield Armory made early models potentially unsafe to shoot.[22] With World War One raging in Europe and American involvement becoming more imminent, the Ordnance Department scrambled to produce enough Springfields for the growing Army. Faced with a demand exceeding production capabilities, the Army yet again resorted to foreign designs. This time, the

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[19] McNaugher, *The M16 Controversies*, 22.

[20] Hallahan, *Misfire*, 249.

[21] This assertion is based on the author's experience among shooters and firearms.

[22] U.S. Department of the Army, Office Chief of Staff, Office Director of Weapon Systems Analyses, "History of the M16 Weapon System," *Report of the M16 Rifle Review Panel* (Washington, DC: U.S. Department of the Army, June 1, 1968), B3, https://thecoltar15resource.com/report-of-the-m16-rifle-review-panel-1-jun-1968/.

British Pattern 14 Enfield rifle filled the need, and was soon contracted to the Remington Arms Company, Winchester Repeating Arms Company, and Eddystone Arsenal for production, thus alleviating the backlog at Springfield Armory.[23]

Experiences in World War One convinced the Army that the individual infantryman needed more firepower than a bolt-action design could provide. Several inventors experimented with modifications to existing rifles during the war, most notably John Pedersen's device to convert the Springfield 1903 rifle into a semi-automatic weapon. None were successfully fielded, and eventually given up with the war's end. But the Army exited World War One believing that the bolt-action rifle was not sufficient for Infantry operations.

Clearly, the advent of the machine gun had changed the battlefield. Against hundreds of rounds per minute, the bolt-action rifle seemed pointless. But the Army had been convinced of the bolt-action's antiquation even before the war because of its effect on the soldier's ability to shoot; every time he worked the bolt to re-load, it often required moving his head and eyes off of the target. An auto-loading rifle would allow him to shoot uninterrupted.

A young inventor named John C. Garand began working at Springfield Armory in 1919 with the goal of developing a semi-automatic rifle. But Garand discovered that the Springfield Armory was a frustrating environment for an inventor; the Armory was focused on production, not research. It did not establish an actual Research and

[23] Ezell, *The Great Rifle Controversy*, 20.

Development Division until 1942.[24] The cost of a reputable job in the Armory was his short tether to the Ordnance Committee (predecessor to the Ordnance Department), which constantly burdened him with new specifications and requirements for rifle development. As Ezell notes, Garand's "days of freedom had ended when he transferred from the National Bureau of Standards to the Springfield Armory."[25]

Garand labored for several years on various auto-loading designs, all centered on the .30-06 cartridge used by the Springfield 1903. The .30-06 caliber was preferred because the Army still had significant quantities of ammunition in storage from World War One, and it was used in several other standard Infantry weapons (Browning Automatic Rifle, Browning light machine gun, and of course the 1903.) This concept of "commonality" would resurface years later with the M-16.

The .30-06 was problematic for auto-loading designers; its powerful recoil and heat generated from each shot required strong materials and complex rifle designs which neared the limit of physical capabilities. Instead, rifle designer John Pedersen recommended a new cartridge: the .276. Pedersen designed this new caliber for the Army as the optimum caliber for an auto-loader, having enough power for long-range shots but not so much as to make the auto-loading design difficult. Garand and Pedersen both designed rifles based on .276 which underwent testing by the Army.[26]

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[24] Ezell, *The Great Rifle Controversy*, 24.

[25] Ibid.

[26] The competition between Pedersen and Garand for the Army's next auto-loading rifle presented quite an impressive show of two brilliant firearms designers. For more information, see Hallahan, *Misfire*, 365-378.

Central to Pedersen's recommendation was research originating from Europe which observed that smaller bullets could be more lethal than larger bullets. Although one would assume that a bigger bullet equals bigger wound, the opposite held true; bigger bullets tended to be more stable, inflicting "pencil holes" in their victims while passing straight through. On the other hand, smaller caliber rounds became extremely unstable upon entering a new medium (i.e., air into flesh), tumbling and spinning through flesh and creating massive, deadly wounds.[27]

While Pedersen's .276 cartridge enjoyed support from the Ordnance Department, it was not without criticism from traditionalists who countered that the .276 round would not have the long-range power necessary for use in machine guns or armor-piercing bullets. The Army's conversion from .38 caliber to .45 caliber for its standard sidearm pistol prior to World War One represented a paradigm held by many Army decision-makers: a bigger bullet equated to a better bullet.[28] Research notwithstanding, the proposed downsizing from .30 caliber to .276 seemed like an unnecessary reduction in lethality for traditionalists, who worried that .30 caliber was the breaking point for a bullet's capability to kill. Therefore, in order to determine the killing power of the .276 in comparison to .30, the Army convened the "Pig Board" of 1928. So-named because of the anesthetized pigs used as target subjects for the tests, the Pig Board confirmed

[27] Hallahan, *Misfire*, 371.

[28] McNaugher, *The M16 Controversies*, 30.

European research and reported that the .276 caliber was fully capable of desired military effects. A second "Goat Board" in 1930 had similar results.[29]

Another criticism leveled against the .276 cartridge was the above-mentioned commonality requirement, which discouraged adoption of a rifle caliber differing from that of the light machine gun. Supply personnel preferred to have one standardized caliber to deliver on the battlefield. However, the .276 also offered some logistical benefits such as smaller size and lighter weight, allowing simplified transportation to the battlefield. Ultimately, the Ordnance Department made its decision based off the research supporting Pedersen's new caliber, dismissing ammunition commonality as a lesser requirement and recommending the .276 as its new caliber. The department also endorsed John Garand's rifle to shoot it.[30]

But, the .276 was not to be. Army Chief of Staff General Douglas MacArthur disapproved the recommendation, opting to remain with the .30-06 and directing Garand to design his rifle around that caliber. Considering the politics of the day, the decision made some sense. The Army was short on funds in the post-war depression years, and prioritizations sent "nice to haves" such as a new caliber to the chopping block. MacArthur cancelled all further work on the .276 and directed renewed work on the auto-loading .30-06 rifle. By 1936, Garand had finalized his design, adopted by the Army as the U.S. Rifle Caliber .30, known as the "M-1 Garand."[31]

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[29] Hallahan, *Misfire*, 379.

[30] McNaugher, *The M16 Controversies*, 31.

[31] Hallahan, *Misfire*, 387.

McNaugher argues that while MacArthur's decision was rooted in financial reasons, the effect was to "keep rifle developments in highly traditional channels."[32] The Army lost an important opportunity to gain innovation in its small arms development. By the time it had another such opportunity, even less of the Army's senior leadership would be in agreement.

Thus, by the start of World War Two, the United States was the only military in the world which had adopted an auto-loading rifle as its standard weapon. However, it had drastically insufficient quantities on hand to fight a major war. In fact, the US Army entered World War Two just as it had entered every other war since the Civil War: with insufficient numbers of its standard infantry rifle.[33] It would do so again in Vietnam.

The M-1 Garand was enormously popular. Reliable and powerful, it gave infantrymen significantly more firepower than their German and Japanese counterparts. Its internal magazine held an 8-round clip, allowing the firer to shoot 8 individual shots without ever removing his finger from the trigger. General George Patton famously observed that "the M-1 Rifle is the greatest battle implement ever devised."[34] In fact, the M-1's popularity has held to this day, making it a highly desirable weapon for collectors and shooters alike. With over 5 million produced, the M-1 became synonymous with the World War Two infantryman.

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[32] McNaugher, *The M16 Controversies*, 32.

[33] Ezell, *The Great Rifle Controversy*, 19.

[34] Major General Julian S. Hatcher, *The Book of the Garand* (Buford, GA: Canton Street Press, 2012), 153.

Yet even such a popular weapon had faults. It was heavy, weighing nearly 10 pounds. Combined with its length, this made it particularly cumbersome for Airborne troops or those in tight confines such as tanks. Various experiments to shorten the M-1 were unsuccessful. Many GIs appreciated the light weight of the M-1's little brother, the M-1 carbine, but this weapon's smaller caliber lacked the lethality or range required by the Army for a standard Infantry weapon.

Troops also desired more firepower. Even though the M-1 was a semi-automatic weapon, it lacked the firepower of the full-automatic Browning Automatic Rifle (BAR). But the BAR had drawbacks too; it weighed 20 pounds. Some infantrymen were issued automatic sub-machineguns such as the Thompson series or the M-3 "Grease Gun." But these pistol-caliber weapons had very limited range (50 yards) and were also quite heavy.

What American GIs really wanted was a combination of the numerous weapons found on the World War Two battlefield. They desired the weight of the carbine, the range and accuracy of the Garand, and the firepower of the BAR. Indeed, research conducted during the war and published shortly after supported this desire for greater firepower.

In 1947, famed military historian S. L. A. Marshall published a series of articles in *Infantry Journal*, along with a standalone book titled *Men Against Fire*. The most notable claim from these works was Marshall's assertion that shockingly few soldiers actually fired their weapons in combat. Basing these claims on his extensive post-combat interviews, Marshall argued that only 15-25 percent of soldiers ever fired a single shot. For an Army that prided itself on marksmanship and spent an enormous amount of time at the firing range, these numbers called into question the Army's oldest paradigm. In

fact, Marshall explicitly criticized the idea that marksmanship training equaled combat effectiveness by asserting, "We are on infirm ground when we hold to the belief that the routine of marksmanship training and of giving the soldier an easy familiarity with his weapon will automatically prompt the desire to use the weapon when he comes under fire."[35]

Part of the problem was that the Army accomplished its marksmanship training too well. Interviewing members of the 502nd Parachute Infantry Regiment after the Normandy jumps, Marshall found that only 20 percent had actually seen any live enemy soldiers.[36] These men had not been taught to shoot for the sake of fire volume, but to take well-aimed shots at definitive targets. McNaugher observes that "the Army's training emphasis on carefully aimed fire seems to have been counterproductive. Trained to fire at targets, soldiers who could not see targets fired no shots."[37]

Marshall concluded that the solution was to increase volume of fire on the battlefield. Arguing that many soldiers were inherently reluctant to fire on a human being, even if that human being was an enemy soldier, he felt that soldiers should be trained not to fire at precise targets but at general regions of the landscape. Additionally, soldiers should be trained not in individual firing but in formation firing in order to mass fire. This harkened back to the days of 19th century musket drills, but Marshall argued

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[35] S.L.A. Marshall, "Ratio of Fire," *Infantry Journal* (September 1947): 32.

[36] S.L.A. Marshall, "Fire as the Cure," *Infantry Journal* (October 1947): 19.

[37] McNaugher, *The M16 Controversies*, 34.

this was necessary to increase bullets fired. After all, "bullets kept in the magazine when they should be fired are certainly bullets thrown away."[38]

In addition to downplaying the importance of individual marksmanship, Marshall argued that soldiers were more inclined to shoot their weapons if those weapons were larger or more powerful. In effect, many soldiers felt that their rifles were not worth firing. Marshall recalled seeing "many cases where men who had flunked it badly with a rifle responded heroically when given a flame thrower or BAR."[39]

It is certainly worth noting here that in the years since World War Two, Marshall's research techniques and conclusions have been extensively questioned.[40] The primary figure in his report, that only 25 percent of infantrymen fired their weapons, is something of a lightning rod for detractors of his work and draws heavy criticism.[41] The

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[38] Marshall, "Fire as the Cure," 21.

[39] Ibid., 19.

[40] Among others, Robert Engen has observed that Marshall's credibility as a scholar should be questioned because of the apparent fabrication of much of his data. Engen argues that Marshall was known to seek data which supported pre-conceived ideas, regardless of these ideas' veracity. See Robert Engen, "S.L.A. Marshall and the Ratio of Fire: History, Interpretation, and the Canadian Experience," *Canadian Military History* 20, no. 4 (Autumn 2011): 39-48, https://scholars.wlu.ca/cmh/vol20/iss4/4?utm_source=scholars.wlu.ca%2Fcmh%2Fvol20%2Fiss4%2F4&utm_medium=PDF&utm_campaign=PDFCoverPages.

[41] Contrasting Marshall's critics, F.D.G. Williams believes that Marshall's evidence is reliable and that his reports were consistent with his actual battlefield observations. Williams explains the harsh criticism of Marshall's 25 percent figure in two ways: 1) Some critics see the lower percentage of firing riflemen as an indictment of their own leadership and thus a personal attack. 2) Other critics, specifically World War II combat leaders, fell prey to the exact mistake for which Marshall is often criticized, namely, perceiving information that supported their assumptions or ideas. On the battlefield, stress and confusion could certainly lead to such incorrect conclusions. See F.D.G. Williams, *SLAM: The Influence of S.L.A. Marshall on the United States Army*, ed. Susan Canedy (Fort Monroe, VA.: Office of the Command Historian, U.S. Army

accuracy of Marshall's work is not the subject of this thesis however, and the important take-away is the influence of Marshall's findings on the Army's doctrine of small arms. An Army which previously resisted wasting ammunition in automatic weapons grew increasingly receptive to the idea of one as its standard infantry rifle.

Marshall was not the only one to advocate for higher volumes of fire on the battlefield. Writing for *Infantry Journal* in early 1946, Lieutenant Colonel John Kelly recalled the tactic of "marching fire" prescribed by General George Patton for his infantry echelons. The key goal of marching fire was to advance on the enemy "with all guns blazing . . . covering with a blanket of fire all possible or known enemy positions within range."[42] Kelly argued that the primary benefits of this technique included prevention of being pinned down, suppression of enemy resistance, and enormous psychological damage to the defender while boosting the morale of the attacker. Attacking GIs utilized a buddy system, with one firing while the other reloaded.[43] While most GIs were armed with the semi-automatic M-1 rifle, one can imagine how much more effective marching fire would have been with large numbers of automatic weapons.

Aware of this need, designers at Springfield Armory experimented with a full-automatic version of the M-1 Garand as early as 1944. But Army requirements were unrealistic: a selective-fire rifle (capable of either automatic or semi-automatic fire),

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Training and Doctrine Command, 1990), https://history.army.mil/html/books/070/70-64/cmhPub_70-64.pdf.

[42] LTC John E. Kelly, "Shoot, Soldier, Shoot," *Infantry Journal* (January 1946): 47.

[43] Ibid., 48.

including a bipod, 20-shot magazine, folding stock, ability to launch grenades, all weighing less than 9 pounds (the M-1 weighed nearly 10), and able to be produced on essentially the same equipment as the M-1.[44] It was simply not feasible. The extra components for automatic capability, enlarged magazine, and bipod would increase weight from the Garand, not decrease it. Work labored on through the end of the war and eventually resulted in the T20, an automatic version of the Garand which weighed just slightly less than the actual M-1 itself. But with the end of World War Two, the Army decided that there was no reason to expedite the new rifle's testing, and thus designers returned to their drawing boards.[45]

[44] Ezell, *The Great Rifle Controversy*, 42.

[45] Ibid., 56.

CHAPTER 3

NEW RIFLES AND NEW CALIBERS: THE M-14 AND M-16

Convinced that a full-auto version of the M-1 was impractical, Colonel Rene Studler, chief of the Small Arms Development Branch in the Pentagon, directed Springfield Armory to start over on a new design. This time however, Springfield Armory soon had more competition than it was used to. After creation of the North Atlantic Treaty Organization in 1949, the United States was tied to weapon and ammunition standardization agreements with its allies. This meant that the United States could possibly adopt a foreign weapon instead of a Springfield Armory design, and that any caliber changes must be coordinated through the alliance.

Furthermore, the United States found itself alone in its commitment to the full-power .30 caliber cartridge. Inspired by the German Sturmgewehr 44 rifle which fired a shorter, less-powerful .30 caliber bullet, the Soviets began producing the AK-47 by 1949, thus fielding the first mass-produced automatic rifle. At the same time, Great Britain determined the .280 cartridge was sufficient, and developed the EM-2 rifle to shoot it. Belgium did likewise with the Fabrique National FAL. In fact, it seemed that the United States was the lone holdout for a high-powered, long-range bullet.

Deeming the .30 caliber cartridges of the Sturmgewehr insufficient, the Army seemed to be at an impasse. It wanted an automatic rifle, lighter than the BAR, which could fire the full-sized .30 caliber cartridge in a controlled manner. All previous experiments with variations of the M-1 Garand suggested that this combination was not possible.

The answer came in the form of new gunpowder. Colonel Studler designed a new cartridge known as the T-65, which utilized Olin Chemical Corporation's new "ball" gunpowder.[46] Although Studler's T-65 bullet was shorter and lighter, it exhibited performance on par with that of the .30-06 and could penetrate enemy soldiers' equipment, clothing, and bodies at ranges up to 2,000 yards.[47] This new smaller cartridge, when combined with advances in metallurgy technology, suggested that the Army's requirements could finally be possible: a lightweight rifle capable of long-range shots. But just because it was technically feasible did not necessarily make it a good idea. Experience with the shorter "tanker" versions of the M-1 Garand suggested that high-power cartridges in shorter, lighter rifles produced undesirable side-effects, such as increased recoil and muzzle blast. Considering that the new rifle was intended to be full-automatic, one might expect that the repeated recoils produced by automatic fire would cause the weapon to be uncontrollable.

The Army remained absolutely committed to the T-65 cartridge however, and continued pushing rifle designs to fire it. Weapons engineers countered that too many requirements were being placed on one weapon. In essence, the Army wanted one rifle to fill the roles of all other small arms: submachine gun, carbine, rifle, automatic rifle, and sniper rifle.[48] The challenges presented by this demand caused firearm designers no end of heartache.

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[46] Hallahan, *Misfire*, 412.

[47] Ezell, *The Great Rifle Controversy*, 70.

[48] Ibid., 71.

Several studies conducted during the Korean War called into question the Ordnance Department's staunch commitment to a caliber that could shoot 1,000+ yards. Marshall had already observed that at least 20 percent of GIs in one European Theater battle never even saw a live enemy combatant; long range capability was useless with no targets. But another study made even more specific observations. In *An Effectiveness Study of the Infantry Rifle,* Donald L. Hall of the Ballistics Research Laboratory determined that the optimum range for rifle fire was 120 yards, with maximum range at 500 yards.[49] The study also noted the superb lethality of a .22 caliber projectile over the .30 caliber projectile, a revelation that would soon inspire development of the AR-15. Together, these two findings countered the deeply-held beliefs of the Ordnance Department. A second study known as the Hitchman Report concluded much the same.[50]

While the Americans squabbled over calibers, the British were quietly conducting their own research. Originally adopted in 1902, the Short Magazine Lee Enfield rifle (SMLE) served the British throughout both world wars with slight modifications. This rifle fired the .303 British rimmed round, which was incompatible with auto-loading mechanisms. Thus, British desires to develop an automatic rifle forced their search for a new caliber. Their efforts resulted in selection of the .276, the same caliber recommended by John Pedersen prior to World War Two. The British were committed to finding the

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[49] Donald L. Hall, "An Effectiveness Study of the Infantry Rifle," (Memorandum Report No. 593, Ballistic Research Laboratories, Aberdeen Proving Ground, MD, March 1952), https://apps.dtic.mil/dtic/tr/fulltext/u2/377335.pdf.

[50] Norman Hitchman, "Operational Requirements for an Infantry Hand Weapon," (Technical Memorandum ORO-T-160, Operations Research Office, The Johns Hopkins University, Chevy Chase, MD, June 19, 1952), https://apps.dtic.mil/dtic/tr/fulltext/u2/000346.pdf.

"lightest possible rifle and ammunition combination consistent with firing comfort."[51] Unfortunately, they were not to find the same mindset in the Americans. Upon presenting their research to the Ordnance Department, British representatives learned that, not only were the Americans not interested in their work, they were already fully committed to the new T65 full-power cartridge. Ezell observes that American rejection of the .276 cartridge was not for legitimate technical reasons, but rather a thinly-veiled display of "national, institutional, and personal biases."[52]

Remaining committed to the T65 bullet, the Ordnance Department continued its search for a new rifle. The first prototype to meet the Lightweight Rifle Program requirement was designer Earle Harvey's T25. First tested in 1948, it initially proved accurate and reliable. But weighing a mere 7.5 pounds, it proved totally uncontrollable in automatic firing.[53] Further testing identified metallurgy faults, and a redesigned stock caused even worse controllability issues during automatic firing.[54] Throughout the next five years, extensive testing against its European competitors, the British EM2 and the Belgian FAL, proved that all three weapons required additional development. Distracted by the Korean War and subsequent orders for nearly 1.5 million additional M-1 Garands, the Ordnance Department quietly scrapped the T25 project.

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[51] Ezell, *The Great Rifle Controversy*, 89.

[52] Ibid., 92.

[53] Hallahan, *Misfire*, 421.

[54] Ibid., 423.

The British also remained convinced of the superiority of their selected bullet, the .276. However, they were faced with a difficult decision: commit to the .276 and potentially alienate their powerful ally, or give in to American pressure and adopt the T65 and a rifle to shoot it.[55] Eventually, they begrudgingly chose the latter option.

By 1953, NATO had selected its new standardized caliber: the American T65, now known as the NATO 7.62 x 51mm. Great Britain selected the FN FAL as its new weapon, angering many in Parliament who lamented the selection of both a rifle and a cartridge of non-British design.[56] But the question of a standardized rifle was far from over in the United States.

The Americans eliminated the British EM2 from consideration, leaving the Belgian FN FAL and the T44. The T44 was a slightly-updated version of the T20 from World War Two, essentially a re-worked automatic version of the Garand. While not popular with the Infantry Board, Springfield Armory continued pushing the T44 in competition with the FN FAL. From 1951 through 1957, the two rifles entered a grueling period of head-to-head testing. The FAL proved the superior weapon in all respects save one: performance in the arctic environment. Clinging to this one redeeming aspect, Springfield Armory gained time to re-work the T44 and enter new rounds of competition against the FAL.[57] Ultimately, the Infantry Board decided both weapons were acceptable

[55] Ezell, *The Great Rifle Controversy*, 103.

[56] Ibid., 105.

[57] Ibid., 125.

for adoption, and on May 1, 1957, Secretary of the Army Wilbur M. Brucker announced that the Army had selected the T44, now known as the M-14, for its new infantry rifle.

This discussion of American rifle development from pre-World War One to the 1950s is critical to the story of the M-16. By the time of the M-16's invention and the adoption of the M-14, Springfield Armory was fighting for its very survival. Except for the M-1 Garand, the Armory had failed to produce any original designs worthy of standardization, and therefore its popularity with both Congress and the Pentagon was severely diminished.[58] Two of its three previous standardized rifles were based exclusively on foreign models (the Krag-Jorgensen of Norwegian design, and the 1903 based on the German Mauser). Now, the Army had almost standardized yet another foreign rifle, the FAL. By all accounts, the FAL was truly the better rifle, and Springfield Armory leadership knew it. Thus, Springfield Armory and the Ordnance Department had much at stake with the success of the M-14. The very last thing they needed was for yet another entry into the rifle discussion, but that is exactly what they got.

Invention of the M-16

The M-14 was only a slight improvement over the M-1 Garand invented twenty years prior. It met the caliber commonality requirement, and its close resemblance to the popular Garand ensured a sentimental position in the hearts of senior Army leaders. But infantrymen who wanted all the benefits of World War Two weapons such as light weight and automatic firepower in reality got none of those. The M-14 weighed only half a pound less than the M-1, was an inch longer, and only a select few designated

[58] Hallahan, *Misfire*, 436.

"automatic riflemen" actually received an M-14 with automatic capability.[59] The rest were semi-automatic only. As many had predicted, the rifle was a marginal performer on full-automatic mode, with strong recoil making the rifle's muzzle climb uncontrollably.

This continued lack of automatic capability contradicted significant research which recommended otherwise. The Ballistics Research Laboratory (BRL) and the Operations Research Office (ORO), both of which had previously published studies on the average distance of infantry rifle kills, also concluded that the probability of a hit increased with the number of projectiles fired. The important factor for a rifle was not its single-shot accuracy, but ability to send multiple projectiles downrange rapidly. This seemingly-obvious conclusion sent the two research agencies down different paths. ORO researched duplex and triplex ammunition, essentially a cartridge containing two or three individual bullets which would fire simultaneously. BRL pursued the "Small Caliber High Velocity" (SCHV) concept, eventually settling on a .22 caliber bullet capable of 3,500 feet per second.[60] While BRL's work focused on caliber more than automatic capability, their opinions were fully in line with the research trend toward automatic capability.

Yet many senior Army officers refused to accept these results. Indeed, Army Chief of Staff J. Lawton Collins wrote in 1952 that "the primary job of the rifleman is not to gain fire superiority over the enemy but to kill with accurately aimed rifle fire."[61]

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[59] U.S. Department of the Army, "History of the M16 Weapon System," B7.

[60] McNaugher, *The M16 Controversies*, 56-57.

[61] Colonel John T. Corley, "New Courses for Old Traditions," *Combat Forces Journal* (June 1953): 15.

Thus, even though one of the key points of the Lightweight Rifle Program was automatic capability, many high-ranking Army officers clung to traditional myths of ammunition waste and long-range marksmanship as reasons to avoid issuing an automatic rifle to every soldier. The Army remained divided on the merits of automatic rifle fire.

One senior Army officer did not cling to such myths, and remained highly skeptical of the M-14. General Willard C. Wyman, Commanding General of the United States Continental Army Command (CONARC), decided it was time to look away from Springfield Armory's bureaucratic egos. Wyman reached out to Eugene Stoner, chief of design for Fairchild Engine and Airplane Corporation's subsidiary, ArmaLite. Stoner had already invented the AR-10, a .30 caliber rifle which had unsuccessfully competed against the M-14 and the FAL in 1955-57. Unfortunately, it entered too late and was not adequately developed to have a fair chance. But it made a strong impression on many Army evaluators, Wyman included. And thus, in mid-1957 Wyman sent his own specifications to Stoner for a new, truly lightweight automatic rifle: .22 caliber, maximum weight (including ammunition) of six pounds, full- and semi-automatic capability, lethality to match the M-1 Garand up to 500 yards, and penetrating capability of a steel helmet out to 500 yards.[62] The M-14 had been the official rifle of the United States Army less than six months, and already a senior commander was questioning the rifle and the caliber, both products of Springfield Armory. It was no wonder that Springfield Armory and the Ordnance Department were prejudiced against any newcomers from the beginning.

[62] U.S. Department of the Army, "History of the M16 Weapon System," C1.

Stoner's solution was the AR-15. Built on the same revolutionary concepts as Stoner's previous AR-10, it featured metal alloys, plastics, and fiberglass in an attempt to minimize weight. Chambered originally for .222 caliber and weighing just over 6 pounds, it fit Wyman's specifications perfectly. Even more, its production costs promised to be far less than the M-14 due to its plastic materials and stamped-metal construction. Initial tests in 1958 against the M-14 at Fort Benning were a resounding victory for the AR-15; in grueling simulated combat tests, the experimental AR-15 experienced three times fewer malfunctions than the M-14.[63]

The onslaught of this radical new rifle presented a major challenge to the damaged reputation of Springfield Armory. Already unpopular because of the bungled M-14 development, Springfield now struggled to produce the M-14. In fact, by April 1960, it had produced just 4,245 rifles, a fraction of the 5 million required to field the Army.[64] If a new rifle could prove itself vastly superior to the troubled M-14 before production began substantially, Congress might ditch the M-14 program altogether in favor of the AR-15. Additionally, admission that both the M-14 and the .30 caliber were an inferior combination would be highly embarrassing for the United States; after all, it had just recently forced the T65 cartridge on its NATO allies, and rejected the Belgian FAL for the M-14. Worst of all, at least in the eyes of Springfield, Congress might conclude that the Armory was no longer needed. If research, development, and

[63] Hallahan, *Misfire*, 451.

[64] Ezell, *The Great Rifle Controversy*, 142-143.

production could all be conducted by private firms, faster, cheaper, and better, why keep Springfield Armory around?

Although Stoner's AR-15 performed well in the early tests at Fort Benning, it faced trouble in the subsequent two studies. First, Lawrence F. Moore conducted tests at Aberdeen Proving Grounds. Known nationally as an excellent marksman himself, Moore was unpopular with Springfield Armory and the Ordnance Department because of his past criticisms of Armory rifles.[65] Following completion of his tests in February 1959, Moore sent a report to Dr. Fred Carten, Chief of Small Arms Development in the Ordnance Department, which praised the AR-15 and recommended continued development. Carten's section published Moore's report, but stripped the positive aspects of the findings and focused on one negative issue: failure of the rain-in-the-bore test. After pouring water in the barrel and firing the rifle, the increased gas pressure from the water blockage caused the barrel to rupture. Moore had identified this as a relatively minor problem to solve, and indeed Stoner quickly designed a better barrel which subsequently passed all water-in-barrel firings. But Carten and the Ordnance Department insisted that the small diameter of the .223 barrel and its tendency to retain water through capillary attraction should disqualify the weapon entirely. Carten also ignored Moore's observation that the barrel's small size would discourage water from entering in the first place. Interestingly, rain in the barrel was not limited to small-bore barrels; even .30 caliber weapons such as the M-14 were susceptible to water retention.[66] Bob Orkand and

[65] Hallahan, *Misfire*, 456.

[66] McNaugher, *The M16 Controversies*, 64.

Lyman Duryea, both Infantry officers in Vietnam with extensive small-arms experience, note that infantrymen are careful to keep water out of their weapons' barrels regardless of the caliber.[67] If water did find its way into the bore, a simple opening of the rifle's action and tilting the barrel down would release the vacuum and allow the water to run out.

The second challenge to the AR-15's initial success came by way of the Arctic Test Board in Fort Greely, Alaska. Stoner had been told that he would be allowed to attend each of the rifle's tests in order to provide initial training and familiarity with the new weapon. But unknown to him, the Arctic Test Board began evaluating three of his rifles in December 1958. Only after running out of repair parts for the rifles did the Board notify Stoner and request his assistance. What Stoner found could hardly have given him assurance of a fair evaluation: the three rifles had loose front sights, one held in place with an incorrectly-installed taper pin, another with a piece of welding rod instead of the proper pin. No doubt, this severely impacted the rifles' accuracy, which was a key focus of arctic testing. Stoner also noted "homemade parts" which likely caused malfunctions experienced during the tests.[68] In spite of Stoner's objections, the Arctic Test Board's report rated the AR-15's performance poorly.

What happened next was a blatant indicator of Ordnance Department bias against the AR-15 and the Small Caliber High Velocity program. The Powell Board, chaired by General Herbert B. Powell (Deputy Commanding General of Continental Army Command), determined that an additional purchase of 750 AR-15 rifles was appropriate

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[67] Bob Orkand and Lyman Duryea, *Misfire: The Tragic Failure of the M16 in Vietnam* (Lanham, MD: Stackpole Books, 2019), 53.

[68] Ezell, *The Great Rifle Controversy*, 182.

to facilitate further testing. Again on the defense, Dr. Carten resisted the recommendation on the grounds that the AR-15's caliber was incompatible with NATO standardization. Rather, he suggested development of a new caliber, .258, which would be large enough to overcome the AR-15's primary test failure of rain-in-the-bore. This contradicted his own issue of NATO compatibility. But the Powell Board took the bait, and Stoner waited on the Ordnance Department to create the new .258 caliber so that he could re-design the AR-15 around it. After waiting "a number of months" and receiving nothing but conceptual drawings of the new bullet, Stoner visited the department and was informed that the .258 project was cancelled.[69] The bait-and-switch had accomplished exactly what Carten wanted: the AR-15 project was delayed, allowing the M-14 to start production without derailment from Congress.

But although the AR-15 suffered serious setbacks through these initial series of tests and reports, it was not the only rifle affected. Although already standardized, the M-14s used as control weapons against the AR-15 also performed poorly. The Powell Board's report elevated the AR-15 over the M-14 in reliability, ease of assembly and disassembly, and weight for both rifle and ammunition. In fact, had it been the M-14 under scrutiny instead of the AR-15, author William Hallahan argues the report would have caused cancellation of the M-14 program altogether.[70]

Although it is easy to suspect political conspiracy and intrigue from examples such as this, Carten and the Ordnance Department did have legitimate concerns with the

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[69] Hallahan, *Misfire*, 461.

[70] Ibid., 457.

AR-15. Foremost was the caliber controversy; the United States had already pushed hard for acceptance of the T65 cartridge with NATO and won. But the Ordnance Department also worried about manufacturing the radically-new AR-15. One of the M-14's key selling points was its similarity to the M-1 Garand and ability to utilize much of the tooling and machinery already in place. The AR-15 utilized completely new materials from stock to muzzle. Considering Springfield Armory's preoccupation with production efficiency, this concern had merit.

Legitimate concerns aside, there were certainly many indicators of illegitimate concerns and biases against the AR-15. As George Strichman, president of Colt Industries (soon to own manufacturing rights to the AR-15) noted, "we were up against the NIH Factor—Not Invented Here. The rifle's basic problem was that it hadn't been invented by Army arsenal personnel."[71] The AR-15 represented everything the Ordnance Department and Springfield Armory stood against: small caliber, automatic fire capability, short range, development by a commercial firm rather than internal military organization, and a complete break with tradition in looks, design and capability.

The House of Representatives would later publish the "Report of the Special Subcommittee on the M-16 Rifle Program." Known as the "Ichord Report" after its leading member, Representative Richard Ichord Jr. (D-MO), this investigation noted specific examples of bias against the AR-15 found during an Inspector General investigation in late 1962. Perhaps most blatant was the alleged statement by an unknown Army Colonel during a 1962 AR-15 planning meeting that "the U.S. Army Infantry

[71] Ezell, *The Great Rifle Controversy*, 183.

Board will conduct only those tests that will reflect adversely on the AR-15 rifle plus other tests that may be considered appropriate."[72] Ichord noted that other records documenting the meeting included no such statement, and the quoted Colonel later claimed that this statement was "not a reflection of what he intended to say."[73] Regardless, the Inspector General report noted other troubling evidence as well. For example, the M-14s used as control weapons were "specially selected and showed closer than normal tolerances," while the ammunition used was premium match-grade and much superior to that of normal M-14 ammunition.[74] On the other hand, the report noted that the AR-15 test firers lacked familiarity with their rifles, giving an obvious advantage to the M-14 firers. In addition, M-14s suffered a number of issues during tests which were largely ignored. For example, during the rain-in-the-bore tests, the M-14's wood stock became "swollen and discolored," which was omitted from test results. Ichord found a common trend from all testing agencies of language, wording, processes, and attitudes which subjectively favored the M-14 over the AR-15 in a manner not supported by objective test results.[75]

The Powell Board's recommendations were sent to Army Chief of Staff Maxwell Taylor. Taylor had been apprised of the AR-15 situation as early as January 1958 when

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[72] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 90th Cong., 1st sess., October 19, 1967, Texas Tech University Sam Johnson Vietnam Archive, 5330, https://www.vietnam.ttu.edu/virtualarchive/items.php?item=2250110016.

[73] Ibid.

[74] Ibid.

[75] Ibid.

he received a letter from General Wyman, urging Taylor to avoid committing himself to the M-14 during the upcoming Fiscal Year 1959 congressional budget hearings:

> As you know, in April 1958 we will receive two types of small caliber rifles, an Armalite and a Winchester, for evaluation at the USA Infantry Board. Should these rifles be found superior to the M14, as I am almost certain they will be, it would be most unfortunate if the Army had committed itself before Congress to irrevocable support of the M14 rifle. Disregard of the potential presented by the small caliber rifle at this time might well preclude the Army exploitation of a superior rifle system which could conceivably appear on the developmental scene at an early date.[76]

Taylor ultimately made his decision not primarily based on the Powell Board results, but on his concern that NATO caliber commonality was most important. Additionally, he felt that the AR-15 did not present a sufficient leap in capabilities to warrant financial and political capital. In January 1959, he decided that the M-14 would continue to be produced on schedule, and that any further weapons would be developed in 7.62 caliber until a "significant improvement" could be offered.[77]

Just four months after Taylor's decree, the Combat Developments Experimentation Center (CDEC) at Fort Ord, California, released a report which might have made Taylor's decision more difficult had it been released sooner. On Continental Army Command's request, the CDEC had been studying the concept of infantry rifles within a typical infantry squad. By simulating realistic attack and defense conditions, the study sought to compare target hit performance of the AR-15, the M-14, and a Winchester lightweight rifle prototype. CDEC's report, released in May 1959, was

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[76] U.S. Department of the Army, "History of the M16 Weapon System," C2.

[77] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5324.

unequivocally supportive of the AR-15, observing that the AR-15 surpassed the M-14 in volume of fire and number of targets hit, and that "a 5- to 7-man squad armed with the AR15 would be as effective as a 10-man squad armed with the M14."[78] The CDEC report strongly recommended further development of the AR-15 with the goal of rapidly replacing the M-14. Although the report was full of glowing praise for the AR-15, it is doubtful that it would have changed Taylor's decision even if it had been released in time. As noted, Taylor was concerned with NATO commonality and remained a strong advocate of the marksmanship tradition. Therefore, the fate of the AR-15 appeared to be sealed. Taylor had not only ruled in favor of the M-14 but had directed cancellation of any project not in 7.62 caliber.

Taylor's decision placed ArmaLite and its parent company, Fairchild, in a difficult position. Although Fairchild's president, Richard Boutelle, believed the AR-15 still had great potential, the company's financial challenges prevented it from further marketing or production investments. So, Boutelle made a fateful decision that was to alter the AR-15's course: he contacted Bobby Macdonald, an old friend who ran an international arms sales and marketing firm in Baltimore called Cooper-Macdonald, Inc. Cooper-Macdonald had already marketed Eugene Stoner's AR-10, and eagerly accepted the AR-15 assignment.[79] Macdonald contacted Colt's Patent Firearms Manufacturing Company of Hartford, Connecticut. Although Colt was also experiencing severe financial strain and even bankruptcy, it too eagerly took on the AR-15, signing a production

[78] U.S. Department of the Army, "History of the M16 Weapon System," C4.

[79] Hallahan, *Misfire*, 464.

license agreement in February 1959. Bobby Macdonald and Stoner immediately began an aggressive worldwide marketing tour, focusing primarily on countries in Southeast Asia. Thus, even as General Taylor seemingly signed the AR-15's death certificate, the black rifle took on an entirely new life.

Stoner and Macdonald demonstrated both the AR-10 and AR-15 in the Philippines, Singapore, Malaysia, Malaya, Indonesia, Thailand, Burma, India, and Italy, but found interest in the AR-10 severely lacking; in fact, Macdonald noted that "I ended up by giving away 6,000 rounds of 7.62 in the Philippines, because nobody wanted to shoot the rifle. Everybody wanted to shoot the AR-15."[80] Leaving behind their supply of AR-10 ammunition, the duo focused solely on the AR-15's newfound popularity. It fit the exact specifications sought by many Asian countries who needed a smaller rifle for the relatively small stature of the average Asian. The AR-15's weight and minimal recoil contrasted sharply with the heavy weight and uncomfortable kick of 7.62 weapons such as the M-14 and AR-10. Its fully-automatic capability made it a great replacement for the surplus M2 carbines used by many southeast Asian countries already. Perhaps the AR-15's greatest selling point was its remarkable performance during the tour. Macdonald later claimed,

> We fired around eight thousand rounds through that one rifle in the course of getting to India, and that means all the Malayans, everybody had a shot with it under all sorts of conditions. And as I recall, we had exactly one malfunction, and

[80] Robert Macdonald's testimony before the Ichord subcommittee, in U.S. Congress, House, *Hearings before the Special Subcommittee on the M-16 Rifle Program of the Committee on Armed Services*, 90th Cong., 1st sess., May 15, 16, 31, June 21, July 25, 26, 27, August 8, 9, and 22, 1967), 4787, https://hdl.handle.net/2027/uiug.30112109164266.

> that was easily traceable to a lip on the magazine which somebody had bent . . . It was the finest, most foolproof weapon I have ever seen in my life.[81]

And yet, for all the excitement and interest generated, Macdonald and Stoner received only small orders from Malaya, Indonesia, and India. Instead, they learned that due to existing military assistance agreements with the United States, participating countries could buy only those weapons already designated as "standard" by the US military. They were welcome to buy more M-1 Garands, M-1/M-2 carbines, or BARs, but none of these fit the requirements for lighter weight and more firepower. In addition, even non-participating countries generally decided not to purchase a rifle which the US had not standardized, citing parts and ammunition availability concerns.[82]

Colt thus requested additional testing on the AR-15 from Dr. Carten and the Ordnance Department in June 1960. Macdonald recalled later that his goal was not necessarily to replace the M-14, but simply to get the AR-15 officially labeled standard by the US in order to facilitate foreign sales.[83] Considering Carten's ties to the M-14 and his bias against the AR-15 in previous tests, it was no surprise that he denied this request.

Once again, the AR-15 appeared to be dead. The Army, who was assigned procurement responsibilities for all US military small arms, had repeatedly refused it. Foreign sales appeared impossible without US acceptance. But Macdonald refused to give up. Although the Army was the primary service responsible for procuring small

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[81] Macdonald testimony before the Ichord subcommittee, *Hearings on the M-16 Rifle Program,* 4787.

[82] McNaugher, *The M16 Controversies*, 77.

[83] Macdonald testimony before the Ichord subcommittee, *Hearings on the M-16 Rifle Program,* 4796.

arms, that did not mean it was the only service able to purchase rifles. Macdonald attempted to avoid the Army's blocking maneuvers by contacting General Curtis LeMay, Air Force Vice Chief of Staff and soon-to-be Chief of Staff. Aware of the general's interest in shooting and his friendship with Richard Boutelle, Macdonald suggested that Boutelle invite his old buddy LeMay to his birthday party. Boutelle annually threw a large joint birthday party for himself and the United States on July 4th at his farm near Hagerstown, Maryland. An energetic firearms enthusiast himself, Boutelle's farm was equipped with archery, rifle, and pistol ranges, and even skeet and trap fields. Macdonald saw an excellent opportunity to demonstrate the AR-15 to a senior military official. Arming himself with AR-15s, plenty of ammunition, and three watermelons, Macdonald placed the juicy targets at 50 yards and 150 yards. LeMay shot the first two and loved it; McNaugher records that LeMay was "highly impressed with its light weight, its relatively gentle recoil, and its lethality, at least as demonstrated by firing at the watermelons."[84] Macdonald then asked if LeMay wanted to shoot the third watermelon. "Hell no, let's eat it," LeMay replied.[85] At last, Macdonald had found a buyer with both interest and authority.

Macdonald's timing with the Air Force was perfect. LeMay had been seeking a replacement rifle for base security personnel, who were currently armed with the aging M-2 carbine. While LeMay understood the Army's rationale for the M-14, he felt it did not adequately meet the needs of the Air Force. Specifically, LeMay wanted controllable

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[84] McNaugher, *The M16 Controversies*, 79.

[85] Macdonald testimony before the Ichord subcommittee, *Hearings on the M-16 Rifle Program,* 4800.

automatic fire, which the M-14 could not provide.[86] And so, when LeMay requested re-tests from the Army just one week after the AR-15's successful foray against the enemy watermelons at Boutelle's farm, he asked not with the goal of replacing the Army's M-14 but with a desire to have the AR-15 approved for Air Force purchase. Grudgingly, the Army began re-evaluating the AR-15 in the fall of 1960 at Aberdeen Proving Grounds.

Not surprisingly, the AR-15 performed well. However, the surprising result came out of the rain-in-the-bore test, which the rifle had previously failed in 1959. In particular, Dr. Carten and the Ordnance Department had used the rain-in-the-bore test to derail the AR-15 program. This time, the AR-15 performed satisfactorily, and outperformed both the M-1 and the M-14 in a number of simulated combat environments.[87] The only obvious difference between the two tests seemed to be the supervising audience in the 1960 Air Force tests, which included LeMay and numerous other Air Force leaders who expected positive test results. Far from glowing, Dr. Carten's test report finally admitted that the black rifle was "reasonably satisfactory."[88] Following these successful tests, the Air Force conducted its own testing at Lackland Air Force Base with excellent results. Based on this sequence of events, LeMay initiated purchase of 80,000 rifles. Although the request faced opposition within the Office of the Secretary of Defense (OSD), Deputy Defense Secretary Roswell Gilpatrick gave the go-ahead for

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[86] McNaugher, *The M16 Controversies*, 78.

[87] Hallahan, *Misfire*, 469.

[88] R. Blake Stevens and Edward C. Ezell, *The Black Rifle, M16 Retrospective* (Toronto: Collector Grade Publications, 1987), 95, https://www.scribd.com/document/498006807/Black-Rifle-I.

purchase of 8,500 rifles, pending congressional approval by the House Subcommittee on Department of Defense Appropriations.[89]

Chaired by Representative George H. Mahon (D-TX), the subcommittee denied the request, partly because of LeMay's intended funding source for the purchase. Rather than using future budget funds, LeMay had planned to re-program unused funds from the previous year in an attempt to expedite the process. However, the committee also sided with the Army, relying on its expertise as the small arms procurement service. In the Committee's eyes, it made little sense to introduce a new rifle into the inventory which had just been deemed unacceptable by the Army. Additionally, the ever-present issues of NATO commonality and logistical simplicity influenced the decision. Dissatisfied with the committee's verdict, LeMay continued to persevere until President Kennedy finally told him to "stop badgering the Army about the AR15."[90] Kennedy was not familiar with the AR-15 at this point, nor was he taking sides specifically with the M-14. He was more concerned about LeMay's funding strategy, which Kennedy considered unconstitutional.[91]

Although LeMay's attempts failed, his effort was not totally in vain. The justification of the rifle's necessity for the Air Force had not been clearly presented to

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[89] McNaugher, *The M16 Controversies*, 80.

[90] Thomas L. McNaugher, *Marksmanship, McNamara, and the M-16 Rifle: Organizations, Analysis, and Weapons Acquisition* (Santa Monica, CA: The Rand Corporation, 1979), 30.

[91] McNaugher, *The M16 Controversies*, 80.

Mahon's committee, causing confusion as to why the M-14 would not suffice.[92] Mahon had denied the purchase request, but stated that he would review the matter further in January 1962 if requested. In effect, his answer was "not now," rather than "no, never."

Perhaps most importantly, LeMay and the Air Force had included the term "special warfare" as its justification for purchasing the AR-15. Always a proponent of unconventional warfare, Kennedy and his administration began to take note of the rifle even as the President stopped LeMay's efforts. Thus, LeMay made a significant contribution to the AR-15 saga simply by bringing it much-needed attention from senior Defense Department leaders and the President.

[92] U.S. Department of the Army, "History of the M16 Weapon System," C11.

CHAPTER 4

THE M-16 ENTERS VIETNAM

Still undefeated, the AR-15 received yet another renewal of interest. The Advanced Research Projects Agency was established within the Department of Defense in 1958 with the specific purpose of scientific research, design, and engineering for long-range defense projects. As a Defense Department organization, ARPA did not fall under a specific service branch and thus could avoid the bureaucratic tangles of service traditions, such as the Army's marksmanship tradition. McNaugher writes that ARPA began focusing on limited-war scenarios during the Eisenhower administration, but received little support due to Eisenhower's "New Look" strategy and its focus on nuclear war.[93] Kennedy's "Flexible Deterrence" strategy brought a new interest in counterinsurgency, graduated response, and limited war scenarios which renewed ARPA's focus on the country's ability to provide support to allies. Thus, in spring 1961 ARPA initiated Project AGILE which sought to conduct "research and engineering support for the military and para-military forces engaged in or threatened by conflict in remote areas of the world."[94] With a major focus on Southeast Asia, Project AGILE needed a new firearm to equip the South Vietnamese military. While some advocated the outdated M-1 Garand, AGILE personnel countered that it was too heavy and

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[93] McNaugher, *The M16 Controversies*, 83.

[94] *Hearings before the Subcommittee on DoD Appropriations, Committee on Appropriations*, 88th Cong., 1st sess., part 6, 221-223, quoted in McNaugher, *The M16 Controversies*, 83.

cumbersome for the small-statured Vietnamese.[95] The M-14 was lighter than the M-1 but its recoil was still too powerful for the Vietnamese, and besides it continued to face its own production problems and was in limited supply even for the US Army. The M-2 carbine made the most sense, but like the Garand it was getting old and the Army's stock of carbines required excessive maintenance. In addition, carbine ammunition was relatively weak; after all, the carbine was never designed as a replacement for a frontline infantry rifle.

Once again, the intrepid salesman Bobby Macdonald intervened. Flying to Saigon in mid-1961, he met with Colonel Richard Hallock, commander of Project AGILE's Combat Development Test Center. Macdonald highlighted all of the AR-15's selling points: light weight, low recoil, automatic capability, and reliability; in short, the weapon of choice for Hallock's Vietnamese advisees. After firing the weapon himself, Hallock immediately submitted an order for 4,300 rifles. This request was quickly denied by the Deputy Secretary of Defense however, who declared that "the political implications were such that any procurement would have to have Congressional approval."[96] Hallock then requested ten rifles, which was successful only because ARPA used its own funds for the purchase.[97]

At last, Macdonald had succeeded in gaining a true foothold. The ten AR-15s were soon in the hands of Vietnamese troops and American advisors, who gave it

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[95] Ezell, *The Great Rifle Controversy*, 186.

[96] U.S. Department of the Army, "History of the M16 Weapon System," C12.

[97] McNaugher, *The M16 Controversies*, 83.

positive marks. Their reports from the field gave credence to Colonel Hallock, who re-submitted his order of 4,300. Secretary of Defense McNamara himself approved purchase of 1,000 rifles in December 1961; although not the full number wished for by ARPA, this was a major step for the AR-15. McNamara had been solidly behind the Army's M-14 until the summer of 1961, when he testified before Congress that "I think that it is a disgrace the way the [M-14] project was handled. I don't mean particularly by the Army, but I mean by the nation."[98] His approval for such a purchase signaled weakened commitment to the M-14.

One reason for McNamara's shift on the AR-15 controversy was the relentless public-relations campaign launched by Colt. Having purchased marketing and manufacturing rights from Fairchild and Armalite in 1959, Colt had "gambled its corporate future on the AR-15."[99] The company had struggled financially since World War Two, and in fact was mere days from "financial collapse" at the time of ARPA's order in 1961.[100] And so, Colt began a public attack on the object standing in the AR-15's way, the M-14 rifle, and its main proponent, the Ordnance Department. From magazine articles to demonstrations of the AR-15 for senior defense officials in Washington, Colt used every opportunity to denounce the M-14 and praise the AR-15. As noted earlier, Colt president George Strichman blamed the AR-15's struggles on the

[98] Report on M14 Rifle Program, Preparedness Investigating Subcommittee of the Committee on Armed Services, 87th Cong., 1st sess., 1961, quoted in Ezell, *The Great Rifle Controversy*, xii.

[99] Ezell, *The Great Rifle Controversy*, 183.

[100] Hallahan, *Misfire*, 472.

"NIH Factor—Not Invented Here." Specifically calling out the Ordnance Department, he accused, "they got the M14 adopted, then tried to cover their tracks. They resented the AR-15 being thrust upon them."[101]

Another explanation for McNamara's new support of the AR-15 was that the M-14 program faced serious production issues which gained the Defense Secretary's attention. In fact, by the time ARPA successfully ordered the first 1,000 AR-15s, the M-14's three initial producers had only recently resolved a series of major setbacks causing massive delays in M-14 delivery.[102] Springfield Armory produced the initial 15,600 rifles in 1958, but needed the assistance of commercial firms to manufacture the 5 million rifles ultimately required to equip the entire Army. Beginning in 1959, Harrington & Richardson experienced problems with disintegrating bolts and receivers caused by using the wrong steel, which was somehow delivered to the factory by accident. Winchester struggled to follow through with its plan to automate production of the receiver, and to manufacture barrels out of the steel specified by the Ordnance Department. Both manufacturers struggled to implement a last-minute heat-treatment procedure that the Army deemed critical. By the end of Fiscal Year 1960, only about 270,000 M-14s had been produced.[103]

The problem was so severe that Senator Margaret Chase Smith (R-ME) initiated an investigation by the Senate Preparedness Investigating Subcommittee, chaired at the

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[101] Ezell, *The Great Rifle Controversy*, 183.

[102] Ibid., 150-152.

[103] Ibid., 153.

time by Senator Lyndon B. Johnson (D-TX). While Senator Smith's motive for the investigation could be questioned (one of the M-14's major sub-contractors was located in her electorate state of Maine), she also wanted to ensure the military was properly equipped. Having already investigated ammunition shortages during the Korean War, Smith was familiar with defense production and contracts. Her report concluded that the M-14 procurement and manufacturing process had been handled poorly by both Army and contractor personnel, and questioned the Army's decision to focus production on commercial firms rather than Springfield Armory.[104]

In addition to Senate attention, the public spotlight became focused on the M-14 as well. A series of damning articles appeared in 1961, highlighting the M-14's development and production struggles. One such article, published in the New York Herald Tribune in June 1961, went so far as to suggest that the M-14 was "a major blunder . . . the result of an official Army ordnance policy, laid down in 1946, to get rid of short-range, light impact spray-fire weapons."[105] The combination of public and official interest caused increased questioning of the M-14 in the President's office.

Such a critical shortage of rifles on the eve of possible war was unfortunately an all-too-familiar scenario to the United States Army. In World War One, the Army lacked sufficient numbers of the 1903 Springfield, and fought largely with the Americanized version of the British P14 Enfield. In the early days of World War Two, American troops fought with leftover 1903 Springfield rifles while they waited on sufficient deliveries of

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[104] Ezell, *The Great Rifle Controversy*, 204.

[105] A. J. Glass, The M14: Best Army Rifle—or a Major Ordnance Blunder?" *New York Herald Tribune*, June 26, 1961, quoted in McNaugher, *The M16 Controversies*, 81.

M-1 Garands. With the Bay of Pigs disaster foreshadowing Kennedy's interest in continued unconventional warfare and the ever-present threat of war with the USSR, Kennedy and McNamara did not want to see the Army so ill-prepared for another conflict that it must equip itself with the 1930s technology of the M-1 Garand. Indeed, even during Kennedy's first year in office, American troops in Berlin were carrying M-1s.[106]

McNamara's approval of ARPA's AR-15 order proved to be the decisive turning point for Colt's automatic rifle. Now that the Department of Defense had approved initial orders, two services proceeded to purchase AR-15s: the Navy purchased a small number of rifles for its SEAL forces in May 1962, and General LeMay was finally able to proceed with his own plans to standardize the AR-15 as the Air Force's official new rifle in January 1962. By May, the Air Force had ordered 8,500 rifles from Colt, with another 19,000 ordered in 1963, and over 8 million rounds of .223 caliber ammunition from Remington.[107]

While the Air Force validated Bobby Macdonald's persistence as a salesman in the United States, the AR-15 was meanwhile validating Eugene Stoner's brilliance as a rifle designer through its trials in Vietnam. Of the 1,000 rifles purchased by ARPA, 965 were issued to seasoned Vietnamese combat troops for evaluation against their current weapons including the M-1 Garand, the M-1/M-2 carbine, the BAR, and the Thompson sub-machine gun.[108] The results were a resounding endorsement of the AR-15's

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[106] Hallahan, *Misfire*, 479.

[107] McNaugher, *The M16 Controversies*, 85.

[108] Defense Advanced Research Projects Agency (DARPA), Research & Development Field Unit, "Report of Task No. 13A, Test of ArmaLite Rifle, AR-15,"

reliability, lethality, and ease of use, especially in the Southeast Asian environment. Field reports often praised the automatic fire capability which allowed infantrymen to fire bursts, thus increasing the probability of a hit. They also described the bodily damage caused by the .223 bullet, as illustrated in the following excerpt from ARPA's June 1962 report on the wounds inflicted on five Viet Cong casualties:

1. Back wound, which caused the thoracic cavity to explode.
2. Stomach wound, which caused the abdominal cavity to explode.
3. Buttock wound, which destroyed all tissue of both buttocks.
4. Chest wound, from right to left, destroyed the thoracic cavity.
5. Heel wound, the projectile entered the bottom of the right foot causing the leg to split open from the foot to the hip.[109]

These wounds were all immediately fatal except for the third casualty, who lived about five minutes. Any doubts as to the lethality of the AR-15's small caliber, at least at ranges within 100 meters (as were these casualties), was put to rest: "The lethality of the AR-15 and its reliability record were particularly impressive. All confirmed casualties inflicted by the AR-15, including extremity hits, were fatal."[110] The ARPA report noted that the AR-15 was far superior to all other comparison weapons, and was "considered by both Vietnamese Commanders and US Military Advisors who participated in the tests as the

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DARPA, Arlington, VA, July 31, 1962, Annex A, 1, https://apps.dtic.mil/dtic/tr/fulltext/u2/343778.pdf.

[109] Ibid., 5.

[110] Ibid., 8.

best 'all around' shoulder weapon in Vietnam."[111] Referencing the AR-15's two primary failures from the first Aberdeen tests (cold weather test and rain-in-the-bore), ARPA testing personnel noted that neither affected the AR-15's performance; extreme cold temperatures did not occur in Vietnam, and actual combat use validated the successful results of the second Aberdeen rain-in-the-bore test when personnel were allowed to open their rifles' receivers, thus releasing all water out the barrel.

For all the praise of the AR-15, ARPA had only two recommended improvements to make: the upper handguard was difficult to grip when wet, and the rifle's barrel cleaning rod was just barely long enough and thus difficult to grip during use.[112]

ARPA's report did not attempt to recommend the AR-15 as a replacement for the United States' primary rifle, and indeed much of its praise for the AR-15 was based on its suitability for the small-statured Vietnamese soldier and the short-range, high-intensity nature of the Vietnamese conflict. Senior Army officials who supported the M-14 could have thus concluded that the AR-15 was perhaps fine for America's Asian allies, but not for the American soldier who had to be equipped to fight in any environment. This conclusion would have ignored studies conducted after World War Two, which suggested that the short ranges encountered in jungles were not unique to the Vietnamese battlefield. As noted earlier, the Hall Report and the Hitchman Report both decried the Army's misguided focus on long-range shooting. Hall observed that the optimum rifle

[111] DARPA, "Report," Annex A, 9.

[112] Ibid., Annex C, 1.

range was 120 yards, while Hitchman concluded that most kills were under 100 yards.[113] These reports, both released in 1952, were based on data from Korean battlefields, but their findings matched the ranges noted in Vietnamese engagements. Thus, it was a false assumption that the jungle limited rifle shots significantly more than other battlefields, and ARPA's report was just one more condemnation of the Army's commitment to long-range shooting and the resulting ties to the M-14.

It was a combination of all these reports, Hall, Hitchman, CDEC, and ARPA, which led to the Secretary of Defense's first official inquiry into the AR-15 controversy.[114] Known as the Hitch Report and published in September 1962 by Assistant Secretary of Defense (Comptroller) Charles Hitch, the inquiry's report picked up where the ARPA report left off: it specifically denounced the M-14 as being inferior to both the M-1 Garand and the Soviet AK-47 while highlighting the AR-15's superiority for all battlefields. Analyses of weight, accuracy, lethality, tactical flexibility, and reliability gave the AR-15 a clear victory; furthermore, the findings concluded that the AR-15 was cheaper. In summary, the report declared the AR-15 "up to 5 times as effective as the

M-14 rifle."[115]

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[113] Hallahan, *Misfire*, 429-432.

[114] U.S. Department of Defense, Office Deputy Assistant Secretary, Systems Analysis, *A Comparison of AR-15 and M-14 Rifles (Effectiveness and Cost)* (Washington, DC: September 27, 1962), https://www.docdroid.net/BAT5HZI/a-comparison-of-ar-15-and-m-14-rifles-hitch-report-pdf.

[115] Ibid., iii.

McNaugher observes that the Hitch report "presented the AR15 in the best light, and the M14 in the poorest light, that the uncertainties that surrounded each weapon's performance would allow."[116] There are certainly aspects of the report that sound biased toward the AR-15; for example, in a summary of the AR-15's accuracy versus the M-14, the report states: "The AR-15 rifle is equal, and probably superior, to the M-14 rifle in basic accuracy at ranges of interest."[117] In this statement, it departed from the normally quantitative and definitive language used by declaring the AR-15 "probably superior." Furthermore, in analysis of the AR-15's lethality, it relied heavily on the ARPA field reports from Vietnam, complete with descriptions of the wounds listed above. The M-14 received no such examples, nor any lethality data at all; rather, the report stated "M-14 lethality should be the same as that for the M-1 cal 30 AP" and included only data derived from M-1 Garand lethality statistics.[118]

Although not perfect, the report was the most thorough, comprehensive, and fair picture of the AR-15 produced to date, and its impact was immediate. Upon reading the Comptroller's report, McNamara grew concerned over the opposing views taken by it and the Army. How could one weapon generate such radically differing results, especially for something as seemingly objective and simple as an infantry rifle? After all, McNamara and his "whiz kids" were handling much more complex programs; no doubt he felt frustration that the Department of Defense could not even seem to get a rifle right.

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[116] McNaugher, *The M16 Controversies*, 109.

[117] U.S. Department of Defense, *Comparison*, III-1.

[118] Ibid., V-3.

In his 1961 criticism of the M-14 program during congressional testimony, he had noted that "it is a relatively simple job to build a rifle compared to building a satellite . . . or a missile system."[119]

If McNamara was frustrated by contradicting tests and results, the months following the Hitch Report were even worse. President Kennedy soon learned of the renewed controversy, and, receiving a brief of the Hitch Report, sought answers from McNamara. McNamara ordered Secretary of the Army Cyrus Vance to conduct a re-evaluation of the competing rifles, in addition to the Soviet AK-47, and to account for the discrepancies of reports. General Earl Wheeler, Army Chief of Staff, thus initiated yet another comprehensive round of testing. Conducted in four international locations, the tests covered a host of tactical and technical topics including "logistical implications, doctrine and concepts, political implications (international and domestic), Soviet small-arms characteristics, doctrine, concept of development trends, technical aspects of the three weapons and the Special Purpose Individual Weapon (SPIW)."[120] The AR-15's old nemesis, Dr. Carten, developed the tactical portion of the tests and also conducted the evaluation.[121]

Not surprisingly, Dr. Carten and the Army doubled down on support of the M-14. Tests were based on military rifle characteristics as defined in 1954 standards, and

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[119] Report on M14 Rifle Program, quoted in Ezell, *The Great Rifle Controversy*, xii.

[120] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5328.

[121] Hallahan, *Misfire*, 481.

therefore incorporated firing at ranges of 800 yards; naturally, the M-14 proved superior. Pop-up silhouette targets remained visible for longer periods than identified in the ORO studies of Korean combat, giving those firing the single-shot M-14 more time to aim and thus negating the AR-15's benefit of automatic fire with regards to hit percentages.[122] In this regard, the tests failed to answer the real question of the Hitch Report and the rifle controversy: what was the correct tactical doctrine of the future? Was it the doctrine of tradition, with sharpshooting infantrymen firing at targets at 1,000 yards, or was it the doctrine according to the Hall and Hitchman Reports, advocating firepower superiority at less than 300 yards?

The tests also highlighted a troubling aspect of the AR-15 which had not previously surfaced: the rifle and its ammunition suffered from a lack of quality control during manufacturing. This manifested itself during tests, with faulty ammunition literally falling apart and a malfunction rate for the AR-15 of eight times that of the M-14.[123] McNaugher attributes these issues not to a lack of quality design but to a lack of quality control in manufacturing.[124] ArmaLite and Colt had spent the majority of their efforts and funds in marketing the rifle as-is, rather than subjecting the production process to the routine rigors of development normally due to emerging military designs. The fault was certainly not theirs alone; in defending the M-14, the Army did not participate in the AR-15's production development either.

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[122] McNaugher, *The M16 Controversies*, 94.

[123] Hallahan, *Misfire*, 482.

[124] McNaugher, *The M16 Controversies*, 90.

In spite of the malfunction issue, Colt and AR-15 supporters had many reasons to cry foul on the tests of late 1962. For one, the tests were seemingly unnecessary; aside from the quality control issue, which was probably a manufacturing problem rather than a design problem, essentially none of the data produced by the tests answered any questions which had not been thoroughly addressed by the CDEC or ARPA tests. For another, the tests were rushed and ill-prepared; whereas the CDEC test had taken a full year to develop and conduct, the Army's 1962 test was initiated and completed in less than a month. The Army's instructions to its evaluators illustrated this point: "Initiation of testing will not await submittal or approval of final detailed plans. Representation at tests will be kept to a minimum . . . Tests should not be influenced or delayed by the requirements for observers."[125]

Perhaps most significant, however, was the issue of bias against the AR-15. In addition to examples noted earlier, the 1962 Inspector General investigation identified several instances of bias against the AR-15 during testing. For example, in one accuracy test participants fired the M-14 on semi-automatic mode while the AR-15 was set to full-automatic.[126] Clearly, this was not a fair evaluation of accuracy, since no automatic weapon could match the precision of a single-shot rifle. This therefore negated any superiority the AR-15 might have held.

For all the questionable aspects of the worldwide testing, one report stood out for both its crudeness and its stark contrast to the ARPA evaluations. Conducted by the

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[125] Stevens and Ezell, *The Black Rifle*, 112.

[126] Ibid.

Army's Biophysics Division at Aberdeen Proving Ground, ballistics experts attempted to replicate the stunning lethality described by the ARPA report's authors. These so-called experts carried out a series of scientifically-questionable tests by comparing the effects of the AK-47, the AR-15, and the M-14 against goats, human legs, and, shockingly, decapitated human heads. Although the human heads apparently originated from India, there exists no information on how exactly these remains were obtained. In fact, the Army attempted to cover up existence of the test, aware of the negative scrutiny which would inevitably follow. The evaluation report was not declassified until the early 2000s, and the Army even refused to share copies of the report with the Defense Secretary's office in 1963. In his excellent book on the history of automatic weapons, C. J. Chivers observes that the results of such tests were quite predictable, having been established by similar tests conducted in 1902. The heads exploded, regardless of which weapon was shot, and the goats were killed with generally comparable effectiveness. The evaluators thus gained very little useful information.[127]

However, one aspect of the test should have been revelatory. In firing the AR-15 against human legs, the evaluators were unable to replicate the effects described by ARPA in Vietnam. While the ARPA report described severed limbs and extreme destruction, the Biophysics Division could obtain no such results by shooting at human legs, even when using different types of ammunition or shooting the legs at different angles.[128]

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[127] C. J. Chivers, *The Gun* (New York: Simon and Schuster, 2010), 288.

[128] Ibid.

What then could explain the contrasts between the laboratory tests and the ARPA evaluations? Chivers argues that ARPA's "tests" lacked scientific credibility, and read more like a sales pitch by Colt than a legitimate field test. Noting that many of the wounds described by ARPA were to be expected with any gun used, such as massive damage caused by head wounds, the ARPA report was "short on dispassionate observation but long on product boosterism."[129] Perhaps it was the report of soldiers excited to use a new piece of equipment, or perhaps there was more influence by Colt personnel than advertised. Regardless, ARPA's conclusion of the AR-15's extreme lethality was hard for the Defense Secretary to overlook, and Aberdeen's tests did little to counter it.

Submitted on January 9, 1963, General Wheeler's comprehensive report to Vance and McNamara included three possible courses of action for the rifle controversy. The first was to proceed with the M-14 production program "until a radically improved individual weapon could be procured, such as the SPIW or its equal."[130] The second option was to terminate the M-14 production line at the end of Fiscal Year 1963, to initiate AR-15 production in order to fill the remaining requirement for rifles, and to continue with SPIW research and development. The third option recommended continued procurement of M-14s, supplemented with AR-15s specifically for Air Assault, Airborne, and Special Forces units and continued development of the SPIW. Based on the Army's

[129] Chivers, *The Gun*, 282-283.

[130] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5328.

tests and opinions, the report recommended the first option: proceed with M-14 production and continue developing the SPIW. Specifically, the report concluded:

> An analysis of all data submitted indicated that, of the weapons tested, only the M-14 is acceptable for general use in the U.S. Army. The AR-15, although lighter than the M-14, is not considered suitable as a replacement weapon because: it is less reliable; it has poor pointing and night firing characteristics; its penetration is marginally satisfactory; and its adoption would violate the NATO standardization agreements.

As for the widely varying opinions, the report explained:

> Throughout the numerous reports available on this subject it is apparent that opinions and positions are many and varied as are their origins. It appears that the divergencies encountered are due to the extreme personal nature of a hand-held weapon. Personal likes and dislikes on intimate or personal implements are comparable to the variance in preference for rifles.[131]

Although General Wheeler was apparently open to the AR-15, he was swayed by two problems. First, his chief proponent for small arms development, the Ordnance Department, still fought fiercely against the newcomer rifle. Second, the Secretary of Defense's meddling in the Army's rifle problem set a dangerous precedent which concerned Wheeler for its possible future implications.[132] Therefore, his report clearly favored the M-14. But his position seemed to tacitly acknowledge the M-14's shortcomings by recommending continued development of the SPIW.

The SPIW was a concept which originated in the 1950s by a private inventor, Irwin R. Barr, and research company Aircraft Armaments Inc. (AAI). Barr's proposal incorporated flechettes, or tiny finned darts, into each individual bullet. Benefitting from

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[131] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5328.

[132] McNaugher, *Marksmanship*, 33.

Operations Research Office's Project SALVO studies which encouraged the use of multiple projectiles, AAI and other groups spent the 1950s developing various cartridges and firing mechanisms. Eventually resulting in a proposal known as the All-Purpose Hand-Held Weapon, the Army began funding the research in 1958 and by January 1962 had developed published military characteristics for the SPIW. In addition to flechettes, the SPIW was to include an integrated 40mm grenade launcher.[133] This was the project on which Wheeler and the Army hedged their bets in order to avoid purchase of the AR-15.

But although the project had promise, it had major obstacles to overcome. For example, flechette ammunition technology by 1962 was still highly complicated, both in manufacturing and operation. AAI's rifle models included a stripper mechanism at the end of the barrel which separated the sabot from the flechette. The increased complexity from this radical new concept suggested increased costs as well. Perhaps most importantly, the SPIW was still very much conceptual at the time of McNamara's inquiry into the AR-15 problem. Thus, while the Army tried to defend its beloved M-14 by looking to the futuristic SPIW, McNamara "caught the service defending the indefensible while it proposed the seemingly infeasible."[134]

The Army's enthusiasm for the SPIW is surprising, for in many respects the characteristics of the SPIW were on par with those of the AR-15. Both designs represented a radical shift from the Army's rifleman tradition. The AR-15 was not meant

[133] Ezell, *The Great Rifle Controversy*, 235.

[134] McNaugher, *The M16 Controversies*, 75.

to shoot past 500 meters, and was most effective within 300 meters. Likewise, the SPIW was designed for ranges up to 400 meters, incorporating just one battle sight setting for that fixed range.[135] The AR-15 looked different than any previous battle rifle, and SPIW concept prototypes looked like something from Star Wars. Both were small-caliber high-velocity designs which violated NATO commonality agreements. And, both were invented by non-Army weapons designers, although, unlike the AR-15, the SPIW concept received buy-in from the Army early in the developmental process. Indeed, perhaps the only difference was the Army's perceptions of the rifles. The AR-15 represented a threat to the M-14, while the SPIW represented a salvation.

Dr. J. A. Stockfisch suggests an alternate explanation for the Army's enthusiasm, opining that the SPIW was "not a weapon; it was a political tactic in the sense that Army thinkers quickly conceived the program as a way of heading off a possible major purchase of M16s."[136] While this is a truly sad commentary on the American small arms procurement process, it makes sense. The Army and specifically the Ordnance Department deserve no benefit of the doubt based on examination of available evidence.[137]

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[135] Ezell, *The Great Rifle Controversy*, 240.

[136] J. A. Stockfisch, *Plowshares into Swords: Managing the American Defense Establishment* (New York: Mason and Lipscomb, 1973), 173.

[137] By a February 1966 deadline, neither Springfield Armory nor AAI had completed their SPIW prototypes. The Army approved a 90-day extension, but neither organization actually delivered their weapons until August 1966. The SPIW program would labor on through the mid-1970s, but was never a serious contender as a replacement rifle.

McNamara's rifle decision was complicated by several factors. First was the ever-present concern of NATO commonality, which had been a recurring concern listed in reports since the AR-15's invention. But the Army's 1968 *Report of the M16 Rifle Review Panel* noted that the issue was never actually discussed with NATO allies, and thus the United States did not know the allies' opinions on the matter.[138] Of course, having just adopted the T65 cartridge against its allies' wishes, one can imagine the embarrassment such a conversation would cause, and American diplomats probably did not wish to bring up the idea of changing calibers once again.

The second complicating factor was the specter of bias, which the Inspector General investigated thoroughly. Although the Inspector General found evidence of bias against the AR-15, it was unclear just how much effect such bias had. Some of the Inspector General's most damning evidence was refuted; for example, the unnamed Army officer who allegedly stated that "the US Army Infantry Board will conduct only those tests that will reflect adversely on the AR-15" claimed that this comment was taken out of context and was not an actual indication of bias against the AR-15.[139] Naturally, one would expect such a statement to be recanted during an investigation, but it is difficult to imagine the innocent context in which this senior officer claimed he made the remark. Regardless of the truth, the statement was included in the report, and it was up to McNamara to make a decision.

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[138] U.S. Department of the Army, "History of the M16 Weapon System," C18.

[139] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5330.

The third factor was Colt's persistent public relations campaign, which as noted earlier included articles in widely-distributed magazines. Two specific articles appeared in April 1963 editions of *True* and *Gun World* magazines, respectively titled "The Blunderbuss Bungle that Fattened your Taxes" and "The M14: Boon or Blunder?"[140] Strongly biased against the M-14, both articles' authors described that rifle's troubled past. Such narratives, Colt hoped, would sway public opinion toward the AR-15 and pressure the Army and Defense Department likewise.[141]

Perhaps Colt's efforts paid off, for Wheeler, Vance, and McNamara finally came to an agreement in January 1963 for a one-time purchase of between 50,000 and 100,000 rifles in order to equip special units such as Airborne and Air Assault. This agreement was caveated that no such units in Europe would be so equipped, which would thus protect NATO commonality.[142] M-14 production would continue, as would SPIW research and development. For all participants, it was a politically-expedient decision: the Army was pleased that the AR-15 was to be a one-time limited purchase and that its M-14 had survived the cut; AR-15 supporters such as ARPA were pleased that their preferred weapon was finally to be purchased in significant numbers; and of course, Colt was thrilled that the proverbial foot was in the door, ensuring some financial stability and providing hope that the AR-15 could earn a more permanent position in the Army's arsenal.

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[140] Ezell, *The Great Rifle Controversy*, 191.

[141] Ibid.

[142] McNaugher, *The M16 Controversies*, 96.

Recognizing that numerous organizations had interests in the AR-15's procurement and that a severe lack of coordination existed between these groups, McNamara established a Technical Coordinating Committee (TCC) in April 1963 with representatives from each armed service, and designated the Army as the lead procuring agency. McNamara directed that only one version of the rifle should be produced, rather than a special version for each branch of the services. He further ordered that all modifications to both weapon and ammunition must be agreed upon by all services, and that "only such modifications as are absolutely necessary should be made" in order to expedite production.[143] Two months later, he directed that any such modifications "should be accomplished by request to the manufacturer concerned in consultation with the weapons designer," i.e., Eugene Stoner.[144] In short, McNamara believed that the AR-15 was ready for the battlefield, and that minimal modifications should be made. None of these directives would be followed, resulting in catastrophic combat tragedies.

[143] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5331.

[144] Ibid., 5332.

CHAPTER 5

MILITARIZATION, COMBAT, AND TRAGEDY

During this fight and previous ones, I lost some of my best buddies. I personally checked their weapons. Close to 70 per cent had a round stuck in the chamber, and take my word it was not their fault.

—Specialist, Fourth Class, Letter, December 24, 1966

In battles there in Vietnam, the only things that were left by the enemy after they had stripped the dead of our side were the rifles, which they considered worthless . . . [and] when battles were over the dead would have the rifles beside them, torn down to attempt a repair because of some malfunction when the enemy attacked.

—Letter received by Rep. Ichord's committee, June 15, 1967

I was walking point a few weeks back and that piece of you know what jammed 3 times in a row on me . . . when I brought the matter up to the Captain, he let me test fire the weapon—well in 50 rounds it double-fed and jammed 14 times.

—Letter, July 20, 1967

The M-16 rifle—it is a miserable piece—cheap and unreliable—we used the rifle in every engagement since I returned form Okinawa. In every instance . . . the weapon has failed us at crucial moments when we needed fire power most. In each case, it left Marines naked against their enemy. Often, and this is no exaggeration, we take counts after each fight, as many as 50% of the rifles fail to work. I know of at least two marines who died within 10 feet of the enemy with jammed rifles . . . the day found one Marine beating an NVA with his helmet and a hunting knife because his rifle failed—this can't continue—32 of about 80 rifles failed yesterday.

—Letter, July 20, 1967

Our M-16s aren't worth much. If there's dust in them, they will jam. Half of us don't have cleaning rods to unjam them. Out of 40 rounds I've fired, my rifle jammed about 10 times . . . these rifles are getting a lot of guys killed because they jam so easily.

—Letter from a Soldier's parents to Congressman McClure, June 23, 1967

We began to have extraction problems almost immediately [upon arriving in Vietnam]. Not every round would fail to extract [but] regardless of whether the rifle was clean or not, one of the cartridges would have its rim torn off leaving the

> case in the chamber. Sometimes after 10 or more shots, sometimes on the first shot. One thing I noticed was that when we shot up 'old ammo' for practice we nearly never had failures to extract.
>
> —Personal Recollection of David Southall, 1st Infantry Division, January 1967.

> Believe it or not, do you know what killed most of us? Our own rifles. Before we left Okinawa, we were all issued the new rifles, the M-16. Practically every one of our dead was found with his rifle torn down next to him where he had been trying to fix it.
>
> —Letter from a Marine to his parents describing actions on Hill 881 and Hill 861, April-May 1967

> The first clue . . . that something was wrong came during the battle of Hill 881 North . . . but *all* the Hill Fights at Khe Sanh in April '67 came up the same—dead Marines with cleaning rods stuck down the barrel of their M16s to punch out cartridge cases that refused to extract. At first, we considered that the experiences encountered during the Hill Fights might have constituted an isolated incident, but as experience was to prove, alas, 'twas not so!'
>
> —Personal Recollection of Dick Culver

Throughout the discussion of traditions, politics, egos, rifle designs, and ammunition, the ultimate goal of a military small arms program should be to place an effective and reliable weapon in the hands of the infantryman. Any distraction from this end state can prove deadly, as shown in the testimonies above. Unfortunately, as the Army received its guidance from Secretary of Defense McNamara to proceed with AR-15 developments and procurement, it completely lost sight of this goal. Whether through deliberate sabotage, bureaucratic red tape or plain negligence, the militarization of the AR-15 was a case study on how to ruin an otherwise effective weapon.

As McNamara established the Technical Coordinating Committee, he placed it under the direction of the Army's Ordnance Department, now known as the Army Materiel Command. Unfortunately, it was this very organization that just recently had fought so strongly against the AR-15, causing further procrastination and exhibiting

disregard for McNamara.[145] But, no longer could the Army rely on its M-14 safety net, for shortly after announcing the Army's one-time purchase of AR-15s in January 1963, McNamara made a bombshell announcement: effective at the end of Fiscal Year 1963, M-14 production would cease. It was not a popular decision with either Army staff or congressmen, who worried about M-14 production facilities located within their electoral districts.[146]

From the Secretary of Defense vantage point, the AR-15 was all but complete and ready for production. It had been exhaustively tested against the M-14, was combat-proven in Vietnam, and the Air Force already had thousands in inventory. Thus, it was bewildering when the TCC identified 130 "necessary" technical modifications. Most were minor and easily implemented; a few were more significant.

The first major issue, identified by the Air Force and Marines, involved the rifle's occasional tendency to fire unintentionally as the bullet was chambered. While some attributed the problem to faulty ammunition, further testing finally placed responsibility with the rifle's free-floating firing pin. The pin would generally lightly tap the cartridge case as the bolt closed, but if the bolt closed hard enough, the pin could fire the cartridge. Opinions varied on the implications of this fault. Frankford Arsenal identified that the inadvertent fire only happened "when rounds were loaded singly into the chamber without the magazine," and the OSD felt that "the frequency of occurrence was within

[145] Hallahan, *Misfire*, 487.

[146] McNaugher, *The M16 Controversies*, 102.

that allowed in normal military procurement specifications."[147] This put OSD at odds with the Army staff, who argued that the problem increased risk beyond acceptable limits. Ultimately, the solution included reducing the firing pin's weight, which thus decreased its momentum and likelihood of igniting the cartridge primer.

This issue represented a situation common with the TCC's 130 proposed modifications. McNamara had dictated that all services would agree before a modification was made, and yet rarely did they all agree. Thus, McNamara's staff often performed the role of mediator or even judge, taking power away from the Army experts and making highly-technical decisions for which they were not trained or experienced. For example, after much disagreement on the appropriate trigger-pull weight, OSD eventually made a decision for the TCC.[148] The services' inabilities to agree on rifle design irritated McNamara's office, and OSD meddling in the rifle procurement process irritated Army staff. This deteriorating relationship further harmed development.

The next major issue addressed a perceived lack of accuracy in certain extreme-cold weather conditions. Air Force testing indicated that the .223 bullet lacked stability in temperatures of minus 65 degrees Fahrenheit. While it was this very instability that caused the bullet's tendency to tumble upon impact and resultant extreme lethality, the instability also degraded accuracy, or at least at -65 degrees. Therefore, the Air Force recommended increasing Stoner's original rifling rate of 1 twist in 14 inches (1:14) to 1:12, which would increase the projectile's rate of spin, increasing both stability and

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[147] Reports from Frankford Arsenal and Office of the Secretary of Defense, quoted in McNaugher, *The M16 Controversies*, 100.

[148] McNaugher, *The M16 Controversies*, 101.

accuracy. Always interested in improved accuracy, the Army and the TCC agreed to the modification. But increased stability caused reduced lethality, since a faster-spinning bullet tended to make pencil holes in its victim rather than tumbling and tearing through human tissue. Thus, in the interest of making the rifle universally accurate in every conceivable environment, the TCC watered down one of the AR-15's key selling points: extreme lethality. Objective measurement of lethality is difficult, but the Ichord report would later conclude that this modification reduced lethality by as much as 40 percent.[149]

The third issue was perhaps the most well-known and controversial: the famous bolt closure device. Demanded by the Army, considered non-essential by the Navy and Marine Corps, and completely rejected by the Air Force, the bolt closure device added weight, moving parts, complexity, and $4.53 to the cost of each rifle.[150] Colt considered this addition unnecessary due to the rifle's inherent reliability. The Air Force, who by this time had been using the AR-15 for three years, had "no record of malfunctions that could have been corrected by use of a manual bolt closure device," nor did ARPA trials or Marine Corps tests indicate a need for such a device.[151] Even Colonel Harold Yount, chairman of the TCC, later testified that he could not justify the device based on any test

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[149] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5334. While this figure is cited in the committee report, the actual impact of barrel twist on lethality was debated by ballistics experts. The Army's 1968 M-16 report disagreed with Ichord's claim of a significant degradation in lethality, instead calling it a "slight decrease in lethality" and generally downplaying the significance of barrel twist. See U.S. Department of the Army, "History of the M16 Weapon System," Enclosure 5, 11.

[150] Ibid.

[151] Ibid.

data but had been instructed to implement the device "on the basis of direction . . . from the Department of the Army staff."[152] Traditionalists within the Army staff wanted a physical method of ensuring the bolt closed all the way; all previous military rifles such as the M-1 Garand, M-1 carbine and M-14 utilized an operating rod connected to the bolt which could be pulled back or pushed forward as needed. But these were very different systems which could sometimes benefit by such a handle to slap forward. Stoner himself stated that the bolt closure device was not necessary: "I never saw an instance it would have done any good."[153] While the device itself was not harmful to the rifle, it could potentially cause a harmful situation by allowing the user to force a cartridge into a chamber fouled by sand or rust. Stoner continued,

> I was always afraid of [the device] myself, because when you get a cartridge that won't seat in a rifle and you deliberately drive it in, usually you are buying yourself more trouble. The thing that I always thought of was immediate action. To get that out of there and find out what the trouble was; rather than jam it in and then fire it.[154]

One result of forcing the cartridge into the fouled chamber, Stoner noted, could be a failure to extract the shell after firing.

In his original guidance to the TCC, McNamara stated his intent that AR-15 production should be expedited. Yet by October, the service reps in the TCC were still bickering about the bolt closure device. The Air Force would absolutely not accept it, and the Army insisted on it. Into this situation stepped Colt, who announced that it would

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[152] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5334.

[153] *Hearings on the M-16 Rifle Program,* 4545.

[154] Ibid.

soon be completing production of the Air Force's initial 1962 order of 8,500 rifles and, in the absence of a significant new order, would shut down its production line in November 1963. Colt continued to face financial struggles and could not continue waiting on the TCC, who was clearly not close to finalizing the militarization process. The Army responded with a renewed attempt to convince McNamara to cancel the AR-15 entirely, arguing that the inadvertent firing pin issue and the bolt closure device proved that the weapon was unsuitable.[155] Instead, McNamara relented on his policy that all services would use the same rifle version by allowing the Army to procure rifles with the bolt closure device, and Air Force models without. Reflecting the militarized nomenclature now given to the AR-15, these models would be known as the XM-16E1 and the M-16, respectively.

The bolt closure device was an excellent example of the negative impact caused by placing the Army Materiel Command in charge of the TCC. The same personnel who had fought so fiercely against the M-14 now sought any excuse to invalidate or discredit the M-16. Bill Davis, U.S. Army superintendent of the NATO North American Regional Test Center for ammunition, hypothesized:

> It is my personal opinion that the stubborn stand taken on this [bolt closure device] issue by the Army . . . was provoked by the frustration that they felt at the impotence to which the TCC had been reduced by the much-used veto power of OSD on every issue, great and small. It was unfortunately a weak issue on which to take such a symbolic stand.[156]

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[155] McNaugher, *The M16 Controversies*, 102.

[156] Stevens and Ezell, *The Black Rifle*, 129.

One modification that was not adopted would play an equally important role in the M-16's performance in Vietnam. Beginning in 1957 with the M-14, the Army began chrome-plating the chambers and barrels of automatic rifles.[157] The low-friction nature of chrome-lining, combined with its resistance to rust and corrosion, made it an excellent protective layer for these high-wear areas. But when Stoner designed the AR-15, he felt that chrome-plating was unnecessary and instead used chrome moly-vanadium steel. The TCC considered chrome-plating, but concurred with Stoner's original opinion and decided not to chrome-plate the AR-15.[158] Unfortunately, chrome moly-vanadium alloy would prove insufficient for high-humidity environments such as Vietnamese jungles. Rust and dirt would soon cause heavily fouled chambers which, although not solely responsible for the M-16's woes, would certainly contribute.

Finally overcoming months of arguing and heel-dragging, the TCC finalized M-16 specifications and sent a contract to Colt in November 1963. The Air Force would receive 19,000 M-16s in addition to the rifles it had already received, while the Army and Marines would receive 85,000 XM-16E1s. The M-16 rifle, which had undergone testing but virtually no development during its first six years in existence, had just completed a whirlwind development process in eleven months. Importantly, many of the modifications implemented during this period would receive little or no testing before being sent to the battlefield.

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[157] Ezell, *The Great Rifle Controversy*, 197.

[158] *Hearings on the M-16 Rifle Program*, 4694.

For the first time since the AR-15's initial tests against the M-14 in 1958, there seemed to be some resolution for the AR-15/M-16. But of course, such an ending would be too simple for a story as convoluted as the M-16. Having been forced to accept a one-time purchase of M-16s, the Army continued to espouse the promises of its futuristic SPIW. In an August 1964 letter to the Army Materiel Command, the Deputy Chief of Staff for Logistics exemplified the typical Army staff opinion on the matter:

> For the past several years we have fought off any solution which would commit the Army to another interim rifle which could hinder the development of a greatly improved individual weapon in the 1965-1970 time frame. If a caliber .223 weapon is to be selected as the successor to the 7.62mm M14, it should be the best caliber .223 weapon available and one which fills the quantum improvement qualification. This could possibly be the AR18, the Stoner 63 or some other design. Such a decision cannot be made until the future of the SPIW is clear.[159]

But the future of the SPIW was to remain very unclear throughout the 1960s. The Ordnance Department pushed back the completion date for the weapon multiple times, from 1962, to 1965, to 1967, then into the 1970s, without any real practical prototypes.[160]

Several events would remove the luxury of delayed timelines from the Army's options. As Vietnam escalated from 1965 onward, the need for more rifles skyrocketed, and the M-16's popularity grew. But another event would occur first, originating from an unexpected source: the Marine Corps. The Marines' Commandant, General Wallace Greene, had never fully bought into either the M-14 or the M-16. The Marines, like the Air Force, received their weapons through the Army, and Greene observed the similarity

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[159] U.S. Department of the Army, "Appendix 5, Procurement, Production, and Distribution History of the AR15-M16-M16A1 Weapon System," in *Report of the M16 Rifle Review Panel,* 5-24.

[160] McNaugher, *Marksmanship*, 38.

between the Air Force's position in 1961 and his own position in 1964. The Air Force had successfully lobbied to get a weapon the Army did not want, and now General Greene wanted to do the same. His preferred weapon was the Stoner-63, a highly adaptable system of weapons which utilized interchangeable components to create a rifle, carbine, or belt-fed machine gun. This weapon, invented by Eugene Stoner for the Cadillac-Gage company in 1961, had been tested by the Marines and was utilized extensively by Navy SEALs in Vietnam. But the Stoner-63 hardly fit the Army's plan, which was to use the M-14s and M-16s on hand and stall until the SPIW could solidify. Greene was undeterred however, and forcefully promoted the Stoner to both Army and Defense officials throughout 1964. Ultimately, he notified the OSD that "the Army has a closed mind on the Stoner system and has been dragging its feet."[161]

Concerned that another major rifle controversy was brewing, General Harold Johnson, the new Army Chief of Staff, introduced a weapons evaluation program which should have been implemented at the very beginning of the AR-15 controversy. Initiated in December 1964, the program was called the Small Arms Weapons System (SAWS) Study. SAWS tests compared the M-16, the Stoner-63, the M-14, the AK-47, a host of commercially-available large and small caliber weapons, and of course the SPIW. Whereas prior testing had been largely tainted by bias, either for or against the AR-15, Johnson wanted a truly objective, fair evaluation of all rifles. Chivers observes that SAWS "tried to be everything that General Wheeler's worldwide tests had failed to be:

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[161] Department of the Army, Memorandum for the Secretary of the Army, Subject: Army Small Arms Weapons Program, 11 November 1964, quoted in McNaugher, *Marksmanship,* 39.

thorough, objective, methodical."[162] There was one key problem: all of the weapons showed up for testing except the SPIW, for the simple reason that it did not yet exist. Instead, the Army relied on computerized test models conducted at Fort Leavenworth, Kansas. Such simulations could not account for the vast array of variables for a weapon not even yet developed, but Army staff felt confident enough in the results to declare, "[the SPIW] as defined by its military characteristics, consistently ranked higher than any other rifle in the study, such characteristics representing a significant improvement over currently available small-arms families."[163]

Fortunately, the Army interpretation of SAWS testing was not the only interpretation; a new office had been formed consisting of both civilian and military personnel, charged with conducting systems analysis similar to that found in McNamara's OSD. This office, called the Force Planning and Analysis Office (FPAO), worked for both the Army Chief of Staff and the Secretary of the Army. Its director, Dr. Jacob A. Stockfisch, had served in OSD positions as well as Army positions. Thus, the FPAO was in a unique position with both civilian and military influences, and was assigned analysis of the SAWS tests. Unlike the Army, Stockfisch and FPAO essentially dismissed the SPIW as a hypothetical dream. Stockfisch later wrote:

> The innovative potentialities that are implicit in going from a .30- to a .22-caliber basic-concept infantry weapon are numerous. But instead of exploring these potentialities, the Army chose to expend resources on a technical approach that might possibly produce a new weapon a decade from now, which would cost

[162] Chivers, *The Gun*, 293.

[163] Army Staff Discussion, Conclusions and Recommendations, Small Arms Weapons Systems (SAWS) Study, quoted in McNaugher, *The M16 Controversies*, 120.

several times as much as existing systems, and which would likely produce no improvement—or indeed, might induce a regression—in combat effectiveness.[164]

The FPAO therefore focused primarily on the weapons available for physical testing: the M-14, M-16, Stoner-63, and AK-47. Most data showed the M-16 superior to other weapons, reflected in the Secretary of the Army's report that "The XM16E1 rifle is generally superior for Army combat use."[165] The Secretary's report also concurred with FPAO's opinion by stating "The current SPIW program is unlikely to result in a satisfactory competitive weapon as early as previous forecast."[166] And finally, it stated that some minor modifications were still needed for the M-16, notably a different propellant powder for ammunition and adjustment of the barrel twist rate. In line with these statements, the Army Chief of Staff and Secretary of the Army recommended limiting rifle purchases to the XM-16E1 for the foreseeable future, while continuing SPIW research.

One troubling outcome of the SAWS data which had not been identified (or possibly even present) in previous tests was the malfunction rate of the M-16. While the M-14 experienced 0.63 malfunctions per 1,000 rounds fired, the M-16 malfunction rate was 7.5 per 1,000 rounds. By comparison, the AK-47 experienced 0.75 malfunctions per 1,000.[167] The report did not account for this surprisingly-poor reliability compared to the

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[164] Stockfisch, *Plowshares*, 173.

[165] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5336.

[166] Ibid.

[167] USACDCEC, Small Arms Weapon Systems (SAWS), Part 1: Main Text, Section 5, 5. Data cited in Ezell, *The Great Rifle Controversy*, 193. Of the reported AK-47 malfunctions, the majority occurred after the weapons had fired over 5,000 rounds

M-14 and AK-47, nor did it suggest a clear solution, aside from the recommendation that the cartridge powder might need to be adjusted.

While the M-16 emerged from SAWS as the front-runner, SAWS was by no means decisive.[168] It did not sway the Army to the Small Caliber High Velocity concept, nor did it result in an official designation of the M-16 as the Army's rifle. However, the events of 1965 in Vietnam did begin to sway the Army. As the Army's 85,000 XM-16E1s began to deploy with Airborne and Air Assault units in addition to continued service with Special Forces and Ranger units, the rifle gained a strong reputation. Some even dubbed it a "miracle weapon."[169] However, it might be more accurate to state that the M-16's popularity *appeared* to grow; for those whose rifles worked, it was truly a miracle weapon and clearly superior to both the M-14 and the AK-47. This was certainly the impression of General William C. Westmoreland, who was apparently impressed by Lieutenant Colonel Harold G. Moore's proclamation after the Battle of Ia Drang Valley that "Brave American soldiers and the M-16 rifle won a victory here."[170] Westmoreland recalled that both Moore and many of his soldiers believed the M-16 to be "the best individual infantry weapon ever made, clearly the American answer to the enemy's AK-

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apiece. In addition, the twenty-six AK-47s used for the tests were salvaged from Vietnamese battlefields. These rifles had fired an unknown number of rounds in combat conditions, while the M-14s and M-16s used for tests were either new or lightly used.

[168] Ezell, *The Great Rifle Controversy*, 193.

[169] McNaugher, *Marksmanship,* 41.

[170] Lieutenant General Harold G. Moore and Joseph L Galloway, *We Were Soldiers Once . . . and Young* (New York: Random House, Inc., 1992), 197-198.

47."[171] Certainly, there were plenty of accounts from the battle of the M-16's firepower and lethality allowing troopers of Moore's battalion to defeat the North Vietnamese Army.

Yet, the idea of the M-16 as a miracle weapon seemed to ignore many descriptions from the battle of jammed, malfunctioning M-16s. For example, Captain John Herren, commander of Bravo Company, 1st Battalion, 7th Cavalry, recalled that he "fired a burst from my M-16 which promptly fell apart. The pin holding the trigger mechanism to the barrel had broken off or dropped off."[172] Specialist 4 Galen Bungum of Bravo Company described his search for a weapon with which to fight:

> I was crawling around looking for an M-16. I got my hands on one, and Specialist 5 Marlin T. Dorman said: 'That doesn't work; I'll get you another one.' Then he hollered: 'That doesn't work either.' I headed for a third rifle and PFC Donald Jeffrey hollered: 'It don't work!' Finally I did find an M-16 and some full magazines from our dead.[173]

Lieutenant Rick Rescorla of Bravo Company recalled a situation that would be all too common for both Soldiers and Marines in the first years of the M-16: "M-16s jammed and every third man was down in the bottom of the holes with a cleaning rod, clearing the rifles."[174] Specialist 4 Robert Towles of Delta Company, 2nd Battalion, 7th Cavalry, described another issue:

> As [the enemy] closed on me I flipped the auto on and fired a burst. He went down. I turned to the next target and squeezed the trigger. Nothing happened. I

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[171] General William C. Westmoreland, *A Soldier Reports* (Garden City, New York: Doubleday and Company, Inc., 1976), 191.

[172] Moore and Galloway, *We Were Soldiers Once*, 97.

[173] Ibid., 89.

[174] Ibid., 187.

> squeezed again, nothing. I jerked the trigger, nothing. The fear I had turned to panic. I turned my rifle over and saw brass sticking out of the breech. I ejected the casing and hit the forward assist to make sure the new round seated itself and began firing again. Success, two down. Turning to a third target I squeezed and nothing happened. Looking, I saw another casing sticking out of the breech. I ejected again and slammed the forward assist. From that point onward, I didn't think about it, I just automatically ejected a round following each burst and slammed the forward assist. However, this action eventually caused pain and blood from the wound it opened in the heel of my hand. Still this maneuver worked until I was wounded in the right arm.[175]

In spite of the malfunctions, General Westmoreland became absolutely convinced of the M-16's necessity to the effort in Vietnam for both American and Vietnamese infantrymen. He placed ultimate faith in the expert testimony from LTC Moore and the troopers of 1st Cavalry, who apparently endorsed the M-16 in spite of its troubles. Westmoreland was especially concerned about Vietnamese soldiers still carrying carbines, which he considered "little more than a pea shooter when compared with the AK-47."[176] Those carrying Garands suffered from the powerful rifle's recoil, which "when firing appeared to rock the small Vietnamese soldiers back on their heels."[177]

Therefore, Westmoreland made an urgent request directly to McNamara for a sufficient quantity of M-16s to equip all American forces in Vietnam, followed by all forces of the Army of the Republic of Vietnam (ARVN). But the Defense Secretary was not interested in further antagonizing the M-16 situation by an additional major order. The M-16 issue had been relatively quiet since the 1963 order for 104,000 rifles, and

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[175] Orkand and Duryea, *Misfire*, 26.

[176] Westmoreland, *A Soldier Reports*, 192.

[177] Ibid.

after all, the SPIW project was still supposedly on the near horizon. Procrastination seemed like the best course of action.

Once again, Colt intervened. It was nearing completion of the 1963 order production and, with no further orders imminent and bankruptcy still looming, concluded it would terminate all M-16 production in favor of more lucrative projects. One of Colt's sales managers, James B. Hall, sent a letter to an Army logistics general, which eventually made its way to Westmoreland. Notifying him of Colt's decision, the letter highlighted the fact that the Army would be "fighting a war without any support."[178] Whether the notification was a threat, a legitimate decision, or both, it produced results. Westmoreland called Senator Richard B. Russell Jr. (D-GA), who then called McNamara on December 7, 1965 with the message, "Buy 100,000 rifles today, or I'm releasing the story to the press."[179] Within 24 hours, Colt had a new contract.

Colt's tenuous financial situation effectively prevented its collapse, since the company was able to leverage its condition against the Army in order to secure further orders. By February 1967, the Army had standardized the M-16 as its primary weapon for all troops except those assigned to NATO, and submitted additional purchases in order to equip Americans and allies fighting in Vietnam. Yet, Colt was the sole-source provider of the M-16, making the Army completely dependent on the company. It would remain so until late 1968, when the Army finally began receiving rifles from two additional manufacturers. McNamara was a proponent of this single-source system, telling the

[178] Chivers, *The Gun*, 296.

[179] Ibid.

House Armed Services Committee in May 1966 that "we can get more [M-16s] faster by concentrating on that one company."[180]

But such reliance on one company meant that any interruptions to Colt's production capability would directly impact the Army and Marine Corps, who by 1967 were eager to put the M-16 in the hands of every American and Vietnamese infantryman in South Vietnam. Such an interruption occurred in July 1967, when Colt employees went on strike for two weeks. The strike occurred simultaneously with the plant's annual two-week shutdown, and thus did not actually cause an unexpected production cessation. But the strike showed just how precarious the manufacturer's position was, and also illustrated the apparent lack of urgency in getting the rifle to the battlefield. The two-week holiday caused outrage in Congress; Representative Paul Findley (R-IL) observed the absurdity that while American troops suffered from a lack of sufficient M-16 quantities, "the sole producer of the single, most vitally needed weapon for combat—a weapon seriously in short [for] allied forces—is permitted to take a two-week vacation."[181]

On the other hand, Colt was apparently meeting the contractual obligation of 25,000 rifles delivered per month, which was officially its production capacity.[182] Unofficially, Colt was capable of producing far more, and sought to capitalize on this capability through its original goal of international sales. It successfully received an

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[180] *Hearings on the M-16 Rifle Program*, 4449.

[181] Ezell, *The Great Rifle Controversy*, 221.

[182] Ibid., 206.

export license in mid-1966 to sell 20,300 rifles to Singapore, for delivery between March 1967 and September 1968. The State Department, which issued the license, felt that no conflict existed since Colt could still provide the contracted amount to the Army. Representative Findley, along with other congressmen and the Army, were outraged; how could Colt send rifles to Singapore when American troops needed them in Vietnam?

But the issue was not so obvious, for the Army apparently was not even capable of accepting more than 25,000 rifles per month.[183] It had notified Congress of such, and the State Department's decision was based off the Army's stated abilities. But the decision failed to take into account those allies also fighting in Vietnam, particularly the Republic of Korea Army. These troops, like the ARVN soldiers, still carried M-1 Garands and eagerly awaited the M-16's arrival. The issue was not a question of production capacity, but of extreme lack of coordination between the State Department, Defense Department, and Colt.

As Westmoreland's requested M-16s began arriving in Vietnam, troubling reports of issues with the rifle began escaping from the battlefields. Most echoed the sentiments expressed in the letters and recollections quoted at the beginning of this chapter: worried soldiers who discovered that their new rifles had a tendency to jam at precisely the worst time. The most common malfunction was a failure to extract a fired shell casing.[184] As an automatic rifle, the M-16 was designed to continue firing as long as the shooter kept the trigger pulled. Once fired, the bullet would travel down the barrel and fly downrange,

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[183] Ezell, *The Great Rifle Controversy*, 207.

[184] Dick Culver, "The Saga of the M16 in Vietnam," Part I, 6, Jouster2, accessed October 24, 2020, http://www.jouster2.com/JousterTales.pdf.

while gas from the burning powder in the shell casing would both propel the bullet and operate the rifle's unloading and loading mechanism. This was accomplished by siphoning some gas out of the barrel through a gas port, which travelled back to the receiver and forced the bolt rearwards. This rearward motion ejected the fired bullet casing, while a spring in the rifle's stock would send the bolt forward, catching another cartridge from the magazine and loading it into the chamber. The process would continue until the firer released the trigger or the magazine emptied of ammunition. However, with a failure-to-extract malfunction, the bolt was unable to extract the spent cartridge. Marine company commander Dick Culver recalled that the failure-to-extract malfunction occurred with two variations: in one, the extractor mechanism would "jump" the shell's rim, pulling to the rear of the weapon without the spent casing. In the other, the extractor would simply rip the rim off of the shell casing, leaving the spent casing inside the chamber.[185] The bolt would then try to load another cartridge into the rear of the spent casing, and the rifle would jam. In both cases, the only option to clear the jam was to feed a cleaning rod through the muzzle end of the barrel, punch the spent shell casing out of the chamber, and load another cartridge. This was time-consuming and essentially reduced the M-16 to a "magazine fed, air cooled, single shot, muzzle ejecting shoulder weapon," more resembling a Revolutionary War musket than a 20th century automatic rifle.[186] The problem was exacerbated by insufficient quantities of cleaning rods, which

[185] Culver, "The Saga of the M16 in Vietnam," Part II, 6.

[186] Ibid.

were either not issued at all, or not issued in numbers to compensate for broken rods.[187] For a rifle whose primary selling point was automatic firepower, such basic problems as failure to extract were not only embarrassing for the American military but highly deadly in combat.

Such reports from the battlefield were indeed troubling, and Colt dispatched an investigation team to Vietnam in late 1966, accompanied by several Army Weapons Command personnel. Colt's team included three employees led by AR-15/M-16 expert Kanemitsu Ito, a decorated Korean War veteran who had been involved with the AR-15 test program from the beginning. Ito's team focused on units which had experienced the greatest number of complaints. The Marines to this point had not experienced significant issues, and although some soldiers in Moore's squadron of the 1st Cavalry had some jamming problems, they were relatively few compared to other units. In his report, Ito described the rifles of the 1st Infantry Division to be "the worst [he had] ever seen in the Army. Some units never cleaned their rifles. Daylight was difficult to see thru some of the M16E1 rifle barrels."[188] Ito further described the situation in a letter to Colt's Manager of Military Engineering, Robert D. Fremont: "I have never seen such filthy, rusty, carboned, and corroded rifles, magazines, and ammunition. It is no wonder that these rifles will not function."[189] Ito would later testify before the Ichord committee that

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[187] Ezell, *The Great Rifle Controversy*, 214.

[188] Kanemitsu Ito, "Trip Report to Vietnam," 19 October 1966-23 November 1966, quoted in Ezell, *The Great Rifle Controversy*, 218.

[189] Letter from Kanemitsu Ito to Robert D. Fremont, October 30, 1966, quoted in Ezell, *The Great Rifle Controversy*, 218.

these rusty barrels and pitted chambers reflected a complete lack of both training and cleaning supplies for proper rifle maintenance. The M-16 was not issued with a standard cleaning kit, nor did it even have a space in the buttstock for a cleaning kit, as had every previous US military rifle.

Ito noticed a troubling trend that many soldiers did not think weapons cleaning was necessary, which he attributed to a "lack of command supervision."[190] Others recognized the importance of proper weapon care and tried desperate field-expedient methods to overcome the lack of cleaning equipment. Ito observed soldiers using "communication wire, strings, anything that they could get their hands on that would go through the bore."[191] Others attempted to make casings easier to extract from the chamber by soaking ammunition and magazines in oil. Naturally, this simply attracted more sand, causing more fouling inside the chamber and more jamming as the extractor failed to overcome increased friction. Dick Culver recalled a more successful remedy used by one Marine armorer:

> He had an M16 that worked under almost all conditions. I asked him what he had done to it, and he replied that he had taken a 1/4" drill, attached a couple of sections of cleaning rod to it, and put some "crocus cloth" through the slotted tip (like a patch) and run it into the chamber and turned the drill motor on. He "horsed" the drill a bit and apparently relieved the chamber dimensions just enough to ensure positive functioning.[192]

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[190] Kanemitsu Ito, "Trip Report to Vietnam," quoted in Ezell, *The Great Rifle Controversy*, 218.

[191] *Hearings on the M-16 Rifle Program*, 4597.

[192] Culver, "The Saga of the M16 in Vietnam," Part II, 4.

Soldiers also lacked proper cleaning solvents and lubricating oils, resorting to gasoline, diesel, WD-40, or any other substitute that could be obtained. Not all lubricants were beneficial. The Army's standard lubricant originally supplied for the M-16, known as VV-L-800, was actually water-soluble. In an environment such as Vietnam known for its rain and humidity, this was clearly a problem.[193] Another lubricant became widely used almost by chance after Christmas 1965 when the Governor of Michigan sent care packages to Vietnam containing Dri-Slide, a commercial lubricant which troops found resistant to sandy conditions. Many soldiers wrote to their families, asking them to send boxes of Dri-Slide. Others wrote directly to the Dri-Slide company, offering to pay any cost for entire crates to be shipped.

The Marines strongly favored Dri-Slide, both in the laboratory and in the field, and the service even purchased 100,000 cans for its M-16s. While not perfect, it was an excellent short-term lubricant (24-48 hours) which was unique for its ability to resist sand. But the Army's testing showed that both VV-L-800 and a third lubricant, MIL-L-46000A, were superior to Dri-Slide. MIL-L-46000A was originally designed for the M-61 Vulcan cannon on aircraft, but also worked well on ground weapons. Even this lubricant was controversial however, and it seemed everyone had differing opinions on the topic. The Ichord Committee tried to make sense of the mismatch, spending several months receiving testimony on the matter. One Marine Corps representative confused matters even further when he stated that the M-16 used for the Dri-Slide tests had been defective, which negated the test's results. Frustrated, Ichord and the committee finally

[193] McNaugher, *The M16 Controversies*, 142.

described the lubricant selection process as a "confused, uncoordinated, crisis-oriented, self-protective [process] which has characterized all too much the handling of the matter of rifle lubrication, so vital to the welfare of the foot soldier in the field . . . ".[194] This was the unfortunate tone used by the committee in describing much of the M-16 program. Certainly, the lubrication issue was an example of a problem which should have been identified much earlier in the rifle development process, but became instead a victim of Army resistance and McNamara's pressure to adopt the rifle rapidly.

Even if troops had sufficient cleaning supplies, many lacked the proper training on handling and care of the M-16. The initial order of 85,000 M-16s had been distributed to special units such as Airborne and Air Assault prior to their Vietnam deployments. These units, including the 173rd Airborne Brigade and Moore's troopers from the 1st Cavalry, gained valuable experience with the weapon's characteristics before facing the grueling chaos of Vietnam. Mike Mantegna of the 1st Cavalry Division recalled his unit's preparation:

> When the M16 was distributed to us just a few weeks prior to deployment, I was the only officer in the 2nd of the 7th who had any prior experience with the new rifle. Hence, I was familiar with its tendency to jam; but I had no idea just how serious or widespread the problem was. I volunteered to supervise the battalion's POR [Preparation of Replacements for Oversea Movement] qualification with the test firing of all its personnel and weapons. When I reported to the battalion commander about the number and kinds of mechanical issues, he ordered his S-4 [supply officer] to obtain enough cleaning rods to be passed out with every rifle. We also recommended that everyone carry a shaving brush and a can of Dry Slide, and clean his weapon religiously.[195]

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[194] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5363.

[195] Orkand and Duryea, *Misfire*, 103.

During the battalion's 4-week ocean voyage to Vietnam, the troopers conducted extensive target practice and familiarization with the rifle, even constructing a towed target behind the ship. Thus, by the time the 1st Cavalry arrived in-country, it was relatively prepared to use the M-16.

But after Westmoreland's emphatic plea for more M-16s, future units began receiving the new rifle in Vietnam with precious little opportunity to practice before their lives depended on it. This included the troubled 1st Infantry Division, noted by Ito to have the worst M-16s. The correlation between training and malfunction rate seemed obvious, and grew more so as the Army and Marines made a deliberate attempt to increase training on cleaning and maintenance throughout 1967. Both Colt and senior Army officials would use this correlation as an explanation for what was wrong with the rifle, blaming jamming problems on soldiers for failing to clean their weapons, blaming commanders for failing to emphasize cleaning, and blaming the Army for failing to train.

But although many individuals had self-preservation reasons for blaming poor cleaning methods, dirty rifles were by no means the only cause of jamming. Ito identified rust and corrosion as a major problem, but he was not the first to identify this. Aberdeen Proving Ground's Development and Proof Services division noted in 1964 that the internal parts of the M-16 would rust within 18 hours of firing in 125 Fahrenheit degrees and 90 percent humidity. This caused difficulty operating the bolt and extraction mechanism, and Aberdeen thus recommended that the rifle be issued with both a cleaning kit and a rust-preventive lubricant.[196] This recommendation was ignored.

[196] Hallahan, *Misfire*, 500.

Had the M-16 undergone a full development and testing program, the Army might have paid more attention to the rust problem. In its own history of the M-16 program, the Army noted that out of all 250 tests which were conducted on the M-16, only two were conducted in tropical environments.[197] This does not excuse the complete disregard for Aberdeen's identification of rust as a significant problem, but serves as yet another example of the incomplete assessment of the M-16 at its adoption.

During Colt's investigations, Robert Fremont suspected that the solution for the chamber rust problem went beyond proper rifle cleaning.[198] After inspecting rifles returned from Vietnam in October 1966, Fremont recommended that Colt conduct "an investigation as to the possible use of stainless steel for barrels or chrome plating the chambers and bores of the AR-15 weapons in order to combat corrosion and neglect." Furthermore, he concluded, "Colt's weapons are sadly lacking in corrosion resistance."[199] Fremont thus suggested something that Colt and the Army tried very hard to dispute: the jamming problems were the rifle's fault, not the soldier's fault.

Fortifying a rifle against rust and corrosion hardly required new technology. Chrome-plating the chambers of automatic rifles was a standard procedure, and the United States had already produced weapons which fared well in the humid environments of the Pacific. The TCC only decided against chrome-plating the M-16 because it felt that chrome moly-vanadium was sufficient and that "further chrome plating would simply be

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[197] U.S. Department of the Army, "History of the M16 Weapon System," D35.

[198] Chivers, *The Gun*, 299.

[199] Trip Report, Headquarters AWC, Rock Island, Illinois, October 26, 1966, Robert D. Fremont to Colt Inc., quoted in Chivers, *The Gun*, 299.

gold plating."[200] And yet, for an unknown reason, Colt did not adequately protect the M-16 from corrosion, both inside and out.

The jamming problems thus seemed to be a perfect storm of poor cleaning, lack of training, insufficient supplies, and susceptibility to corrosion. But there was one final element of the jamming problem which perhaps did more to incriminate both senior Army officials and Colt than any other contributor: the powder issue. Over 90 percent of M-16 ammunition used in Vietnam was loaded with a gunpowder for which the M-16 was not designed.[201]

When Eugene Stoner originally invented the AR-15, he also designed the .223 caliber cartridge, based on an existing .222 cartridge produced by Remington Arms Company.[202] Remington utilized a propellant (also referred to as gun powder) known as IMR4475, or Improved Military Rifle. Manufactured by DuPont since 1936, IMR consisted primarily of nitrocellulose, which burned quickly and left relatively little powder residue. All ammunition for the AR-15 and M-16 until 1964 used IMR powder, including the highly-successful ARPA combat tests in Vietnam and the Air Force's order of 8.5 million rounds for its initial AR-15 purchase. As specified by Remington, IMR4475 would produce an average bullet velocity of 3,250 feet per second, ±40 feet,

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[200] Testimony of Colonel Yount to Ichord Subcommittee, *M-16 Rifle Program, Hearings*, 4694.

[201] James Fallows, "M-16: A Bureaucratic Horror Story," *The Atlantic*, June 1981, https://www.theatlantic.com/magazine/archive/1981/06/m-16-a-bureaucratic-horror-story/545153/.

[202] Stevens and Ezell, *The Black Rifle*, 60.

and a maximum chamber pressure of 52,000 pounds per square inch.[203] But in reality, chamber pressure for IMR often proved to be slightly higher. Both DuPont and Olin Mathieson, who each submitted their own alternatives to IMR4475, requested that the Army relax the chamber pressure requirement, citing an inability to consistently meet 52,000 pounds. The Army therefore increased the limit to 53,000 pounds in January 1964.

Frankford Arsenal worked closely with the Air Force to determine optimum ammunition requirements throughout 1962. Although Stoner had matched the AR-15 with IMR4475-loaded cartridges, Frankford Arsenal and Remington concluded that this propellant would be difficult to mass-produce with consistent loads in each bullet. The amount of propellant required to meet the velocity specification of 3,250 fps was difficult to pack into the .223 shell, and easily exceeded specified chamber pressure limits. Thus, Frankford Arsenal sent a recommendation to the TCC in June 1963 to lower the velocity requirement by 50 feet per second, which would alleviate ammunition production challenges while also lowering chamber pressures.[204] It also recommended modifying the bullet's shape in order to preserve velocity at longer ranges. But neither of these recommendations met receptive ears. The bullet modification would require a modified rifling rate in the barrel, which the TCC had just finished establishing as 1:12. The

[203] U.S. Department of the Army, "Appendix 4, Ammunition Development Program," in *Report of the M16 Rifle Review Panel,* 4-31.

[204] McNaugher, *The M16 Controversies*, 149.

velocity requirement of 3,250 fps was a key factor for the Air Force, who viewed velocity as key to the M-16's lethality.[205]

These specifications of 3,250 fps and 52,000 pounds were slightly artificial, as neither existed when Stoner invented the AR-15. The rifle performed well during tests in the laboratory and in ARPA's Vietnam field trials, in spite of the fact that it generally failed to meet the Army's retroactively-created requirements. Therefore, it would have made sense to reconsider the necessity for such requirements in light of the AR-15's performance thus far. Instead, Colonel Yount and the TCC began searching for a permanent replacement propellant which would meet velocity and pressure requirements while exhibiting the positive performance characteristics of IMR4475, such as a lack of smoke and fouling.

By early 1964, three propellants were in consideration for standard use in the M-16. IMR4475 was technically still an option. Second, DuPont submitted another IMR model, known as CR8136 (CR=Cool Rifle). And finally, Olin Mathieson submitted WC846 (WC=Western Cartridge, a subsidiary of Olin Mathieson). Remington continued experiencing difficulties achieving both velocity and pressure standards with IMR4475, and although it produced 1 million rounds using IMR4475 in early 1964, it switched to CR8136 for the next 50 million rounds. However, Remington faced challenges meeting requirements with CR8136 as well, and therefore switched completely to WC846 in December 1964. Between Remington and Olin Mathieson, which also produced primarily

[205] McNaugher, *The M16 Controversies*, 150.

WC846, 81 million rounds of .223 (5.56mm) cartridges were produced during 1964 using WC846, which became the M-16's new standard.[206]

But WC846 differed significantly from DuPont's IMR powders. Known colloquially as "ball powder," WC846 was a spherically-shaped, double-based propellant consisting of both nitrocellulose and nitroglycerine. It had been used for the Army's .30 caliber ammunition since 1942, and was the primary propellant for .30, .50, and 20mm ammunition since 1952. It was also generally easier, safer, and simpler to manufacture in large quantities, and could be stored longer. But it also burned longer than IMR powder, and was known to cause increased fouling and residue on rifle components.

In the M-16, the duration and cleanliness of the propellant burn were critical. The M-16's automatic loading system was driven by gas generated from the propellant's combustion. As described earlier, siphoned gas out of the barrel would flow rearwards, forcing the bolt back and initiating the unloading/re-loading process. Stoner had placed the gas port sufficiently forward to ensure that the bullet did not reach it while propellant was still burning. By the time the bullet passed the gas port, IMR propellant had burned and harmless gas would enter the port, driving the mechanism. But because ball powder burned longer, it was still burning by the time the bullet passed the gas port. The result was burning propellant entering the gas port, causing increased fouling on the rifle's internal mechanisms. Ball powder's general tendency for dirtier combustion further exacerbated the issue, sending sooty grime into the M-16's receiver.

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[206] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5352.

In the Army's .30 caliber rifles such as the M-1 and M-14, such fouling was not a problem. These weapons incorporated tolerances which allowed for some fouling while still operating normally. In addition, their re-loading actions were controlled by an operating rod, which separated the gas system from the bolt and chamber area. By contrast, the M-16 was designed and manufactured to extremely tight tolerances. Such precise measurements increased the rifle's accuracy, but also increased its susceptibility to malfunctions due to fouling.

Ball powder also caused another unwanted side effect. The M-16 was designed to fire in automatic mode at approximately 750-850 rounds per minute. But because ball powder burned slower and was still burning when its gasses reached the gas port, the energy driving the rifle's reloading mechanism was significantly higher than that produced by IMR. This in turn drove the firing rate, known as cyclic rate, up to between 900 and 1,000 rounds per minute. Unlike velocity and chamber pressure, this was an exceedance for which the M-16 had not been designed. This increased cyclic rate resulted in higher parts breakage and malfunction rates, specifically failures to feed. In addition, the bolt often failed to lock to the rear after firing the last bullet in the magazine, which was not a comparatively major issue but was an indicator that something was not working as designed. As Hallahan observed, "the TCC was caught in a trap: it had rejected the IMR4475 ammunition for not meeting standards, then replaced it with WC846, which also did not meet standards."[207]

[207] Hallahan, *Misfire*, 497.

Colt's production contract specified 650-850 rounds per minute as a condition of acceptance, and use of ball powder would clearly cause the failure of large quantities of rifles. As Colt started receiving ball powder at the factory in 1964, it conducted a comparison of acceptance rates using both IMR4475 and WC846 (ball powder). Out of ten rifles firing WC846 ammunition, six failed. Out of ten firing IMR4475, only one failed, and only by five rounds per minute.[208] Concerned that over half of its production line would be rejected, Colt requested that the Army increase the acceptable cyclic rate to 900 rounds per minute. The Army issued a temporary waiver for rifles produced in April 1964, which was extended into July. 12,400 M-16s were produced under this waiver. By August, Colt was able to secure a shipment of ammunition loaded with CR8136, DuPont's IMR alternative to IMR4475, which resulted in lower cyclic rates and thus higher acceptance rates.

But by August 1965, Colt faced a serious problem. DuPont had announced during the previous December that it would no longer produce CR8136. IMR4475 was not approved by the TCC, leaving only ammunition loaded with WC846, which caused excessive cyclic rates. Colt had a legitimate complaint against the Army: the TCC had set cyclic rate requirements, yet it approved only ammunition which caused failed acceptance rates over half. Frustrated, Colt asked again for an increase to 900 rounds per minute. Instead, the Army officially notified Colt that it could use any propellant it desired for acceptance tests. Colt was able to secure a precious-few remaining lots of IMR4475-loaded ammunition. It then utilized this ammunition solely for acceptance

[208] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5354.

tests, knowing that troops in the field would be firing the weapon with ball-propellant ammunition. As the Ichord report concluded,

> Many thousands of these [M-16s] were shipped or carried to Vietnam, with the Army on notice that the rifles failed to meet design and performance specifications and might experience excessive malfunctions when firing ammunition loaded with ball propellant. It was also known that 90 percent or more of the 5.56 millimeter ammunition delivered to Vietnam was loaded with ball propellant.[209]

The official Army position on the matter, as repeatedly stated by Colonel Yount to the Ichord committee, was that at the time there was no known correlation between ball powder and the cyclic rate exceedance. Therefore, Yount concluded that since no evidence existed connecting the two issues, there was no reason to restrict Colt's usage of IMR4475. Yet this was a weak defense, because the relationship of cyclic rates, fouling, and ball powder was quickly becoming apparent.

Just as the corrosion problem was identified and ignored during pre-production tests, so was the problem with ball powder identified. By March 1964, experts at Colt were clearly convinced of the connection between ball powder and cyclic rates. Their experiment showed six of ten rifles failed the cyclic-rate requirement using ball powder, while just one failed using IMR, and this by the narrowest of margins. Furthermore, per the TCC's meeting minutes from March 24-25, 1964, Colt representatives presented this information in a bid to increase the cyclic limit. But Colonel Yount testified that Colt's

[209] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5354.

data did not cause him concern, blaming the results on "considerable variation from lot to lot" and essentially dismissing the results as a fluke.[210]

Colt was not the only organization to sound the alarm. During the SAWS studies of 1964-1966, the Combat Developments Command Experimentation Center (CDCEC) at Fort Ord, California, identified a surprisingly high malfunction rate with the M-16. In fact, it proved less reliable than any other weapon tested, including the M-14 and AK-47. Suspecting that the recently-adopted ball powder might be to blame, CDCEC personnel conducted further tests to compare WC846 ball powder and IMR4475. The results clearly indicated the problem: with ball powder, the malfunction rate was 5.60 per 1,000 rounds, close to the 7.50 per 1,000 rounds observed in the previous test. When firing IMR4475, the malfunction rate dropped to 0.91 per 1,000 rounds.[211] The CDCEC made a special telephonic notification of these results to Yount in November 1965, approximately six months before it officially published its report as part of the SAWS study. Yount and the TCC responded by ordering yet another study from Frankford Arsenal, which promptly confirmed the CDCEC's test results. In spite of these red flags, no one would take significant action until late 1966, when reports from Vietnam would finally give credence to what CDCEC already knew.

Tragically, the ball powder problem could have been avoided had the TCC followed McNamara's original guidance from 1963: all modifications and changes to the

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[210] *Hearings on the M-16 Rifle Program*, 4960.

[211] McNaugher, *The M16 Controversies*, 139.

M-16 were to be accomplished "in consultation with the weapons designer."[212] As the rifle's inventor, Eugene Stoner had designed the rifle specifically for IMR powder, and believed that "you can't change the ammunition without causing a change in the performance of the weapon."[213] Yet, not until after the propellant decision had been made did anyone seek Stoner's opinion on the matter. Soon after ball powder was officially accepted, Frank Vee of the Department of Defense Comptroller's office paid a visit to Stoner. As a member of the TCC, Vee's goal was to secure Stoner's endorsement for the propellant. Stoner later told Ichord's committee,

> He asked me my opinion after the fact. In other words, this was rather an odd meeting. He asked me to meet him and I did, and I looked at the technical data package and he said, what is your opinion, and I said, I would advise against it.
>
> I asked, so what is going to happen, and he said, well, they already decided this is the way they are going to go, meaning the committee. I said, so why are you asking me now, and he said, "I would have felt better if you had approved of the package." And I said, well, we both now don't feel so good.[214]

Not surprisingly, the M-16's reputation quickly became tarnished, and many infantrymen sought alternatives. For those who nearly died or watched buddies die while attempting to clear jams, their hate for the "miracle weapon" was quite understandable. Some resorted to carrying AK-47s picked up from the battlefield. This method provided a reliable rifle, but also brought the risk of fratricide when fellow soldiers would fire at the sound of an assumed enemy weapon. Others carried anything else they could scrounge,

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[212] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5332.

[213] *Hearings on the M-16 Rifle Program*, 4560.

[214] Ibid.

borrow, trade or steal. Dick Culver's Marines of Hotel Company, Second Battalion, Third Marine Regiment, found many rear-echelon troops eager to trade their M-14s for the Marines' M-16s.[215] Others purchased M-14s, .38 caliber revolvers, or any other weapon that would still shoot when the M-16 quit. Private First Class Alfred J. Nickelson of Culver's Hotel Company simply refused to carry the M-16 after it jammed multiple times during a firefight in July 1967. He was given an M-79 grenade launcher, and refused to carry the M-16 throughout the remainder of his tour.[216]

Perhaps the most well-known crisis of the M-16 involved Culver's Marine battalion. Serving as a "Special Landing Force," the battalion was stationed on an LPH ship (Landing Platform-Helicopter) and regularly dispatched to reinforce units already in contact. When the battalion was sent to Okinawa to refit and train following extensive action in Vietnam, it turned in all M-14s and received XM-16E1s in exchange. The Marines were excited to try out the new weapon, although the rifle's plastic toy-like appearance "drew lots of snickers and comments from the old timers."[217] But Culver recalled that just one cleaning rod was issued per rifle, with no extras to be found. Additionally, each Marine received only three twenty-round magazines, even though a basic load included 400 rounds. Stripper clips were not yet available, so Marines carried seventeen boxes of twenty rounds each in their packs, in addition to the magazines. This did not facilitate rapid re-loading during combat.

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[215] Culver, "The Saga of the M16 in Vietnam," Part I, 5.

[216] Chivers, *The Gun*, 318.

[217] Culver, "The Saga of the M16 in Vietnam," Part I, 3.

As the battalion entered the Hill Fights surrounding Khe Sanh in spring 1967, the lack of magazines proved to be the least of concerns for Culver's Marines, many of whom did not make it past one or two shots before jamming. These Marines struggled to punch out the fired cartridge using the cleaning rod through the barrel. Those who lost their cleaning rods or whose cleaning rods simply broke were out of luck. Culver observed that "if your rifle *would* shoot, it would shoot under almost all conditions (if clean), but if it wouldn't, no amount of coaxing would help. ***All*** of the M16s seemed to be extraordinarily sensitive to carbon build-up."[218]

Frustration was extremely high among the Marines as they returned to the ship after the Hill Fights, but the battalion followed regulations and dutifully submitted the appropriate reports documenting the malfunctions. In response, a Marine small arms repair team visited the battalion to assess the problem, and gave Culver his first experience of receiving blame for the malfunction. The team, according to Culver, boarded the ship convinced that poor maintenance and cleaning practices were the causes for all of the M-16's troubles. But this explanation made no sense; Culver himself had just finished a stint on the Marine Corps Rifle Team, had grown up with firearms, and prided himself on the exceptional cleanliness maintained on all weapons in his company. Further countering this theory, Culver noted that 50 percent of the company's rifles would jam immediately after cleaning even under the relatively sterile environment aboard ship. If these rifles jammed under such perfect conditions, how many more would malfunction on the battlefield?

[218] Culver, "The Saga of the M16 in Vietnam," Part I, 4.

When no acknowledgement of their situation came forth throughout the summer, Culver's Executive Officer, Mike Chervenak, decided to take action. Composing a letter in July 1967 describing the situation, he mailed copies to the Washington Post, the Barnesboro Star of his hometown, Senator Robert F. Kennedy (D-NY), and Representative Ichord, who by this time was already conducting his investigation. While Chervenak was careful not to assume an accusatory tone, the letter did not sugarcoat the situation, and placed blame squarely on the M-16 itself, not on the operators. After reading the letter, one of Chervenak's staff sergeants remarked, "Hey sir, you're not planning to make the Marine Corps a career, are you?"[219]

Chervenak's letter did indeed create some trouble, both for himself and the Marine Corps. Before long, he was given a reprimand for his unauthorized letter, and four senior organizations above Culver's company initiated investigations into the letter which had bypassed each of them. Chervenak's promotion to captain, normally all but a guarantee, was delayed one year. His story was an example of attempts by both the Army and the Marines to suppress the outrage created by the M-16.

In another example, Mike Mantegna recalled that upon his return from Vietnam, he was assigned as a training officer for the Army's Officer Candidate School. He observed that during marksmanship training, no mention was given to the M-16's susceptibility to malfunctions. "When I questioned [the instructor] about it, he said that he had been told by his department head at Building 4 [Infantry School headquarters] that

[219] Chivers, *The Gun*, 323.

all such info was classified."[220] One could understand the international security concerns associated with a problematic infantry rifle, but the information should have been shared with American infantry trainees along with the proper mitigating procedures.

While suppressing the bad news, the Marines attempted to reinforce confidence in the M-16. In a Washington Post article from May 27, 1967, Marine Corps commandant General Wallace M. Greene noted that the M-16 "has proved to be a real hard-hitting, light-weight rifle ideally suited to the jungle type of environment in Vietnam."[221] Speaking just a few weeks after the brutal Hill Fights in which so many Marines died next to their jammed rifles, Greene stated that there had been "relatively few complaints," and those few complaints were normal for the introduction of a new gun. But his defense had a contradictory tone to it, for even while he stated that the M-16 was fully reliable, he noted that two "improvements" were forthcoming. One was to chrome-plate the chamber, and the other was to reduce the rate of fire by increasing the weight of the buffer. He did not elaborate on why these improvements were needed if the rifle was already so reliable, but he did caveat his opinion of the M-16's reliability with the same phrase that Dick Culver heard: the M-16 is fully reliable as long as it is kept clean and properly lubricated. Clearly, this was not the case, as proven by Culver's experiments on board the ship.

Placing the blame on the rifle's cleanliness not only absolved senior military officials of blame, but placed fault with the soldiers and Marines who were dying. In

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[220] Orkand and Duryea, *Misfire*, 99.

[221] George C. Wilson, "Marine Chief Defends M-16 Rifle," *Washington Post*, May 27, 1967, Texas Tech University Sam Johnson Vietnam Archive, https://www.vietnam.ttu.edu/virtualarchive/items.php?item=2250111030.

another article from May 25, 1967, Marine Lieutenant General Lewis W. Walt concluded that while the M-16 was the all-time greatest rifle of the Marine Corps, its malfunctions were a "failure of the troops to keep their weapons clean."[222]

Other public relations efforts took a different approach by simply ignoring the weapon's failures and lauding its battlefield successes. An article from the New York Times in June 1967 described General Walt's meeting with a Marine commander after the battle for Hill 881. The unnamed Marine commander stated, "If we had not had the M-16 in my company, we could not have held that hill." When General Walt asked the Marine how many malfunctions he had, the commander answered, "none."[223]

In spite of these accounts, letters similar to Mike Chervenak's continued arriving all over the United States: to parents, wives, girlfriends, hometown newspapers, and congressmen. All told the same story, unaltered by senior military leaders: the M-16 was unreliable at best, and causing American deaths at worst. And although the military did its best to downplay the story, Chervenak's letter seemed to accomplish exactly what he had hoped. Culver's battalion soon received a shipment of 400 new XM-16E1 rifles, along with a visit from a team to inspect the unit's old rifles and determine which needed replacement. With the team was Colt employee Kanemitsu Ito, who had investigated the

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[222] "M-16 Rifle Probe Going to Vietnam," *Baltimore Sun*, May 25, 1967, Texas Tech University Sam Johnson Vietnam Archive, https://www.vietnam.ttu.edu/virtualarchive/items.php?item=2250111029.

[223] William Beecher, "Weapons Dispute: M-16: Dandy or Dud?" *The New York Times*, June 11, 1967, Texas Tech University Sam Johnson Vietnam Archive, https://www.vietnam.ttu.edu/virtualarchive/items.php?item=2250111070.

M-16 problem in Vietnam the previous fall. What Ito observed showed the ridiculous nature of the Marine generals' public comments regarding the M-16:

> I walked into a den of angry, feroucious [sic] lions when I visited the 2nd Battalion of the 3rd Marines. It was really a touchy situation. I would never ask anyone else to be in the situation I was in. The officers and a great majority of the men hated the M-16A1 rifles. They had a right to hate it. The chambers of the rifles were so badly pitted that the only thing they could use the rifles were for a club.[224]

Ito's inspection validated his suspicions that the problem lay not with poor cleaning habits, but with the rifle's susceptibility to corrosion.

[224] Letter from Kanemitsu Ito to William H. Goldbach, vice president and general manager of Colt's Military Division, December 3, 1967, quoted in Chivers, *The Gun*, 328.

CHAPTER 6

SOLUTIONS AND LESSONS

Even before Culver and his Marines were clearing rifle jams in the hills near Khe Sanh, Colt was working with the TCC to identify potential solutions. As chief of the TCC's technical division, William C. Davis later testified before Ichord's committee that the problem was two-fold: one problem was "associated with the condition of the chamber, the other associated with the cyclic rate."[225] Chamber corrosion seemed to be the primary cause of extraction failures, exacerbated by ball powder's increased fouling in the M-16's sensitive system. Ball powder was the only cause of the increased cyclic rate, which resulted in an increased parts wear-out rate of about ten percent, as estimated by Ito.[226]

Each problem required a separate fix. For the cyclic rate issue, Colt proposed a heavier buffer, consisting of a long, cylindrical bar at the rear of the rifle's bolt carrier. During the reloading sequence, the buffer and buffer spring would send the bolt carrier forward in order to chamber a new round. By increasing the weight of this buffer, the bolt carrier moved slightly slower and thus slowed the cyclic rate. Colt had already experimented with heavier springs to reduce cyclic rates in 1965, and the TCC quickly approved the proposed heavier buffer in July 1966. But production on the new buffers

[225] *Hearings on the M-16 Rifle Program*, 4628.

[226] Ibid., 4590.

would not begin until January 1967, and old rifles would not receive retrofit buffers until later that year.[227]

The extraction problem took a bit longer. The solution agreed upon by Colt and the TCC in May 1967, just as Culver and Chervenak were fuming over Marine leaders' ignorance of their plight, was to chrome-plate the rifle's chamber. This chrome-plating significantly reduced the coefficient of friction between the cartridge casing and the chamber, easing the extractor's job of pulling out the spent shell. It also prevented corrosion in the chamber, one of the key causes of jamming. Although this reduction of friction also caused a slight increase in cyclic rate, the modified buffers were able to keep the cyclic rate at acceptable levels. However, large quantities of chrome-plated rifles would not appear in Vietnam until late 1968.

While poor cleaning habits were probably not a primary cause of jamming, both the Army and Marines began a campaign to debunk the myth of the self-cleaning M-16. New cleaning equipment accompanied fresh copies of Department of the Army Pamphlet 750-30, *The M16A1 Rifle Operation and Preventive Maintenance*, first published in 1968 and revised in 1969. Written in a comic-book style, the pamphlet was clearly aimed at the front-line male GI, complete with quotes from popular songs of the era ("Gettin' to know all about you . . . ") and suggestive double entendres. On the first page, a section titled "How to Strip your Baby" detailed field-stripping of the M-16. The description began: "You want to know her inside out, every contour and curve, every need and whim, what

[227] Chivers, *The Gun*, 303.

makes her tick."[228] Naturally, an attractive blonde was featured on each page to illustrate the proper methods of caring for "your baby."

Together, the solutions were effective, if not immediate. The delay in manufacturing updates meant that chrome-lined chambers were not produced at Colt until late 1968, and plenty of non-chromed rifles continued in existence much later. Likewise, retrofitted buffers took time to manufacture, since priority was placed on putting the updated buffers in new rifles. Generally, by 1970 the M-16 was considered reliable and most of the jamming issues had subsided.[229]

While reading the numerous reports, studies, first-person accounts and third-person narratives available on the M-16 topic, it is extremely easy to become confused as to what really caused the M-16 malfunction problems. Was it a faulty weapon, bad ammunition propellant, lack of cleaning, or corrosion? Some reports suggested the fault lay with the troops, whose careless neglect of their weapons caused malfunctions. Still many other accounts cast doubt on this explanation, such as Culver's recollections of the pristine conditions of malfunctioning rifles in his battalion. Ball propellant has over the years certainly received its share of criticism for the jams, but even ball propellant performed better in laboratory tests than one would expect based on combat reports. Indeed, Defense Department tests conducted in Panama in January 1968 indicated that ball powder was more reliable than IMR8208M, another IMR powder closely related to

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[228] U.S. Department of the Army, Department of the Army Pamphlet 750-30, *The M16A1 Rifle Operation and Preventive Maintenance* (Washington, DC: U.S. Government Printing Office, June 28, 1968), http://tractioncontrol.well-regulatedmilitia.org/the-m16a1-rifle-operation-and-preventive-maintenance/.

[229] Chivers, *The Gun*, 326.

the original IMR4475 which was sometimes used in M-16 ammunition beginning in mid-1966.[230]

No one may ever be able to state definitively the actual cause of the jamming. Even Ichord's investigating committee was unable to positively identify the root cause, although it placed much emphasis on the problems with ball powder. Based on the evidence at hand, the most reasonable conclusion is that the primary cause of jamming was due to corrosion in the chambers, which was caused by extreme humidity in Vietnam. The increased friction caused by corrosion thus triggered the failure-to-extract jamming problem. Contributing to the root cause was the increased fouling from ball propellant, which added another layer of friction to the chamber and thus more difficulty in extractions. While the increased cyclic rate caused by ball powder certainly caused its own set of problems, it was in all likelihood not directly related to the failure-to-extract malfunction.

However, if the primary cause of jamming was due to corroded chambers, why did the rifles used by ARPA during the 1962 tests not exhibit similar problems? The AR-15s used for those tests did not have chromed chambers, and were just as susceptible to corrosion as were the M-16s of 1967. One possible explanation is that the test period was simply not long enough for corrosion to develop. McNaugher notes that most jamming malfunctions began "several months" after rifles arrived in Vietnam, suggesting that the problem's root cause was not present initially.[231] Something must have changed

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[230] McNaugher, *The M16 Controversies*, 160.

[231] Ibid., 158.

during the time between arrival and jamming. In most cases, the ammunition remained constant; the only variable was corrosion.

Or, perhaps ball powder did indeed play a larger role. ARPA's 1962 field trials utilized IMR4475-loaded ammunition, and evaluators reported no issues. There are additional possible explanations which support this conclusion. These explanations are rarely discussed, probably because they were identified after Ichord's investigation concluded. For example, it was not until 1969 that studies finally discovered the source of the "sticky residue" which fouled M-16 chambers after firing ball powder: calcium carbonate.[232] This finding placed more blame with ball powder by specifying the responsible element of ball powder, rather than just blaming generic increased fouling.

In 1968, Frankford Arsenal determined that some shell casings used for M-16 ammunition were too soft to stand the rigors of a military automatic firearm. When the rifle fired, extreme pressures created within the shell would cause the casing walls to expand slightly, increasing friction as the casing lodged into microscopic tooling marks in the chamber. If the chamber was corroded and pitted, the effect was magnified. Interestingly, the shell casing hardness issue had been considered and dismissed by the TCC during the M-16's modification process in 1964. Similar to the chrome-plated chamber modification which was also considered and dismissed, the TCC concluded that setting criteria for casing hardness was unnecessary because there had been yet no cause to suspect that casing hardness was an issue.[233]

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[232] McNaugher, *The M16 Controversies*, 159.

[233] Ibid.

M-16 expert Christopher Bartocci takes this argument one step further by asserting that soft shell casings acted in conjunction with the abnormally-high cyclic rates caused by ball powder. He notes that after expanding, the shell casing would then contract as pressure diminished. Because the rifle was designed to fire at 750-850 rounds per minute, the shell casing should have had sufficient time to contract before the extractor pulled it rearward and tossed it out of the rifle. But when ball powder caused cyclic rates to increase by 100-150 rounds per minute, the shell casing was ejected sooner, potentially before it had fully contracted. Bartocci posits that this combination of soft shell casings, pitted chambers, and high cyclic rates was the primary cause of increased friction between the shell and chamber walls, and therefore responsible for failures to extract.[234]

Having begun his investigation in May 1967, Representative Ichord finally submitted his report that October. It had been a whirlwind five months, packed with four months of testimony in addition to on-site inquiries at Fort Benning, Camp Pendleton, Hamilton Air Force Base, South Vietnam, Colt's factory in Hartford, Connecticut, and the M-14 factories of Olin-Mathieson and Harrington & Richardson. Considering that Ichord's investigation was largely aimed at the Army, whose senior leaders spent many hours testifying, much of the testimony had the tone of a defendant on trial. In particular, the testimony of Colonel Yount, chief of the embattled TCC, reads as that of someone not

[234] Christopher R. Bartocci, "The M16 in Vietnam: Just the Facts!" *Small Arms Review,* last modified March 15, 2013, http://www.smallarmsreview.com/display.article.cfm?idarticles=1735.

at all eager to cooperate.[235] Still other senior officers exhibited stunningly poor memories, seeming to have forgotten details such as why certain modifications were made or who ordered such additions.

Ichord's committee members had plenty of opportunities to see the M-16 in action. The committee kept an M-16 on hand in the hearing room for examination during testimonies, and attended several firing demonstrations at Fort Benning and Camp Pendleton. These did little to impress the committee, with malfunctions occurring during every demonstration. Ichord lamented to Eugene Stoner that the committee had yet to see the M-16 fire a demonstration without a jam.[236]

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[235] While Colonel Yount was not openly hostile to Ichord's committee, his comments taken as a whole give an impression to the reader of resistance. The best individual example of this occurs during Ichord's questioning of Colonel Yount regarding the effects of ball propellant on the M-16, from page 4615 of *Hearings on the M-16 Rifle Program*:

> Mr. Ichord: "Are you telling this committee that you do not feel that the ball propellant has had any adverse effect upon the operation of the M-16 rifle?"
>
> Colonel Yount: "I am telling the committee that I had no evidence it has had any adverse effect."
>
> Mr. Ichord: "You have had no evidence, after being project manager from March of 1963 to June of 1967, that the use of ball propellant ammunition is a part of your problem?"
>
> Colonel Yount: It was a part of the problem as far as cyclic rate is concerned."
>
> By this point, the relationship between ball propellant, cyclic rate, and at least certain types of malfunctions was clearly established. Colonel Yount's responses were clearly evasive.

[236] *Hearings on the M-16 Rifle Program*, 4561.

Other opportunities were not so negative, but, as the committee would learn later, were less than honest. During the committee's visit to South Vietnam in June, members met with soldiers of the 173rd Airborne Brigade. The brigade reportedly had relatively few jamming issues and its soldiers religiously cleaned their weapons. But a few weeks after returning home, the committee received a letter from the sister of a 173rd trooper, who explained why the brigade's rifles appeared so reliable to the committee:

> The investigators were going to interview different riflemen, supposedly picked at random . . . it was the Commander's considered opinion that the only thing that caused the M-16 to misfire or jam was improper maintenance and anyone that had a weapon that malfunctioned was often guilty of not maintaining his weapon in the prescribed manner, and would be disciplined accordingly. Everyone that was selected to go to be interviewed was either a squad leader or a team leader or someone who had been asked, "has your weapon ever malfunctioned on you?" If the man said "Yes," he didn't go. If he said "No," he went. They made sure that the men that the investigators interviewed from our company were picked people that they could bust if they said the wrong thing.[237]

Although Ichord had initially been tasked to examine the controversial sales of M-16s to Singapore, the jamming issue occupied the vast majority of his investigation. Aside from a cursory mention that the proposed sale reflected a "lack of proper coordination between the State and Defense Departments" and coincided with a "shortage of M-16 rifles for training purposes," most of Ichord's 31 findings dealt with the jamming problem.[238] These are summarized below:

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[237] *Hearings on the M-16 Rifle Program*, 4580.

[238] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5370.

1. Army and Marine commanders at multiple levels were negligent in their failure to provide appropriate cleaning equipment and training, which contributed to M-16 malfunctions.
2. The "major contributor" to M-16 jamming malfunctions was ball propellant.
3. The switch from ball to IMR powder was "not justified or supported by test data."
4. Ball powder created a need for numerous modifications which were not necessary to the original design, which was an "excellent and reliable weapon."
5. Army officials knew about the correlation between ball powder and increased cyclic rates as early as 1964, but continued to accept rifles knowing they had been tested with IMR powder instead of ball powder.
6. The failure of responsible Army officials to find solutions to the jamming problems "borders on criminal negligence."
7. The M-16's development was significantly hampered by the "bias and prejudices" of those responsible for the rifle's evaluations.[239]

Ichord's report also took direct aim at the Army's overall rifle procurement process, describing it as "unbelievable" and noting that "the division of responsibility makes it almost impossible to pinpoint responsibility when mistakes are made."[240] Just as Ichord struggled to assign responsibility, today it is likewise virtually impossible to

[239] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5368-5372.

[240] Ibid., 5371.

blame any one person or organization for the mistakes made during the M-16 history. Indeed, many articles and books on the subject take a generic approach in naming those responsible, using terms such as "the Army" instead of specifying committees or people responsible for such decisions. In some cases, this is understandable; even Ichord largely failed to identify specific responsible parties. This thesis certainly falls short of naming specific individuals at times also.

But in a few cases, there are characters who definitely appear as the villains. Dr. Fred Carten and the Ordnance Corps both stand out as examples. Fallows observes that the Ordnance Corps was "small-time, insular, [and] old-fashioned . . . Its first instinct, when presented with a new technical possibility, was to reject it and stick to its own, traditional solutions."[241] Carten certainly reflected this description through his repetitive insistence on smothering any positive aspects of the AR-15 during early tests. His stubborn resistance unquestionably hurt the rifle's development and played a major role in McNamara's decision to force the M-16 issue.

McNamara himself was also not without blame. McNaugher notes that many Army leaders considered McNamara the "agent most responsible for the rifle's problems" because of his office's involvement in the TCC and his dogged persistence to rush the M-16 into production.[242] Instead of allowing the TCC to develop the M-16 into a thoroughly-evaluated rifle, McNamara's politicization of the issue forced the TCC to operate in a highly-restrictive environment, hardly conducive to the objective

[241] Fallows, "M-16: A Bureaucratic Horror Story," 5.

[242] McNaugher, *The M16 Controversies*, 161.

development of a new rifle. Yet, McNamara's decisions were driven by the environment of the time: the M-14 had proven disappointing, while the AR-15 showed promise. McNamara's creation of the TCC as an independent body responsible for the AR-15's militarization made sense, given that the alternatives (the Ordnance Corps and Springfield Armory) were vehemently against the new rifle.

Colonel Harold Yount's role as the M-16 project manager from 1963 to 1967 and chief of the TCC earn him no small share of fault. As the Army officer responsible for the program, he was ultimately accountable. Certainly, it is difficult to comprehend such decisions as allowing Colt to test-fire rifles with IMR ammunition, knowing that ball-propellant ammunition was at least suspected of causing a degradation in performance. But, as McNaugher argues, perhaps Yount receives too much blame.[243] Yount was tasked to head a highly-politicized program, already in the spotlight of Congress, the Secretary of Defense, and even the President. He was responsible for implementing a new rifle which many senior Army personnel did not want, and many of the available testing agencies (such as the Ordnance Corps) certainly did not want. Perhaps he did the best that could have been done, given the circumstances.

Although Army and government officials made some very poor decisions, some fault lay with the M-16's civilian producer as well. Senior Colt employees, especially Colt's president Paul Benke, attempted to cover up the cause and extent of M-16 jamming. In spite of multiple reports from Colt employee Kanemitsu Ito which clearly illustrated the rifle's susceptibility to corrosion, Benke routinely insisted that stories of

[243] McNaugher, *The M16 Controversies*, 159.

malfunctions were "based on very brief contact, hearsay, and single pieces of evidence."[244] Instead, Benke blamed "interservice rivalries, inadequate troop training, and bureaucratic opposition to the rifle within military circles."[245] He would maintain Colt's innocence even forty years later while corresponding with author C. J. Chivers for his book, *The Gun.* But Colt personnel understood perhaps better than anyone the problems with ball propellant and cyclic rates, and yet Colt happily agreed to use IMR ammunition for its acceptance tests. And, more than a year after Ito and other Colt engineers specifically identified corroded chambers as contributing to the jamming problem, Colt had still failed to implement the recommended solution of chrome-plating.

The Ichord committee's findings also addressed the Army's failure to obtain production rights for the M-16 from Colt, which made the Army completely reliant on a single manufacturer. While Colt "enjoyed an excessive profit on M-16 production contracts," the Army's sole-source rifle arrangement wasted at least 40 million dollars.[246] Ichord later estimated that the figure could be as high as 100 million.[247] In an interview with Ichord's lead investigator Earl Morgan, James Fallows asked if the committee found any specific evidence of corruption. Morgan answered, "Oh, I'd be amazed if there wasn't some, knowing how that business is done. But we never found anything we could

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[244] Chivers, *The Gun*, 331.

[245] Ibid.

[246] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5371.

[247] "The Black Rifle is a Troublemaker," *Business Week*, July 6, 1968, Texas Tech University Sam Johnson Vietnam Archive, https://www.vietnam.ttu.edu/virtualarchive/items.php?item=2250113034.

prove."[248] Indeed, Ichord's only real accusation of impropriety concerned Major General Nelson Lynde, Jr. In his role as Commanding General of Army Weapons Command from 1962-1964, Lynde was heavily involved in early M-16 procurement negotiations with Colt, and specifically approved contract pricing for the 1963 order of 104,000 rifles. A few weeks after his retirement in March 1964, Lynde accepted an offer from Fairbanks Whitney Corporation, the parent company of Colt. Although he received an approving legal opinion from the Army concerning the proposed job position, the approval was caveated with the provision that Lynde would have no contact with the M-16 program as a civilian employee. However, much evidence exists that he did indeed interact with the program while employed by Fairbanks.[249] Ichord's report described Lynde's acceptance of the job as "at least unethical."[250] This was hardly evidence of major corruption, but certainly aroused suspicion.

Aftermath

While Ichord's report identified many important aspects of the M-16 problem, the results of the report itself were minor. The primary fixes, chrome-plating and heavier buffers, were already in progress by the time the report was published, and everyone seemed content just to leave the issue behind.[251] One year later in late 1968, malfunction

[248] Fallows, "M-16: A Bureaucratic Horror Story," 19.

[249] U.S. Congress, House, Report of the Special Subcommittee on the M-16 Rifle Program, 5366.

[250] Ibid., 5371.

[251] Hallahan, *Misfire*, 525.

rates had dropped significantly in Vietnam.[252] Colt was producing M-16s with the new buffer and chrome-lined chambers, and cleaning equipment was finally available in quantity. Rifles continued to jam occasionally, and many criticized the M-16's susceptibility to sand and dirt, but complaints from the field were much lower than in previous years.[253] There appeared to be an acceptable equilibrium between malfunctions and performance in the M-16A1, which would continue to serve the Army until adoption of the M-16A2 in 1982.

In addition to implementing solutions to the jamming problems, the Army finally addressed the issue of Colt as the sole-source provider by securing additional manufacturers in mid-1968. Though this process itself was fraught with controversy and scandal, by 1975 three manufacturers were delivering significant quantities of rifles: Colt, Harrington & Richardson, and the Hydramatic Division of General Motors Corporation.

Perhaps the greatest impact of the M-16 on the Army's small arms development culture was the closure of Springfield Armory. The Armory had invented, procured, developed, or produced most of America's small arms since its founding during the Revolutionary War, and many millions of American soldiers had carried rifles bearing the inscription of Springfield Armory. But the Armory's failures with the M-14 and its reluctance to cooperate with the M-16 caused a mortal wound from which it would not recover. Secretary of Defense McNamara, always seeking more efficient methods of

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[252] Because of the Army and Marines' attempts to downplay the problem, data on malfunctions prior to 1968 was unreliable and incomplete. Overall volume of complaints decreased as solutions were implemented, but it is impossible to use data and statistics to answer the question of which solution actually fixed the problem.

[253] Chivers, *The Gun*, 333.

operating, decided that the Army could do without Springfield's seemingly-lackluster contributions to small arms. He opted to close the Armory in 1967 and instead consolidated small arms research and development at Illinois' Rock Island Arsenal. This decision was problematic, for it rested on the assumption that many of Springfield's personnel would transfer to Rock Island. They did not. Out of 480 Springfield employees, only 20 opted to transfer.[254] The Army thus lost a valuable source of weapons expertise by closing Springfield.

In addition, Springfield Armory's role as a rifle manufacturer played a valuable part in producing large quantities of rifles for the United States military during periods of high demand. While civilian contractors were capable of manufacturing large quantities, such firms often required assistance in the early stages of production. Springfield Armory provided this assistance through "tricks of the trade" and "techniques for rapid reliable production."[255] Without Springfield Armory, such techniques rested solely with private manufacturers such as Colt, who were generally unwilling to share proprietary information with competing firms. Thus, while Springfield's closure may have had some short-term merit, it had long-term ramifications for America's abilities to rapidly mobilize mass-production of small arms.

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[254] Ezell, *The Great Rifle Controversy*, 226.

[255] Preparedness Investigating Subcommittee of the Committee on Armed Services, Report on Additional Procurement of M-16 Rifles, 90th Cong., 2nd sess., 1968, quoted in Ezell, *The Great Rifle Controversy*, 228.

Fallows writes that the M-16 story is "the purest portrayal of the banality of evil in the records of modern American defense."[256] Perhaps, but this seems a bit of an exaggeration. It is certainly a terrible act to place profit or reputation above the provision of essential equipment to American troops, and no doubt this has occurred on too many occasions. However, it is more likely that the M-16's troubles resulted from a series of unfortunate, short-sighted decisions which failed to account for possible ramifications. Perhaps Dr. Carten and the Ordnance Corps honestly believed that the M-16 was wrong for the Army, in spite of research to the contrary. Perhaps Colonel Yount and the TCC genuinely saw no connections between their modifications and the resulting malfunctions, in spite of Eugene Stoner's advice.

Regardless of motivations or justifications, the story's recurring trend was flawed decision-making, centered on a refusal to accept research and evidence which supported alternative conclusions. Senior Army officers who grew up with long-range marksmanship refused to accept the idea that a 300-yard automatic weapon was more relevant than a 1,000-yard semi-automatic rifle. Both military and civilian personnel blamed the soldiers' lack of proper cleaning, without acknowledging that the same soldiers experienced no similar issues with their previously-issued M-14s. If there is a lesson to learn, it is that a changing world demands changing equipment, which sometimes requires leaders to let go of pre-conceived ideas. As so tragically demonstrated by the failures of the M-16 in Vietnam, any failure to obtain the right equipment for those in harm's way can have fatal consequences.

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[256] James Fallows, *National Defense* (New York: Random House, 1981), 77.

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