

LESSONS LEARNED FROM THE USE OF THE MACHINE GUN DURING THE
RUSSO-JAPANESE WAR AND THE APPLICATION OF THOSE LESSONS
BY THE PROTAGONISTS OF WORLD WAR I

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Military History

by

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ABSTRACT

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CHAPTER 1
INTRODUCTION

Background

Since the advent of the harquebus, tacticians have dreamed of ways that they might use firearms to apply overwhelming force against their enemies. For centuries, one of the primary ways to realize this dream was by having multiple ranks of infantry, armed with single-shot, muzzle-loading muskets, line up at short range and fire at the opposing army en masse. This was an effective tactic in its day, but it was also costly in terms of casualties and materiel. Thus, military tacticians continually sought to devise new and better methods.

Starting as early as the fourteenth century, there were several attempts to improve upon this technique by designing a weapon that could deliver rapid and sustained rifle-like fire, which led to the creation of “organ guns” and similar weapons.¹ However, the technologies of the day were simply not up to the task and the solution remained elusive. This situation radically changed between 1862 and 1884 when gunsmith pioneers like Richard Gatling and Hiram Maxim produced weapons that were capable of delivering rapid and even “automatic” fire, at rates never seen before.² The first “machine guns” were born.

Strangely enough though, rather than producing a revolution in military tactics, the machine gun had no significant impact on the battlefield for decades. Finally, here was a weapon that appeared to deliver on the dream of rapid and sustained fire. Yet, for some reason, over the course of the half-century between the machine gun’s first

appearance and the beginning of World War I, no army pervasively adopted it or developed the tactics necessary for the weapon to achieve its potential.

One way of determining why this occurred, is to study the how these weapons were used in one of the “small wars” that occurred just prior to World War I. Of the potential options, the best conflict to use for this purpose is the Russo-Japanese War. There were several good reasons why this war in particular should have provided the world with the best insight possible on how the machine gun might affect the battlefield in any future European war. First, this war was one of the very few instances prior to World War I where two large modern armies, both armed with machine guns, fought each other. Second, there was a host of military observers from most of the eventual combatants in World War I who meticulously recorded the events so that they might apply any lessons learned to their own armies. Finally, it occurred less than a decade before World War I, so the lessons learned should have been fresh in the minds of military leaders.

This thesis will show, however, that despite these facts, and because of a complex combination of the prevalent military tactical culture, bureaucratic pragmatism and logistical concerns, the protagonist armies of World War I generally failed to adapt their own tactics and organizations based on their observance of machine-gun employment in the Russo-Japanese War. Some armies were more perceptive than others were in this regard, but none of them fully integrated the weapon into their formations prior to the Great War and as a result were completely surprised by the weapon’s impact on the battlefield.

Thesis Organization

Chapter 1 of this thesis, the introduction, will set up the context of the argument. It includes background on the machine gun, an organizational structure, a review of some of the seminal works on the machine gun and the Russo-Japanese War, a synopsis of the development of the machine gun and its general state of adoption by the armies of World War I. Chapters 2 through 6 will focus on each of the five major participant armies of the Great War: Russia, the United Kingdom, France, Germany and the United States. They will concentrate on how these specific armies used machine guns prior to the Russo-Japanese war, what their observers reported about the machine gun and its employment, and most importantly, these chapters will analyze what effect those reports had on changing their doctrine, tactics, procedures, acquisition strategies, and organizations. In chapter 7, the conclusion, the study offers a summation of why these five armies were less than fully effective at adapting their practices given their unique situations and based on the three main arguments of this thesis and identifies some potential lessons that the armies of today can learn from these events. The paper also contains two appendices. Appendix A contains a basic timeline and area map of the Russo-Japanese War, and appendix B is a weapons compendium of the machine guns in common use at the time and referred to throughout this thesis.

Literature Review

The Social History of the Machine Gun, written by John Ellis in 1975, is the most concise work about the general influence of the machine gun on history. It covers the time period from the development of the Gatling gun in the early 1860s to the late 1960s. While it is not really the subject of his book, Ellis devotes a significant portion of it to

enumerating the reasons behind why the various armies of the late nineteenth and early twentieth centuries failed to widely adopt the machine gun and incorporate it into their battlefield tactics. Ellis lists several of these reasons, but the focus of his argument is that this failure occurred because the machine gun directly challenged the military tactical culture and concepts of warfare that were prevalent at that time. Military officers of the day were unwilling to believe that a mere technological innovation could effectively nullify the impact of the cavalry charge or the bayonet push.³ Put more directly, they steadfastly held onto the belief that man, not machine, remained the master of the battlefield and therefore that weapons, such as the machine gun, would not fundamentally alter the calculus of warfare.⁴ However, given the scope of his work, Ellis neither conducts any significant analysis of the impact that the Russo-Japanese War had upon this line of military thinking, nor did he examine any primary source material on the Russo-Japanese War.

David Armstrong's *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916*, is an exceptional scholarly work and focuses on the issues behind the US Army's use of the machine gun from its first acquisition in the Civil War on through to its full integration during World War I. On the specific subject of the Russo-Japanese War, Armstrong contends that based on the reports of the US military observers, the conflict did not sufficiently prove to the US War Department that the machine gun should be widely adopted.⁵ Despite the weapon's apparent battlefield successes, it still appeared to them that the weapon's merits did not outweigh its manifest deficiencies, which included a high rate of ammunition consumption, a low number of hits per round, the difficulty of determining the range from the gun to the target, and the

weapon's mechanical unreliability.⁶ While this work is noteworthy for its extensive use of primary source material, the analysis is once again incomplete as it focuses almost exclusively on the U.S. Army and thus fails to analyze how and why the armies of Europe reached their conclusions about the usefulness of the weapon.

The most recently published work on the machine gun and its impact throughout history is Anthony Smith's *Machine Gun: The Story of the Men and Weapon that Changed the Face of War*. While one chapter of the book addresses "lessons learned" about the machine gun in wartime, the work is not particularly relevant because it is mostly an amalgam of early machine-gun designer biographies, technological innovations and because it argues no point in particular. As a whole, the book also has many of the same deficiencies as the previously mentioned works. The book pays little attention to the Russo-Japanese War specifically, no primary source material on the Russo-Japanese War is referenced, and despite an extensive bibliography, the work conspicuously contains no footnote or endnote citations at all.

When examining the issue from the vantage point of the Russo-Japanese War itself, rather than from the history of the machine gun, one can find a clear and concise accounting of its events in Bruce Menning's *Bayonets Before Bullets: The Imperial Russian Army, 1861-1914*. While only one chapter is devoted to the Russo-Japanese War, the book provides a non-argumentative and excellent chronological overview. It also briefly but specifically comments on the inventory and effectiveness of the machine gun during several of the battles and has some details on how the Russian Imperial Army incorporated and envisioned using the machine gun at various points in its history. Another seminal work on the history of the war is Denis and Peggy Warner's *The Tide at*

Sunrise: A History of the Russo-Japanese War, 1904-1905. This work is comprehensive, extensively researched with good use of primary source information, and covers a wide range of topics and events throughout the course of the war. Unfortunately, its utility is limited as the Warners pay scant attention to several tactical aspects of the war and as they literally only mention the machine gun and its impact on a single page.

Based on this review, it is evident that to date there has been no comprehensive study of how the protagonist armies of World War I applied, or failed to apply, the lessons of battlefield machine-gun employment that they directly observed during the Russo-Japanese War. This thesis will then shed considerable light on the question of just how and why the armies of the world failed to anticipate the dramatic impact of this weapon on the battlefields of Europe during the Great War.

Early Development and Adoption of the Machine Gun: 1339 to 1904

The earliest weapons designed to deliver a high volume of fire were the *ribauldequins* or “organ guns,” of which the first known historical record dates back to 1339.⁷ These were cumbersome weapons consisting of multiple, muzzle-loaded barrels laid out in parallel layers on a wheeled carriage, which one or two gunners generally fired all at once. Military tacticians tinkered with the employment of such weapons on the battlefield for roughly two centuries, but the inordinate amount of time it took to reload the weapon and reposition it in the field greatly outweighed the advantages of its impressive initial fusillade.⁸ In fact, the overall crude and unreliable nature of gunnery rendered the notion of rapid and sustained fire utterly impractical until the nineteenth century.

Still, the tantalizing concept of being able to produce a gun possessing the equivalent firepower of tens if not hundreds of standard muskets occasionally drove inventors to the drawing board in the intervening centuries.⁹ Some of them were even remarkably prescient in their concepts of a rapid-firing weapon. In 1718, a gentleman named James Puckle applied for a royal patent for what he called “A Portable Gun or Machine called a Defence,” which on paper appears broadly similar to the Gatling Gun of 1862.¹⁰ While it is highly doubtful that the engineering aspects inherent in the design could have produced a functioning weapon, even if the necessary manufacturing technologies were available, it is still remarkable that the general concepts were present so early.

By the early to mid-nineteenth century, working machine-gun prototypes began to appear. In 1834 Danish inventor N. J. Lobnitz actually built a pneumatically powered gun capable of firing 80 shots per minute. However, since two six-foot diameter flywheels powered it, it was almost immediately rejected as a practical military weapon.¹¹ In 1854, Sir Henry Bessemer patented a self-actuating, breech-loading gun that used steam as the primary motive force. Though this weapon never caught on, he luckily also developed and patented the “Bessemer Process” for making steel, which was one of the crucial breakthroughs enabling the development of modern firearms.¹²

Finally, in the latter half of the nineteenth century, the world witnessed the introduction of practical, well-designed, reliable, rapid-fire and even “automatic” weapons. In 1862, Richard Gatling produced a crank-operated gun that was capable of producing a steady stream of fire at 200 rounds per minute.¹³ He was soon followed by Hiram Maxim, who produced the world’s first truly automatic machine gun in 1882, and

by John Moses Browning, who in 1892 produced his first machine gun, which was the first to incorporate the modern principle of capturing the pressure of the muzzle gasses to actuate the weapon.¹⁴

To be sure, it was not simply these inventors' genius that was responsible for the development of the machine gun. Various technologies of the day were now also finally advanced enough to produce these new machine-gun designs. The introduction of metallic cartridge-type ammunition, the ability to finely machine components, and the general manufacturing methods of the Industrial Age all combined with the skill and intrepidity of these early pioneers to make machine guns a reality and procurable on a large scale.

On the eve of the Russo-Japanese War, the general state of adoption of the Gatling, Maxim, Browning, and similar weapons by the armies of the world varied. In general, however, machine guns were not widely employed by any army and showed no signs of being so. In 1904 for example, Vickers was supplying the British Army with just 11 machine guns per year.¹⁵ That priority did not shift until the actual outbreak of World War I, when Vickers produced 11 per week for the British, which was their maximum capacity.¹⁶

It is not particularly surprising that this was the case for the British, indeed for the rest of the world, given the prevailing military tactical culture of the day. This culture, particularly in Europe and in England, held steadfastly to the belief that the cavalry charge and bayonet push were the decisive elements of warfare irrespective of technological progress.¹⁷ More specifically, they felt that the soldier himself, properly trained and imbued with a spirit of *élan*, was and would remain the master of the

battlefield. The influential military theorist Spencer Wilkinson, founder of the Manchester Tactical Society, clearly stated in 1891 what many believed true until the bitter experience of World War I proved them wrong:

It is true that within certain narrow limits, which can be precisely specified, the defender is strengthened by modern improvements in firearms. But it is not true that this results in a great or sudden change in the relations of attack and defense, either in regard to the battle as a whole or in regard to the general course of a campaign. There has been no revolution in tactics or strategy, but certain modifications long since realized have become more pronounced. The balance of advantage remains where it was.¹⁸

Furthermore, British General Sir Douglas Haig, who was a cavalryman by trade and was to command the English Army during World War I, also dismissed the fact that the rifle or the machine gun would nullify the “moral factor.” Haig severely criticized one military journalist in 1904 who, “sneers at the effect produced by sword and lance in modern war; surely he forgets that it is not the weapon carried but the moral factor of an apparently irresistible force, coming on at high speed in spite of rifle fire, which affects the nerves and aim of the . . . rifleman.”¹⁹ Unfortunately for men such as Haig, the armies entrenched on the Western Front showed themselves to be quite immune to such unnerving tactics.

Actual military regulations of the time fell right in line with this philosophy. For example, the regulations of the French Army in 1895 specified for infantry assaults that, “As soon as the battalion arrives within 400 meters of the enemy, bayonets are fixed . . . At a distance of 150 meters . . . all available reserves close up closely for the assault. At a signal from the colonel the drums beat, the bugles sound the advance, and the entire battalion charges forward with cries of ‘en avant, a la baionnette!’”²⁰ The infantry regulations of the German Army were substantially similar, and remained so through to

1914. For example, one excerpt reads “all parts of the force throw themselves with the greatest determination upon the enemy. It should be a point of honor with the skirmishers not to allow the supports to overtake them earlier than the moment of penetrating the enemy’s position.”²¹

As a result of the prevailing “wisdom” of the day, it should be no surprise that few military leaders showed any real interest in using machine guns or developing new tactics for them. Additionally, the tendency of the armies of that period to treat machine guns as a type of artillery, given their weight and that their usual mode of transport was on an artillery caisson, did far more than just limit the development of tactical doctrine. It also in fact led to some disastrous practical applications. Most notably, the tendency of the French army to view the machine gun as a type of artillery during the Franco-Prussian War reinforced the notion that the machine gun was not particularly useful. Just before the war began, the French army unveiled what they described as their new “secret weapon,” which turned out to be the Montigny *mitrailleuse* machine gun. It is unclear, however, exactly how the French military hierarchy thought that the army should employ the *mitrailleuse*, or what justified it being thought of as their “secret weapon.” Lacking any specific training on its operation or employment, the officers in the field simply followed conventional practice and literally sighted the guns in directly adjacent to their standard field artillery. As a result, they were outranged by the Prussian Krupp artillery pieces and destroyed generally before they even had a chance to fire.²²

Cultural bias alone might not have proven sufficient to keep the machine gun in the background; however, there were some other unfortunate realities that worked against its acceptance. For instance, armies of all historical periods achieve little if its

bureaucracy is not supportive of the effort. This type of problem could not have been more pronounced than it was in the U.S. Army during the Civil War. The weapons procurement branch of the U.S. Army, the Bureau of Ordnance, had built up a formidable bureaucratic culture of fiscal restraint and reluctance to change ever since its inception in 1809.²³ In particular, the tenure of Brigadier General James W. Ripley as Chief of Ordnance during the Civil War probably did more than any other single event to perpetuate bureaucratic resistance to the machine gun's adoption. Ripley had spent 47 years as an ordnance officer prior to this appointment and as a result, he was intimately familiar with all aspects of departmental regulations. Moreover, he religiously believed in following the letter and spirit of all of them.²⁴ In fact, while Ripley was still a Lieutenant Colonel, General Andrew Jackson threatened to hang him for refusing to fill an irregular requisition submitted by a unit under his command.²⁵

His faith in procedure apparently undiminished by the event, Ripley went on to husband the Army's ordnance assets throughout the Civil War. While it might be tempting to be critical of his actions, one also must remember that he was facing the enormous challenge of properly equipping a new army of over 480,000 men (up from only 16,000 the year before), and virtually overnight. As a result, he made his position on the machine gun and other new weapons abundantly clear in a letter he sent to the Secretary of War in June of 1861:

A great evil now especially prevalent in regard to arms for the military service is the vast variety of new inventions, each having, of course, its advocates, insisting upon the superiority of his favorite weapon over all others and urging its adoption by the Government. The influence thus exercised has already introduced into the service many kinds and calibers of arms, some, in my opinion, unfit for use as military weapons, and none as good as the U.S. musket, producing confusion in the manufacture, the issues, and the use of ammunition, and very

injurious to the efficiency of troops. This evil can only be stopped by positively refusing to answer any requisitions for or propositions to sell new and untried arms, and steadily adhering to the rule of uniformity of arms for all troops of the same kind, such as cavalry, artillery, and infantry.²⁶

Finally, although the armies of this period often receive harsh criticism for their handling of logistical concerns, when it came to the machine gun, military officers were very much mindful of the challenges that the weapon posed. Perhaps the most notable example of this was in 1876 when U.S. General George Armstrong Custer declined to take four available Gatling guns with him to the Little Big Horn. He wrote at the time that this was simply because he felt the guns would prove too difficult to haul over the terrain.²⁷ In hindsight this might look like a colossal tactical blunder, but General Custer certainly cannot bear all the blame for it. He acted in much the same way that any commander would likely have acted at the time and under similar circumstances. There were some solid, practical logistic reasons behind this reluctance to use machine guns. The Gatling guns in question each weighed in excess of 450 pounds. That amount of weight precluded man-portability; thus, the only practical way of moving them as noted earlier was via artillery carriage. This was of course often impractical for the U.S. Army, who at the time was chiefly concerned with policing the frontier and who was ranging over hundreds of miles of rough terrain in order to do so. In fact, this expedient solution of artillery carriage mounting was probably responsible for limiting much of the machine gun's early tactical applications. On a fixed carriage there was no easy way to traverse the weapon from side to side, thus significantly reducing its effectiveness.

Besides its sheer size and weight, other logistical considerations helped preclude widespread machine-gun adoption. It is helpful to remember that a prevailing military tenet of the day was to ensure that riflemen fired carefully aimed shots at identifiable

targets; the goal being one shot per kill. By its very nature, the machine gun used ammunition at a far more prodigious rate and could in no way guarantee a hit for every shot. Thus, the weapon was considered wasteful not only due to the cost of the ammunition but also due to the difficulty in re-supplying it at such a rapid rate. In austere budgetary environments, particularly in the United States, this problem added yet another voice to the chorus advising against widespread machine-gun adoption.

However, the aversion to machine guns was not universal. One can easily find individuals who were challenging the prevailing military wisdom. At times, these heralds of machine-gun virtues were even famous and highly respected people. Theodore Roosevelt was a powerful supporter, both when he served as the Commanding Officer of the First U.S. Volunteer Cavalry, better known as the “Rough Riders,” and after he became President. In his account of his days with the Rough Riders, he noted in his memoirs that at one point during the Battle of Santiago he raised the cry, “It’s the Gatlings men! Our Gatlings! . . . It was the only sound which I ever heard my men cheer in battle.”²⁸ Roosevelt also commented on the inventiveness and daring of Lieutenant John “Machine Gun” Parker, who commanded the Gatling detachment, saying that the Rough Riders strove to keep Parker and his guns as their constant companion.²⁹ His support, however, even as President, never translated into a marked change in army policy.

Other proponents also voiced their support. Among the first of these, even earlier than Roosevelt, was Sir Garnet Wolseley. Wolseley’s name was literally proverbial in the British Army. To say that something was “all Sir Garnet” meant that it was in perfect working order. He directed the efforts of the Army in several of their colonial campaigns,

and after having significant experience with the Gatling gun in Africa, he remarked in 1885 that “the British Army has now most certainly arrived at the conclusion that we must have machine guns . . . I feel convinced that the fire of this small arm . . . will be most effective.”³⁰ Later, he was even more emphatic, stating that “The machine gun is still in its infancy. Its power when in its prime in my opinion will astonish the world.”³¹ Another notable proponent was Lieutenant Colonel N. R. McMahon, who was the Officer in Charge of the Hythe School of Musketry. Shortly after the Russo-Japanese War, he pleaded with his superiors to adopt the machine gun. “Machine guns will be used in the near future in very large numbers. There need be no fear in overstating the value of these weapons. All tendencies in modern tactics . . . bring their good qualities more and more into relief.”³² Finally, J. F. C. Fuller wrote a particularly ironic and prescient paper at the British Army Staff College in January of 1914 in which he contended that military tactics are based on weapon-power and not on historical example. Thus, since the machine gun was one of the newest weapons available, tactics should be based on it.³³ He was severely criticized for it afterwards.

Unfortunately, like President Roosevelt, all of these distinguished gentlemen were utterly unable to make a significant dent in the prevailing theories regarding machine-gun employment or influence army procurement of the weapon. The Russo-Japanese War was therefore, at least in theory, the first major test of the competing machine-gun philosophies with its lessons potentially radically altering the course of the weapon’s tactical employment in the decade that followed.

¹John Ellis, *The Social History of the Machine Gun* (Baltimore: Johns Hopkins University Press, 1986), 10.

²Ibid., 16.

³Ibid., 50.

⁴Ibid., 17.

⁵David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, Connecticut: Greenwood Press, 1982), 140.

⁶Ibid., 137-140.

⁷Ellis, *The Social History*, 10.

⁸Ibid., 11.

⁹Ibid., 12.

¹⁰Ibid.

¹¹Ibid., 16.

¹²Ibid.

¹³Ibid.

¹⁴Ibid.

¹⁵Ibid., 39.

¹⁶Ibid.

¹⁷Ibid., 50.

¹⁸Spencer Wilkinson, *War and Policy: Essays* (New York: Dodd, Meade and Co., 1900), 159.

¹⁹B. H. Liddell-Hart, *The Tanks: The History of the Royal Tank Regiment and its Predecessors, Heavy Branch, Machine-Gun Corps, Tank Corps, and Royal Tank Corps, 1914-1945* (New York: Praeger, 1959) 234.

²⁰Ellis, *The Social History*, 74.

²¹Melvin Kranzberg and Carroll Pursell Jr., *Technology in Western Civilization* (New York: Oxford University Press, 1967), 499.

²²John Ellis, *The Social History*, 74.

²³Armstrong, *Bullets and Bureaucrats*, 7.

²⁴Ibid., 8.

²⁵Ibid., 9.

²⁶Ibid., 13.

²⁷Ibid., 64.

²⁸Theodore Roosevelt, *The Rough Riders* (Barnes and Noble Publishing, Inc. 2004, 1899), 80.

²⁹Ibid.

³⁰Ellis, *The Social History*, 57.

³¹Ibid.

³²Ibid., 58.

³³Brian Bond, *The Victorian Army and the Staff College 1854-1914* (London: Eyre Methuen, Ltd., 1972) 186.

CHAPTER 2

THE RUSSIANS

This study begins with an examination of Imperial Russia's use of the machine gun. It is fitting to begin with Russia, as it was the only country in this study to be a combatant in both the Russo-Japanese War and World War I. Thus, the Russian Army should have learned the war's lessons most poignantly having experienced them first-hand. The Russians are also of particular interest for this study due to their military tactical culture. In their following of eighteenth century General Aleksandr Vasil'evich Suvorov's maxim that "the bullet's a fool, the bayonet's a fine lad," Russian tacticians continued to emphasize the use of the bayonet over concentrated rifle fire or other methods of attack through World War I.¹ Captain L. Z. Soloviev, who was a company commander in the 34th East Siberian Rifle Regiment during the Russo-Japanese War, stated as much in his memoirs. "Let us now take another phase of infantry battle, the most decisive of all, for which preparations are made not only for several hours but several days, and the result of which gives always a decided and final preponderance to one side or the other. I mean the bayonet charge."²

Use of the Machine Gun Prior to 1904

Prior to 1904, the Russians had mostly only experimented with the machine gun as an adjunct to their artillery units. They began this experimentation in 1870 with the Gatling system.³ Between 1874 and 1876, Russian armorer V. S. Baranovskii improved the weapon by reducing its weight and increasing its rate of fire, and ultimately an eight-gun Gatling battery was added to each artillery brigade.⁴ These weapons along with a

domestically produced version known as the Gorloff were in fact used to great effect in the Russo-Turkish War of 1877-78.⁵ Ultimately, however, the Russians decided that the gun's weight, limited range as an "artillery" piece, and other technical difficulties rendered it impractical for field use and by the end of 1876 machine guns were used only as fortress armaments.⁶

In 1891-92, the Russians again tinkered with the employment of machine guns outside of fortresses, field-testing the Nordenfelt gun in the Turkistan and Siberian Military Districts.⁷ However, owing once again to the prevailing military thinking that machine guns were a type of artillery, they were tested by the Artillery Committee of the War Ministry rather than by the infantry or cavalry. It concluded that "under present armament of the infantry and field artillery, machine guns in general and earlier systems in particular [such as the *mitrailleuse*-type weapon] have little significance on the battlefield."⁸ It was not surprising that the Artillery Committee came to such a conclusion, since as noted earlier, the Franco-Prussian War two decades previous had proven that the machine gun was ineffective as an artillery piece. Thus, machine guns were once again relegated strictly to fortress defense. Interestingly, the Commission on the Armament of Fortresses concluded that "they could be of undoubted use" and immediately ordered 250 of them.⁹ In fact, the combination of these two findings probably helped cement the Imperial Army's notion that machine guns were inherently a defensive weapon. The findings of the Artillery Committee were also consistent with Russian army field regulations of the day, an updated version of which was released in that same year. These regulations should have at least somewhat reflected the ongoing technological advances of the Industrial Revolution and their effect on the battlefield, yet

its authors did little to adapt them to these new realities. Many sections were literally exact copies of earlier versions and they still lacked a section on how to conduct actual combat operations.¹⁰

Finally, by 1896, the Russians began to conduct large-scale experiments with machine guns. The War Ministry acquired 379 Maxim-model machine guns for testing in three military districts as well as in the imperial capital region.¹¹ Despite some flaws, they concluded that machine guns would be a useful addition to the armament of the army because “they could significantly increase [enemy] casualties” and by 1902, the Russians obtained a contract from Vickers to produce the Vickers version of the Maxim under license in Russia.¹² 1902 was a banner year in fact for machine guns in the Imperial Army. Because of the interest in the weapon and the commencement of domestic production, the army issued the *Manual for Training in the Use of the Machine Gun, 1902 Model* as a supplement to the 1900 *Manual for Infantry Operations*.¹³ This marks the first instance where formal regulations linked the machine gun to infantry rather than artillery operations. The eight-weapon machine-gun batteries were moved out of the artillery brigades and reorganized into machine-gun companies within infantry divisions.¹⁴ The Russians estimated that one gun could replace the firepower of fifty infantrymen in a defensive position.¹⁵ There was still no real talk of using a machine in the assault, probably because the weapon was still so heavy and cumbersome to move. The 1905 Model Maxim machine gun weighed 107 pounds total on a tripod mount and 537 pounds on a wheeled carriage.¹⁶ The Maxim gun did, however, prove to be an excellent overall choice for the Russians. It was fairly reliable, available with both

wheeled and tripod mounts, and with some modification, it remained their standard heavy machine gun through World War II.¹⁷

Reports and Observations from the Russo-Japanese War

During the Russo-Japanese War, the Russians often employed the machine gun to great effect, particularly during the siege of Port Arthur and at the battles of Liaoyang, Sandepu and Mukden. Again, consistent with their doctrine, logistical realities and overall strategy in Manchuria, they used them only in a defensive role. The machine gun of course proved to be extremely effective in the defense. The Japanese commanders were certainly impressed, since their army began the war with no machine guns at all but ended it with a large number of them, mostly of the lighter, Hotchkiss-type.¹⁸ A German press correspondent embedded with the Russian Army witnessed first-hand how devastating the machine gun was:

On January 8, 1905, near Lin-chin-pu, the Japanese attacked a Russian redoubt armed with two Maxim machine guns. A Japanese company, about two hundred strong, was thrown forward in skirmishing order. The Russians held their fire until the range was only three hundred yards; the two machine guns were then brought into action. In less than two minutes they fired about a thousand rounds, and the Japanese firing-line was literally swept away.¹⁹

Correspondents from other nations were no less impressed. During the defense of Port Arthur, one British war correspondent wrote, “The death-dealing machine guns of the Russians in the casements of the fort are playing ghastly havoc--such havoc that only a score or more men of Ouichi’s battalions reached the first ditch of the defense, where they threw themselves panting into pits that their own artillery had torn.”²⁰ Another said of these same guns, “Nothing can stand against them, and it is no wonder that the

Japanese fear them, and even the bravest have a chilly feeling creeping down their backs when the enemy's machine guns beat their devil's tattoo."²¹

Some of this could possibly be written off as sensationalistic journalism; however, military officers were just as impressed with the weapon's performance. While the Russians did not as a rule record their direct observations of the machine guns impact at the time of the war, several Russian commanders mentioned it in their memoirs and after action reports. Among them was the previously mentioned Captain L. Z. Soloviev of the 34th East Siberian Rifle Regiment. He wrote:

In speaking about the present war it is impossible to pass over unnoticed this new weapon, which in short time has shown itself to be the most deadly invention of military ingenuity. These are machine guns.²² [A little later, he elaborated still further] In modern battles the harsh, broken rattle of the machine gun is heard uninterruptedly for whole hours, producing a disheartening and irritating effect on the men. In addition to the losses suffered by a detachment coming under fire of machine guns the enormous losses incurred in a brief period of time cause great depression. The greatest effect is produced, both morally and physically. It is not surprising, therefore, that the machine guns were christened by the men 'the devil's spout.'²³

These opinions were not shared only by junior officers either, for as one moves up the chain of command, the impact of the weapon as noted in senior officer's memoirs was not diminished. Lieutenant General N. A. Tretyakov, who commanded the 5th East Siberian Rifles at the Battle of Nan-Shan wrote in his after action report that, "I built great hopes on our four machine guns, posted behind the 7th Company's left flank. They constituted a tremendous power, practically equaling a whole company."²⁴

Most notable, however, are the after action reports and comments written by General A. N. Kuropatkin, who was in overall command of all Russian land forces in Manchuria during the Russo-Japanese War. In two volumes, he covered several aspects of the war and offered his opinions on why Russia did not perform well. With regard to

the machine gun in particular, his major lament was that he never had anywhere near as many as he thought he needed, either in terms of the weapons themselves, their ammunition, or means of transportation, which negatively affected the outcome of several battles. In 1904 alone, General Kuropatkin ordered 246 tripod-mounted Maxim guns and 411 mounted on wheeled carriages. He only received 16 and 46 respectively.²⁵

In his second volume, General Kuropatkin focused his comments on recommendations to improve the army, several of which involved the machine gun. Based on his experiences in the war, he recommended including one machine gun each at the company level, or 150 machine-gun sections per regiment, which was a far more pervasive inclusion than any other nation had even come close to doing at that time.²⁶ He stated quite clearly that, “The value of machine guns is now so great that we cannot afford to be without them.”²⁷ He also noted some difficulties with the weapon that he thought should be addressed, which included its weight and lack of “adaptability to the ground,” which meant that the weapons on their artillery carriage mountings presented too large of a target and were thus too vulnerable to attack.²⁸ Most significantly, Kuropatkin not only explicitly stated that the prevailing wisdom of employing machine guns as artillery pieces was wrong, he also opined that they should be adapted for use in the offense. He argued that, “Our high, unwieldy weapons, with their shields, more resembled light field-guns . . . combined with the difficulty of adapting them to the ground, was responsible for the decision that these guns should be organized into batteries, and be treated and used as artillery. Such an opinion is absolutely wrong, for the great volume of fire which they can deliver calls for their distribution at the most

important points along the firing-line, and, therefore, a capability of advancing with assaulting columns.’²⁹

The Transformation in Machine-Gun Employment

Unfortunately, most of General Kuropatkin’s recommendations were not acted upon. He was disgraced as a military leader within Russian because of his failures in prosecuting the war and in fact was removed from command six months before the war ended with the Peace of Portsmouth. As a result, his specific recommendations about the machine gun fell on deaf ears. Despite this, the Russians did undertake many measures to rebuild their army following their humiliation at the hands of Japan. The machine gun was not ignored in the process. Russia’s most pressing overall concerns involved how creating an effective strategy for national defense, rebuilding the army as a fighting force and whether or not to rebuild and refortify Russia’s defensive fortresses in and around Poland. The specific job of how to rebuild the army fell to the new Minister of War, General A. F. Rediger, who assumed his post on 2 July 1905, just two months before the Russo-Japanese War ended.³⁰

Second on Rediger’s list of priorities for rebuilding the army, coming only after training and education, was to reequip the military with modern weapons. He surmised, correctly, that Russia’s equipment was not nearly as modern and effective as that of Germany, France, or, for that matter, Japan.³¹ Among several other initiatives, Rediger personally emphasized the importance of the machine gun in modern warfare, and worked to increase the use of the Maxim gun.³² He was relatively successful in this effort, and by the end of 1906 Russia had 118 companies of eight machine guns each within the infantry regiments and cavalry divisions, compared with 64 total guns on the

eve of the Russo-Japanese War.³³ His successor, Vladimir A. Sukhomlinov, further improved upon this total and by 1910, helped along by domestic production of the Maxim under license, he had added a machine-gun detachment (two guns in peacetime and four guns during war) to each regiment and independent battalion.³⁴ While this number of guns was not particularly generous by later standards, it was a considerable investment in new weapons for an army whose adaptive capacities have never attracted much attention.³⁵ One weakness that the Russians still had with regard to using the machine gun, at least in the offense, was that like most other armies of the day the Imperial Army still had no light and easily portable automatic firepower. Russian inventors tried to solve this problem by experimenting with automatic and semi-automatic rifles, but they never got beyond the prototype stage.³⁶

In the area of doctrine and tactics, the Russians put serious effort into incorporating recent combat experience into their war plans. In 1912 they published war plan PU-1912, which like many contemporary plans of the day still emphasized the attack but also placed special emphasis on the defense.³⁷ They even recognized that the defense could become the dominant form of warfare in the event that “an objective could not be accomplished by the attack.”³⁸ To provide supplementation for PU-1912 at the operational and tactical levels, in February 1914 the War Ministry released another publication titled *Instructions for the Action of Infantry in Battle*.³⁹ While it still clung to the idea that the bayonet attack was integral if not the decisive element in infantry employment, it also stipulated that “the force of infantry consists both in rifle and machine gun fire.”⁴⁰

The major problem that the Russians now faced was how to achieve a timely concentration of combat power, or infantry, in order to successfully attack and seize an objective under conditions where survival required dispersion.⁴¹ Some tacticians thought that the novel use of machine guns might provide an answer. M. D. Bonch-Bruevich and A. A. Buniavskii, for instance, recommended that under certain circumstances commanders might move heavy machine guns forward to aid in the suppression of the defense.⁴² This was not really a new tactic, as U.S. Army Lieutenant J. H. Parker had pioneered the use of just such a tactic in 1898 during the Spanish-American War. Unfortunately, the machine gun's age-old problems of weight, size, and lack of availability below the battalion level, made this tactic impractical for the Russians.⁴³ The Russians thus entered World War I with this issue still unresolved and, like the rest of the world, they learned or relearned some painful lessons on just how deadly and effective the machine gun could be.

¹Bruce W. Menning, "Train Hard, Fight Easy: The Legacy of V. A. Suvorov and his 'Art of Victory'," *Air University Review*, Vol. 7 (November-December 1986), 83.

²L. Z. Soloviev, *Actual Experiences in War: Battle Action of the Infantry; Impressions of a Company Commander* (Washington: U.S. G.P.O., 1906), 22.

³Bruce W. Menning, *Bayonets Before Bullets: The Imperial Russian Army, 1861-1914* (Indianapolis: Indiana University Press, 1992), 33.

⁴*Ibid.*

⁵John Ellis, *The Social History of the Machine Gun* (Baltimore: Johns Hopkins University Press, 1986), 66.

⁶Menning, *Bayonets Before Bullets*, 33.

⁷*Ibid.*, 107.

⁸*Ibid.*

⁹L. G. Beskrovny, *The Russian Army and Fleet in the Nineteenth Century*, trans. Gordon E. Smith (Gulf Breeze, FL: Academic International Press, 1996), 185.

¹⁰*Ibid.*, 109.

¹¹Menning, *Bayonets Before Bullets*, 107.

¹²*Ibid.*

¹³Beskrovny, *The Russian Army*, 103.

¹⁴*Ibid.*, 186.

¹⁵Menning, *Bayonets Before Bullets*, 108.

¹⁶Beskrovny, *The Russian Army*, 185.

¹⁷Menning, *Bayonets Before Bullets*, 108.

¹⁸Aleksei Nikolaevich Kuropatkin, *The Russian Army and the Japanese War: Being Historical and Critical Comments on the Military Policy and Power of Russia and on the Campaign in the Far East*, trans. Alexander Bertram Lindsay (New York: E. P. Dutton, 1909) 307.

¹⁹Ellis, *The Social History*, 67.

²⁰G. S. Hutchison, *Machine Guns: Their History and Tactical Employment (Being Also a History of the Machine Gun Corps, 1916-1922)* (London: Macmillan and Co., 1938), 89.

²¹*Ibid.*, 90.

²²Soloviev, *Actual Experiences in War*, 33.

²³*Ibid.*

²⁴Nikolai Aleksandrovich Tretyakov, *My Experiences at Nan Shan and Port Arthur with the Fifth East Siberian Rifles* (London: H. Rees, 1911), 47.

²⁵Kuropatkin, *The Russian Army and the Japanese war*, 308.

²⁶*Ibid.*, 134.

²⁷*Ibid.*

²⁸*Ibid.*, 136.

²⁹Ibid., 137.

³⁰Walter Thomas Wilfong, "Rebuilding the Russian Army, 1905-1914: The Question of a Comprehensive Plan for National Defense" (Ph.D. diss., Indiana University, 1977), 62.

³¹Ibid., 76.

³²Ibid., 77.

³³Ibid.

³⁴Ibid., 161.

³⁵Menning, *Bayonets Before Bullets*, 232.

³⁶Ibid.

³⁷Ibid., 259.

³⁸Ibid.

³⁹Ibid.

⁴⁰Ibid., 260.

⁴¹Ibid.

⁴²Ibid.

⁴³Ibid.

CHAPTER 3

THE BRITISH

Of all the nations included in this study, historical judgment has perhaps been the least kind to Great Britain's military commanders and their actions with respect to the machine gun and the use of infantry during World War I. In fact, the mere mention of the Great War conjures mental images of British soldiers hopelessly yet repeatedly dashing across "No Man's Land," only to be mown down by German machine-gun fire. The British are therefore of particular interest for this study, since it would appear that despite the lessons of the Russo-Japanese War and indeed their own hard-learned lessons at the beginning of World War I, the army stubbornly clung to outdated offensive tactics. Some of the more influential British staff officers shortly before World War I were even strongly arguing for a complete return to the bayonet-assault tactics of the 1870's. Brigadier General Sir Lancelot Kiggel, who was a protégé of Field Marshal Haig and whose views were largely representative of the General Staff at the time, said as late as 1910 that:

After the Boer War the general opinion was that the result of the battle would for the future depend on fire-arms alone, and that the sword and bayonet were played out. But this idea is erroneous and was proved so in the late war in Manchuria. Everyone admits that. Victory is won actually by the bayonet, or by the fear of it, which amounts to the same thing so far as the conduct of the attack is concerned. This fact was proved beyond doubt in the late war. I think the whole question rather hangs on that; and if we accept the view that victory is actually won by the bayonet, it settles the point.¹

It is of some interest that General Kiggel felt qualified to discourse on the subject of minor tactics, as he had no line experience since 1893, but never the less his opinions as well as similar ones by other staff officers held sway.²

Use of the Machine Gun Prior to 1904

The first exposure that the British Army had to the machine gun was not particularly positive. In 1862, they sent three officers to report on the American Civil War. While in America, they witnessed a demonstration of the just-invented Gatling gun and remarked that:

We saw some practice at 250 yards range against a target, with this gun, which was very bad; this appeared to be the fault of the ammunition, as the bullets were too small, and few of them took the rifling. It fired with great rapidity, but soon got out of order, and would not be likely to remain long in proper trim...It might be useful in the defense of a narrow passage or bridge, but it is questionable whether it would be of any great practical utility in the open field of battle.³

This poor review was not surprising, as there were several problems with the Gatling gun's original design. The officers were also quite correct in that the ammunition being used was not particularly well suited for the mechanism. In addition to the problems noted, the bullets were still housed in paper cartridges and were prone to malfunction.

Nevertheless, by 1871 the British Army began to use the machine gun. The first model adopted was the .45-caliber, ten-barrel Gatling gun which by then was being domestically manufactured under license by the Armstrong Company in Birmingham.⁴ Initially, British tactical doctrine on the use of the machine gun was very much the same as it was in other armies of the world. That is, due to its sheer size and weight, it was mounted on artillery carriages to facilitate movement and was considered a type of artillery. This expedient mobility solution in fact was probably in large part responsible for limiting the development of machine-gun doctrine beyond its role as an "artillery" piece for the better part of thirty years. Early carriage mounting systems also prevented the weapon from being traversed side to side, thus severely limiting the weapon's usefulness.⁵

That is not to say that tactical development in the British Army was entirely lacking. As early as 1874, Captain H. Brackenbury, who was a professor of military history at Sandhurst, argued that in fact the entire British tactical system was in need of overhaul. In a detailed analysis of the Franco-Prussian War, Brackenbury argued that new tactics were needed and that they had to be based on a firm understanding of the improvements in modern weapons.⁶ While he does not specifically mention the machine gun, it seems certain that he was aware of how it, and other modern firearms, had changed the nature of the tactical fight. After studying the conduct of that war, and specifically the differences between the doctrinally close British formations and the more spread out formations favored by the Prussians, he concluded that, “it is not too much to say that [British] troops could not move under fire, or that if they attempted to do so they would speedily be annihilated.” He added that, “the actual results are so great that the front of a position held by troops in good order is, so long as troops are not demoralized by fire, practically unassailable by troops in any close formation, if the attacking force has to pass over open ground.”⁷

Interestingly though, there appeared to be something of a disconnect between this line of thinking, even among its adherents, and the machine gun itself. At least in part, this was probably due to the performance of the machine gun in the Franco-Prussian War. This war turned out to be a major setback for the use of the machine gun, despite its having been billed by the French as their new “secret weapon.” Once again, in keeping with the prevailing practice of the day, the French used their *mitrailleuse* or “grape-shot firer” machine guns as artillery pieces. They even went so far as to sight them in directly adjacent to their other field guns. As a result, they were often outranged by the Prussian

Krupp artillery pieces and were destroyed before they had a chance to fire.⁸ Thus, they were roundly discredited as a useful military weapon.

Despite this, the British continued to use the machine gun to great effect in their colonial campaigns. In fact, in the area of machine-gun application, the British probably had more practical experience than any other nineteenth century army. The first major triumph of the machine gun, a Gatling gun in this case, came in 1879 when Lord Chelmsford employed them on a campaign into Zululand against the *impis* of Cetshwayo.⁹ To be fair, even without the Gatlings, the British possessed overwhelming firepower and the battle was almost totally one-sided. The Gatlings were, however, a major contributor to the victory. As one war correspondent from the *London Standard* said, “When all was over and we counted the dead, there lay, within a radius of five hundred yards, 473 Zulus. They lay in groups, in some places, of fourteen to thirty dead, mowed down by the fire of the Gatlings, which tells upon them more than the fire of the rifles.”¹⁰ Lord Chelmsford was so impressed with their usefulness as an infantry support weapon that after the Zulu campaign he said that machine guns should, “not be attached to artillery, but should be considered essentially as an infantry weapon...So utilized, they might, I feel sure, be used most effectively not only in defense, but in covering the last stage of an infantry attack.”¹¹

Another battle where the Gatlings played a major role was in the assault on Tel-el-Kabir in 1882. The *Army and Navy Gazette's* account of the action probably best sums up the efficiency of the weapons:

The naval machine gun battery, consisting of six Gatlings . . . reached the position assigned to it . . . Having received orders to advance they came within easy reach of the Tel-el-Kabir earthworks . . . The order “action front” was given

and taken up joyously by every gun's crew. Round whisked the Gatlings, r-r-r-r-rum, r-r-r-r-rum, r-r-r-r-rum! That hellish note the soldier so detests in action, not for what it has done, so much, as for what it could do, rattled out. The report of the machine guns as they rattle away rings out clearly on the morning air. The parapets are swept. The embrasures are literally plugged with bullets. The flashes cease to come from them. With a cheer the blue-jackets double over the dam, and dash over the parapet, only just in time to find their enemy in full retreat. That machine gun was too much for them. Skulking under the parapet they found a few poor devils, too frightened to retire, yet willing enough to stab a Christian, if helpless and wounded.¹²

The last sentence of the quotation illustrates another factor that helped keep the machine gun's potential from being realized in Europe. Namely, because the weapon was only really being used against "savages" on a remote continent, there was a tendency among senior British officers to dismiss the tactical lessons learned. They simply felt that the weapon would have no real place on a "civilized battlefield," where training and the superior moral character of their soldiers would effectively nullify any tactical impact that the weapon might have.

Still, the tactical implications of the machine gun did interest some in the late Victorian army, particularly, of course, those officers with direct experience in the colonial wars.¹³ Several officers, most of them junior in rank, submitted papers on the machine gun and its tactical applications at the Royal United Services Institute (RUSI) from 1876 through to 1889.¹⁴ They were supported by some senior officers as well, among them being Sir Garnet Wolesley, Lord Chelmsford, Henry Brackenbury, and Lord Beresford who in 1887 noted that "it would be a very serious [dangerous] thing if the German or any other army were to take up the machine-gun question. Whilst we, with all our practical experiences having found it so useful on so many occasions, were not to take it up and thrash it out."¹⁵

By at least 1899, this interest actually translated into some specific tactical recommendations. In that year, Lieutenant Colonel E. Gunter of the East Lancashire Regiment put forth his proposals for use of the machine gun in his *Outlines of Modern Tactics*. Most notably, all of his tactics involve the use of the machine gun with infantry and cavalry, not with the artillery as was the far more common practice, and in the offense, not just the defense. Right about the time that Lieutenant John Parker was pioneering the use of the machine gun in the assault with Roosevelt's Rough Riders, this officer also offered remarkably prescient views on machine-gun tactics. In their offensive use with the cavalry the manual stipulates, "The cavalry attack should immediately follow their fire, and they should continue to fire until the Squadrons of their unit's attacking lines pass them. After a success they should be pushed forward to support pursuit."¹⁶ For the infantry the concepts were much the same. The manual states, "In attack their use is to act with the Advance Guard in forcing the enemy to show his dispositions and in covering the advance from a flank, to fend off the counter-attack, and to fire on the point of assault previous to the final charge."¹⁷

Ultimately, however, all of this experience and commentary was insufficient to meaningfully alter standard British army tactics prior to the Russo-Japanese War. In most respects, this has to be attributable to the prevailing British military tactical culture of the day. As has been noted previously, the British Army, like many others, was wedded to the concept of the primacy of man on the battlefield. For them, it was almost inconceivable that a single improvement in modern weaponry could effectively nullify what they still considered the decisive elements of battle. Namely, the cavalry charge and the bayonet push. *The British Cavalry Manual of 1907*, published several years after the

Russo-Japanese War, may have best summed-up this attitude when it stated, “It must be accepted as a principle that the rifle [which by this time was capable of quick-action firing, and thus implying the machine gun as well], effective as it is, cannot replace the effect produced by the speed of the horse, the magnetism of the charge, and the terror of cold steel.”¹⁸ Beyond this, however, as is also noted with other armies of the day, the British were very much mindful of the technological and logistical limitations of the machine gun. Many of the previously mentioned papers submitted at the RUSI show that much of the debate revolved around which weapons the British should actually buy, given their inherent problems and limited financial resources, rather than how, when or if they might be a factor in the future.¹⁹ Given all the variations which were available, the expense of obtaining them, and their questionable reliability, it was by no means clear that an additional investment in machine guns would yield a better “bang for the buck” as compared to, for instance, additional investments in quick-firing artillery. As a result, most machine-gun manufacturers who were attempting to interest the British in their weapon received much the same response, which was, in essence, “Come back and see us once you have perfected your weapon.”²⁰

Reports and Observations from the Russo-Japanese War

The British had a host of military observers posted with both the Russian and Japanese armies in Manchuria, probably the most famous of which was then Lieutenant General Sir Ian Hamilton. He wrote an extensive series of memoirs and accounts of the war, along with his fellow officers, and they give us some real insight on the use of the machine gun. However, it must also be understood that since the use of the machine gun was greatly deemphasized within the British military, the officers were not really looking

to comment upon the machine gun's effect in the field. As has been mentioned before, it was not considered to be a particularly important weapon to the British. Thus, it is all the more remarkable that so many officers mentioned its tactical usefulness.

First, one can examine the report from Lieutenant General Sir Ian Hamilton. As the senior British officer present on the Japanese side, his personal observations were likely to have the most impact. Unfortunately, the machine gun was generally overlooked in his reports.²¹ He focused more on the Japanese trench systems, their use of smoke screens, and the importance of every soldier being "multipurpose," which generally translated to infantrymen being able to dig and create minor engineering structures and cavalrymen who were proficient in the use of a rifle.²² On the machine gun itself, he mentions it in his account of the Battle of Hei-kou-tai where he commented both on the Russian and Japanese use of the weapon. His words seem eerily prescient of situations that the British army would face a decade later. As an example of Japanese success, he wrote, "At Shen-tan-pu the enemy made no less than five determined attacks against our entrenchment and its [sole] machine gun, and were repulsed each time. The machine gun did great execution, and we have heard, but this is not yet verified, that there were a thousand dead Russians before it."²³ Later on in the battle, the weapon did the much the same service for the Russians. As Sir Ian observed, "The 8th Division made some fine attacks upon Hei-kou-tai, but were each time repulsed mainly by the fire of the Russian machine guns."²⁴

Another senior officer, Lieutenant Colonel A. L. Haldane, who was a general staff officer with the Second Army, was so impressed with the impact of the machine gun that it ended up becoming the main issue of one of his reports. Towards the end of the war, he

observed the Battle of Mukden, which was the largest engagement of the war as well as its last. Use of the machine gun, by both sides, had thus reached its greatest point of maturity. His first point on the report's cover letter was:

Throughout the campaign in Manchuria the Japanese have suffered severely in attacking those points of the Russian front which have been armed with machine guns, and an episode related by Captain Hart-Synnot, in the account already submitted by him regarding the operations of the 5th Division in the Battle of Mukden, seems to be of interest as showing to what length the Japanese will go in order to silence such weapons. I refer to the daring and successful manner in which a mountain gun, two guns actually, were brought up by them to decisive rifle range of the enemy in order to destroy a machine gun whose presence was materially affecting the prospects of the attack.²⁵

Captain J. B. Jardine was another officer embedded in the Japanese Army along with Haldane at Mukden. After the battle, he interviewed various Japanese commanders about the machine gun and its role during the fight:

All officers are enthusiastic about them. All agree that their chief role is defense, even at night, but that they are also extremely useful in the attack [the Japanese used a light, Hotchkiss-type machine gun that was much more portable]. During the battle of Mukden machine guns were used very much in the attack by the Japanese, but it seems that the casualties of the machine gun detachments were very heavy indeed; one commander thought them especially useful in pursuit.²⁶

The other major engagement where the machine gun figured prominently was earlier in the war during the Siege of Port Arthur. Ultimately the Japanese were victorious in the siege, but it was at an enormous cost of men and resources. The machine gun was responsible for probably more than its fair share of the butcher's bill. As just one example, Captain C. A. L. Yate wrote the following about the siege of 203-Meter Hill, which was eventually to be the decisive engagement of the siege:

They [the Japanese] reached the wire entanglement surrounding it, and a small party penetrated beyond . . . But the great obstacle was the flank fire of machine guns in casements made of stout circular beams . . . The troops could progress no further, and after remaining for two days in the south-western portion of the lower

trench, they were withdrawn -- about 2 p.m. on the 22nd of September. The party which originally penetrated beyond the wire entanglements was annihilated.²⁷

The Transformation in Machine-Gun Employment

Given these reports, even though the use of the machine gun was not exactly “on the radar screen” of the British military at the time, one would think that some innovation and development would have taken place. For the most part, however, this simply was not the case despite some debate on the subject. In fact when commenting upon the position of the weapon in the British Army in 1909, Colonel Walter N. Congreve complained that, “although we have had the gun longer than any other people in the world . . . we have fallen behind foreign nations in every respect, both in thought, in mechanical devices, and in recognizing the absolute necessity for making the workers specialists.”²⁸

In many respects, this lack of interest in the machine gun was simply fostered by the doctrine prevalent at the time. As one keen observer noted:

Except for a few specialists -- looked upon as cranks -- the machine gun was for long belittled. Few battalion commanders detailed their best officers and men to machine gun duty, which in some units was regarded as a fatigue [menial labor]. Nor was there any definite policy regarding its employment on maneuvers. Among the many epigrammatic slogans, which though true, are so often misused to stifle thought, was that summing up the machine gun as a “weapon of opportunity.”²⁹

Another reason for this situation was the prevailing capabilities and accuracy of the British rifleman. After the Boer War, the British had expended considerable effort and resources to ensure that their infantry were the finest sharpshooters in the world. The accuracy, rapidity and discipline of the regular British soldier was so advanced that their officers saw no need to incorporate additional machine guns into their formations.³⁰

Interestingly enough, however, was that the man most directly responsible for creating these expert shooters, Major N. R. McMahon, chief instructor at the Hythe School of Musketry, did not agree. He continually pointed out the importance of high volumes of fire and spoke out against the fetish of marksmanship and rifle competitions.³¹ He pointed out that the crack shots at Hythe proved only marginally more effective than average regimental shots in field conditions, while the nerveless machine gun in the hands of men with only two weeks training were worth forty rifles.³² He even tried to support his argument of how volume was more important than accuracy by pointing out that this was exactly how the British longbow was able to defeat enemies armed with the crossbow, which was a more accurate weapon.³³ A Captain Wetherell of the 1st Bedfordshire Regiment also supported Major McMahon's views. He took specific issue with the prevailing concept of the day that "to advance is to win" and that the infantry's energies should be directed to getting forward, where the question of fire action is secondary.³⁴ He pointed out that:

In ancient days, the superiority of armor over the weapons of range made it necessary to close with the enemy as quickly as possible. "To advance is to win" was then considered the very latest thing in tactics. Now, hundreds of years later, we are being given the same precept even though weapons have changed. Soon we will be armed with a rifle whose trajectory is flat and whose rate of fire in short bursts is machine-like, yet we are told that the bayonet is the deciding factor of the battle . . . There must come a time when it will be madness to send human beings, however willing, to walk up against metal pumped against them from rifles.³⁵

Wetherell was congratulated for speaking out, but his theme was quietly buried by more senior officers.³⁶

Some of the lessons learned in the Russo-Japanese War were not always helpful in shoring up these arguments. In fact, some even resulted in changes to British doctrine

that made the infantry more vulnerable to the machine gun. For instance, one of the conclusions that Field Marshall Haig drew out of Manchuria was that, “the war of masses necessitates mass tactics.” As a result of this new emphasis on mass, the infantry regulations of 1911 actually tightened British formations to a mean density of one man per square yard.³⁷ It made them a marvelous target for machine guns and their crews. This fallacy even seemed to be exposed during actual infantry exercises held at the time, but failed to produce a change. During many of them, the infantry had shown a tendency to get bogged down in fire-fights instead of advancing, and the tempo of field tactics had slowed to a crawl as a result.³⁸ The reaction to this was interesting, for despite some reforms that were instituted after the Boer War, often the “answer” to this dilemma was to find ways to force the infantry to advance rather than adapt the tactics to the observed conditions. The senior officers feared that operations reduced to a standoff would severely affect morale, and that eventually, a company would have to rise to its feet and take its chances. The most that could be done, it was felt, was to reduce their odds of being hit by emphasizing the speed of the advance.³⁹

This adherence to assault tactics, fully supported by the prevailing British military tactical culture of the day, was probably more important than any other factor in preventing the machine gun from realizing its potential in the British Army prior to World War I. Despite the lessons of Manchuria, the opinions of some respected officers, and even the results of their own exercises, the British General Staff was unwilling to depart from what they felt was a winning formula. In fact, when the General Staff ultimately rejected Hythe’s 1911 request for an allocation of light machine guns, it was

done solely because machine guns were felt to be tactically unnecessary and not because of any financial constraints or logistical concerns.⁴⁰

¹Martin Samuels, *Command or Control?: Command, Training and Tactics in the British and German Armies, 1888-1918* (London and Portland: Frank Cass, 1995), 102.

²Ibid.

³Jay Luvaas, *The Military Legacy of the Civil War* (Chicago: University of Chicago Press, 1959), 25.

⁴Ian Knight, *Go to Your God Like a Soldier: The British Soldier Fighting for Empire, 1837-1902* (Mechanicsburg, Pa.: Stackpole Books, 1996), 169.

⁵John Ellis, *The Social History of the Machine Gun* (Baltimore: Johns Hopkins University Press, 1986) 63.

⁶Michael D. Welch, *Science in a Pickelhaube: British Military Lesson Learning at the RUSI (1870-1900)* (London: Royal United Services Institute for Defense Studies, 1999), 16.

⁷Ibid., 17.

⁸Ellis, *The Social History*, 74.

⁹Ibid., 82.

¹⁰P. Wahl and D. R. Toppel, *The Gatling Gun* (New York: Arco, 1965), 86.

¹¹Edward Spiers, *The Late Victorian Army, 1868-1902* (Manchester and New York: Manchester University Press, 1992), 244.

¹²Wahl and Toppel, *The Gatling Gun*, 107.

¹³Spiers, *The Late Victorian Army*, 245.

¹⁴Welch, *Science in a Pickelhaube*, 33-34.

¹⁵Ellis, *The Social History*, 68.

¹⁶E. Gunter, *Outlines of Modern Tactics* (London: William Clowes and Sons, Ltd., 1899), 54.

¹⁷Ibid., 54-55.

¹⁸Ellis, *The Social History*, 55.

¹⁹Welch, *Science in a Pickelhaube*, 35.

²⁰*Ibid.*, 36.

²¹Jay Stone, "The Boer War and Its Effects on British Military Reform," (Ph.D. diss., City University of New York, 1985), 525.

²²*Ibid.*, 524.

²³Great Britain, War Office, *The Russo-Japanese War: Reports from British Officers Attached to the Japanese and Russian Forces in the Field* (London: H.M.S.O., 1908), 56.

²⁴*Ibid.*, 56-57.

²⁵*Ibid.*, 83.

²⁶*Ibid.*, 346.

²⁷*Ibid.*, 437.

²⁸David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, Connecticut: Greenwood Press, 1982), 171-172.

²⁹*Ibid.*, 172.

³⁰*Ibid.*

³¹Shelford Bidwell and Dominick Graham, *Firepower: British Army Weapons and Theories of War, 1904-45* (London: Allen & Unwin, 1982), 29.

³²*Ibid.*

³³*Ibid.*, 30.

³⁴*Ibid.*

³⁵*Ibid.*, 30-31.

³⁶*Ibid.*, 31.

³⁷Stone, "The Boer War," 522.

³⁸Bidwell and Graham, *Firepower*, 31.

³⁹*Ibid.*

⁴⁰Samuels, *Command or Control?*, 102.

CHAPTER 4

THE FRENCH

Given the first experience that the French had with the machine gun, their domestically developed Montigny *mitrailleuse*, it is almost a wonder that they ever subsequently adopted one. As previously discussed, despite the hopes and hype that the French placed on the *mitrailleuse* as their “secret weapon” of the Franco-Prussian War, it proved to be tactically irrelevant. Their experience was so disappointing in fact that the French Army did not adopt a standard machine gun until almost thirty years later in 1899, and they made no large purchases until after it became a political issue in 1907.¹

Use of the Machine Gun Prior to 1904

There were several reasons behind the failure of the *mitrailleuse* on the battlefield. Perhaps the most important of these was the lack of training and experience that the army had with the weapon. Due to the secrecy surrounding its development and the short amount of time between its adoption and use in combat, neither the gunners nor their commanders were properly trained or had gained enough practical experience with the weapon to employ it effectively.² Beyond that, the same practical logistical issues that limited the utility of early machine guns in other armies also presented challenges for the French. The guns had no shields and were employed in the open, thus they were far more vulnerable to attack and were easily overrun.³ Additionally, the sheer weight and size of the guns, approximately two tons when one includes the gun, carriage, limber, and 2100 rounds of ammunition, meant that only the French artillery branch had the ability and experience to move and support the weapon.⁴ Its classification as an artillery weapon was

therefore not surprising and in fact was a practical necessity at the time. As the French learned, however, it was ill suited in its intended role as a counterbattery fire weapon, since it lacked the effective range required to engage enemy cannons.⁵

In recoiling from the defeat, however, the French unfortunately failed to note some of the positive aspects of the weapon. During one engagement in the Battle of Gravelotte-St. Privat, a *mitrailleuse* battery concealed within the French infantry lines managed to repulse a Prussian attack and inflict severe casualties.⁶ The Prussians themselves were also somewhat afraid of the weapon, despite being mindful of its limitations. As was common with other early machine guns, the French used a fixed carriage mounting for the *mitrailleuse* and thus were unable to easily traverse the gun from side-to-side as it fired. While this fact severely limited its tactical utility, it did produce a great moral impact on the Prussian soldiers who saw a comrade move into its arc of fire. Quite often, this resulted in much of the 37-round canister being emptied into a single soldier, literally tearing him to pieces. The Prussians therefore dubbed the weapon the *Hollenmaschine* or “hell machine.”⁷ One can only imagine how different the story might have been if the weapon would have been traversable and able to take the entire assaulting force under fire.

Because of the casualties and other setbacks suffered in this war, 1870’s France had little choice but to adopt a defensive stance and doctrine. After assimilating all of its lessons learned from the war, the French army issued new *Service Regulations* in 1875, in which the preamble stressed:

- (1) The preponderating importance of fire as a method of action.

- (2) The impossibility for a body of troops of any considerable size to move or fight in close order, whether in line or in column, within the zone of the enemy's effective fire.
- (3) Consequently, the necessity of subdividing the troops in the first line and adopting for them action in extended order.
- (4) The compulsory transference of the fight itself to the skirmish line, which formerly was only entrusted with its preparation.

Troops massed in column, or in line in close order, can no longer maneuver, fight or even remain in position under fire...In consequence of the destructive effects of fire such formations no longer afford even the assurance of solidarity nor that aid in maintaining cohesion and facilitating control of the men by the commander which it formerly did.⁸

It is very interesting to note that the basic tenets of this doctrine, which was the only one issued between the Franco-Prussian War and World War I that was directly based in France's own real-war experience, would likely have been far more effective than the *offensiv a' l'outrance*, or "offense to excess" doctrine that was their standard in 1914. Even here though, with the war's lessons still fresh in everyone's mind, the acceptance of this doctrine was not universal. Most French officers, in their reverence for Napoleon and his offensive orientation, feared that these regulations might doom the offensive spirit of the French army. They clamored for a return to the irresistible attacks of the Napoleonic columns, despite the lessons of the war and the changed battlefield conditions wrought by modern weaponry.⁹

Slowly, and in large part due to influential theories by Russian General Mikhail Dragomirov and French Colonel Ardant du Picq in the 1880s, the French army shifted back towards an offensive posture. The 1884 revision of the *Service Regulations* called for a stiffer firing line designed to achieve fire superiority over the defender. The basic idea, advanced mostly by du Picq, was that the "heart of man" remained the unchanging

and decisive factor in war. It was also felt that since modern weapons, such as the machine gun, were available to all sides their presence would not fundamentally alter the equation. Final victory was to rest on the moral effect of formed supports and reserves.¹⁰

In another interesting twist, at the turn of the century, French doctrine sways back towards dispersion and more defensive tactics as French tacticians absorbed the real-world lessons of the Boer War. Officers like General Charles Kessler and General Francois de Negrier, both members of the Superior War Council, were impressed with the British infantry's inability to carry an effective frontal assault against prepared Boer positions, primarily due to the impact of machine guns and other modern weaponry. Their study concluded that the French infantry would have fared little better, thus the *Service Regulations* of 1904, which were issued by the War Council, brought a return to dispersion, concealment, and the defensive-offensive.¹¹ General de Negrier was in fact personally quite impressed with machine guns and foresaw the extreme difficulties that troops would have in assaulting and holding a prepared enemy position. As evidence, he quoted figures from a British victory over a colonial force at the Battle of Omdurman in 1898. These credited the British Maxim machine guns with the killing of 12,000 and the wounding of 15,000, against British losses of three killed and seventeen wounded.¹² The adherence to this 1904 doctrine was evident in their maneuvers. Unfortunately, these maneuvers quickly devolved into exercises of deception where umpires assessed casualties based mostly upon the visibility of opposing forces. One observer of the maneuvers described the two sides in the following way:

There were opposed to one another two commanders, each of whom was impressed thoroughly with the idea that the acme of the art of war consists in not being seen. Both maneuvered so skillfully that they lost each other completely.

Recall was sounded, and after repeated blasts of the trumpet the commanders finally reported . . . the director received them affably . . . “Gentlemen, I am highly pleased with this maneuver; I could see absolutely nothing of either of you.”¹³

Despite the criticism, the 1904 defensive-offensive doctrine managed to hold sway on the eve of the Russo-Japanese War.

Reports and Observations from the Russo-Japanese War

Of the French military observer reports that are available within the delimitations of this study, the only one that makes significant mention of the machine gun is from (Brevet) Captain Henri Niessel, the Aide-de-Camp to the commanding general of the 14th Infantry Division. He in fact devoted a specific section of his report to the use of the machine gun. However, rather than discerning any specific lessons to be learned from its use, Captain Niessel concentrated on merely describing the disposition of the weapons within the Russian and Japanese armies and rendering a nonjudgmental but generally positive account of how they were used. His opening paragraph was representative of how vague his report was about the impact of the weapon, “For the first time machine guns, as they are now constructed, received the test of a great war. They came out of it with credit and all reports agree in recognizing their great moral and material value in the defensive as well as the offensive.”¹⁴

He did, however, make two important observations. One of them, and his only specific recommendation in this portion of the report, was that the conventional French wisdom of employing the machine gun as an artillery piece was wrong. As he noted, “Let us remember that in both [the Japanese and Russian] armies the machine gun fires the infantry bullet, and is used essentially in producing a reinforcement to the infantry fire.

Its duties and effects have nothing in common with those of the artillery, with whom it is impossible to compete at long range.”¹⁵

The other important observation was not his per se, but was dutifully reported by him as the best possible account of how machine guns are used in a modern battle. Essentially, he quoted the entirety of a letter sent to the *Russkii Invalid* by the commanding officer of a Russian machine-gun company, which described a portion of that company’s actions during the Battle of Liaoyang. Captain Niessel offered no amplifying analysis of the account, but its implications, particularly of the following section, are clear:

Later, toward 10 o’clock in the morning, some mounted men were seen on the railroad track. These men, having been under fire since leaving the hills, threw themselves into the kaoliang [a type of millet or wheat common in Manchuria] to the east of the railroad track; however, their progress could be noted on account of the movement of the stalks. . . It was clear that a mountain battery was trying to advance unobserved, in order to fire upon the rear of the hills occupied by the regiment of infantry. The objective was excellent for the machine guns . . . there was not much time for range finding. Fire was immediately opened, sweeping in both breadth and depth. . . The company fired 6000 rounds; but this expense was justified by the importance of the objective. I caused the firing to cease one minute and a half after its opening, because there was no object left to shoot at.¹⁶

Even bereft of any amplifying analysis, one might expect that the annihilation of an entire mountain artillery battery in 90 seconds, with no casualties taken by the attacking side, would have garnered the interest of French tacticians. Unfortunately for the French infantry in 1914, these tacticians concentrated their efforts on other matters.

The Transformation in Machine-Gun Employment

Unfortunately, the Russo-Japanese War was to have little long-term influence on French military leaders. As the harshness of the war faded from the minds of the army and its lessons consciously disregarded, the proponents of the glorious offensive once

again began to shape the French military's cultural mindset, and in turn, asserted their influence over doctrine and regulation. The most vocal of these proponents were a group of officers known as the "Young Turks," whose primary spokesmen were Ferdinand Foch and Francois Loyzeau de Grandmaison. By emphasizing the offensive as the proper method to avenge France's humiliation during the Franco-Prussian War combined with emotional rhetoric and references to France's glory under Napoleon, they managed to push the development of French doctrine inexorably toward the concept of the *offensive a' l'outrance*, which became their standard by 1914.¹⁷

One of the major reasons for this shift in thinking was that the "Young Turks" and their supporters tended to dismiss the lessons of the Boer and Russo-Japanese wars. They thought in fact that the lessons of all non-European wars were poor models for future European conflicts. General Foch himself dismissed many of the factors that lead to the sieges and stalemates of the Russo-Japanese War as being the product of overly extended supply lines and the lack of good roads, which would not be a factor in Western Europe.¹⁸ These French officers were also not particularly impressed with the impact of modern weaponry. They tended to oversimplify the issue by assuming that since these weapons were available to both sides, their impact would cancel each other out and would therefore not be decisive. Foch stated that, "any improvement of firearms is ultimately bound to add strength to the offense."¹⁹ In the 1909 edition of his *Conduite de la guerre*, he characterized the experience of the Russo-Japanese War as "neither complete nor of immediate interest" and concluded that there was nothing in the Manchurian experience to "affect the fundamental principles of the conduct of war."²⁰ Foch did not mention the machine gun at all.

This type of thinking led to major shortcomings in the *offensive a' l'outrance* doctrine. Specifically, the doctrine did not address how to employ the machine gun or how to mitigate its effects when used against French troops. This fact was recognized relatively early on in the development of the 1914 doctrine, at least by a few junior French officers. In 1903, Commandant [Major] Auguste Gerome estimated that one machine gun could replace 100 riflemen, and that machine gunners would be less effected by panic because the weapon's stability and volume of fire would reduce the need for accurate aiming.²¹ In 1910, a Commandant Lavau even waxed poetic about the qualities of a good machine gunner, "As there is a cavalry spirit and an artillery spirit, which moulds the ideas and directs the actions of the cavalier and gunner, so . . . there should be a 'machine gun spirit' in those who handle the new weapon--a spirit of enterprise and dash, of readiness to seize the fleeting opportunities that offer themselves amid the confusion of the battlefield for the sudden intervention of the death-dealing weapon."²²

The issue of machine guns had become political by 1907 with the publication of Charles Humbert's book *Somme-nous defendus?* In the book, Humbert raised the disturbing point that Germany had a clear military superiority in machine guns over the rest of Europe. Given the state of machine-gun employment in the French army, the impact of this book was felt as high as the National Assembly and became a politically charged issue.²³ Therefore, on 27 September 1907, the Superior War Council voted unanimously to endow all infantry formations with machine-gun sections as soon as possible.²⁴ This was, however, almost surely a result of the political pressure rather than some new tactical insight, since there was still no agreement among the army on what the

proper role of the machine gun should be. The debate still centered on “morale” issues rather than practical tactics. General Millet of the Supreme War Council advised against allocating them to battalions and regiments. In a strange assertion of circular logic, he argued that since this would ensure their use by the front ranks of infantrymen, it might adversely affecting their morale if they at some point failed to get the machine-gun support that they expected.²⁵ A General Lacroix countered that the troops’ morale would be doubled knowing that they had machine-gun support, and his experience in maneuvers had convinced him that machine guns could move with infantry and use the terrain.²⁶ He also felt that a colonel leading a regiment could employ his machine guns more effectively than a general could commanding a brigade. The Council therefore took the compromise, and voted to arm both regiments and brigades with machine guns.²⁷

One very interesting result of the French mindset was that once they actually started to use machine guns, the army folded them into their overall offensive doctrine in a way that no other nation had save perhaps Germany. As one anonymous major wrote in 1911, machine guns were:

To advance with the infantryman. In attacking enemy positions, the machine gun would keep the enemy pinned down, so as to prevent return fire. During the assault, machine guns might best be paced on the wings in order to increase the effects of enfilading fire. If an attacking force with machine gun met defensive machine gun fire, the assailant would come out with fewer losses. This was because the defender would be confined to one spot and could therefore be hit continuously by machine guns and threatened by infantry movement.²⁸

In fact, by 1913 the infantry regulations actually specified that the machine gun was to be used basically as an offensive weapon. This mindset also helped lead the French to adopt the Hotchkiss-type light(er) machine gun over the heavier and more common Maxim gun. They were to be used during the approach in the first-line battalions and during the

course of the battle they were to be brought to those points of the front where a more dense fire was needed.²⁹ In principle, these points included the enemy's flanks and any geographical locations that dominated the battlefield. They were also to play a role in the organization of positions taken by the enemy, as their firepower was crucial to preventing a successful counterattack.³⁰ Unlike the Germans, however, the French did not develop any regulations for employing the machine gun in a defensive role. This is not surprising, for precious little time was spent on any defensive matters within the French army immediately prior to World War I.

In addition to these oversights in French doctrine, the very nature of the French infantry's composition during the years between 1905 and 1914 tended to exacerbate the army's reliance on simple bayonet pushes rather than disciplined fire superiority. Bureaucratic and political pressures help push through the two-year service law of 1905, which was to govern the mandatory conscription of the French army that entered World War I. This law resulted in either first-year trainees or reservists making up 70 percent of every combat infantry company.³¹ Of course, these individuals received far less training than the other 30 percent of officers, career non-commissioned officers, and soldiers of longer tenure. Moreover, the officers and non-commissioned officers had little respect for the conscript's and reservist's abilities as soldiers or their capacity for independent action.³² This reinforced the notion that formations had to be tight in order to allow for the control of un-trained troops, and simple in their application of tactics. It was a situation that did not lend itself to developing sophisticated tactics for an advance or withdrawal under machine gun covering fire. Some French officers wondered if they were even capable of properly conducting an attack at all. The War Ministry in fact

officially criticized the 1908 infantry maneuvers for the, “Habitual improbability of the appearance presented by our combat exercises, resulting from the following situations: Infantry units too often seeking cohesion in rigid deployments (long continuous lines marching together, close order formations, etc.); instead of acting in autonomous groups oriented towards a common end and freely using the terrain to attain that end.”³³ The 1913 maneuvers in Languedoc, the last war games held before World War I, demonstrated that little had improved. In reviewing these maneuvers, General Barthelemy Palat commented that, “one saw the infantry delivering pre-mature assaults, marching without consideration for the effects of fire, without profiting from cover [or] from defilade pathways, and without keeping in contact with neighboring troops or with rear echelons.”³⁴

All of these elements unfortunately positioned the French to suffer the immense number of casualties that they did in World War I. French tactics proved suited only to the prevailing military tactical culture of their army in 1914 rather than to the realities of the machine gun and industrialized warfare. Thus in 1914, just as they had in 1870, the French infantry marched to meet the Germans with fixed bayonets, wearing red trousers, topped by blue *capote* and loaded down with poncho, pack, and cooking utensils.³⁵ The results of which, as a dramatic understatement, were somewhat less successful for the French than their doctrine had predicted.

¹David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, Connecticut: Greenwood Press, 1982), 61.

²*Ibid.*, 60.

³Geoffrey Wawro, *The Franco-Prussian War: The German Conquest of France in 1870-1871* (Cambridge, UK; New York: Cambridge University Press, 2003), 53.

⁴Armstrong, *Bullets and Bureaucrats*, 60.

⁵Ibid., 61.

⁶Ibid.

⁷Wawro, *The Franco-Prussian War*, 53.

⁸Joseph C. Arnold, "French Tactical Doctrine: 1870-1914," *Military Affairs* 42, no. 2 (April 1978): 61-62.

⁹Ibid., 62.

¹⁰Ibid.

¹¹Ibid., 63.

¹²Joel A. Setzen, "The Doctrine of the Offensive in the French Army on the Eve of World War I" (Ph.D. diss., University of Chicago, 1972), 32.

¹³Arnold, "French Tactical Doctrine," 63.

¹⁴Henri Albert Niessel, *Tactical Lessons Derived from the Russo-Japanese War*, trans. G. G. Bartlett (Paris: H. Charles-Lavauzelle, [19??]), 100.

¹⁵Ibid., 100.

¹⁶Ibid., 103.

¹⁷Arnold, "French Tactical Doctrine," 63.

¹⁸Jonathan M. House, "The Decisive Attack: A New Look at French Infantry Tactics on the Eve of World War I," *Military Affairs* 40, no. 4 (December 1976): 164.

¹⁹Arnold, "French Tactical Doctrine," 64.

²⁰Ibid.

²¹House, "The Decisive Attack," 166.

²²John Ellis, *The Social History of the Machine Gun* (Baltimore: Johns Hopkins University Press, 1986), 62.

²³Ibid.

²⁴Setzen, "The Doctrine of the Offensive," 68.

²⁵Ibid.

²⁶Ibid.

²⁷Ibid.

²⁸Ibid., 69.

²⁹Ibid., 168.

³⁰Ibid.

³¹House, "The Decisive Attack," 167.

³²Ibid.

³³Ibid.

³⁴Ibid.

³⁵Arnold, "French Tactical Doctrine," 65.

CHAPTER 5

THE GERMANS

The Kaiser's Imperial German Army is also of particular interest for the purposes of this study because of all the armies considered herein, it was probably the most perceptive about how the machine gun affected the conduct of land warfare. The Germans thus spent more time and effort developing tactics for the machine gun's use and incorporating it into their structures than any of their contemporaries, despite the fact that they began the process later on than most of the rest of Europe. Other than being on the receiving end of the French *mitrailleuses* during the Franco-Prussian War, the German army had almost no exposure to the weapon until 1887 when Prince Wilhelm sent a British machine gunner to Potsdam in order to demonstrate the weapon for German troops.¹ In large part, this was probably because unlike most of the other armies of the world, the Germans considered that tactical innovation was a corporate problem rather than the province of a few elite officer theorists. The German army often solicited simple and practical solutions to tactical problems from its lowest ranks, and then after careful evaluation and testing, ensured that they disseminated the best of these lessons throughout the entire army.² Certainly, the Germans did not entirely "get it right" with regard to machine-gun employment, as testified by their disastrous attacks against the British at Langemark in 1914. However, it seems clear that the German army was generally better provisioned with and more proficient in the use of machine guns than her adversaries were in the opening months of the Great War.

Use of the Machine Gun Prior to 1904

As noted above, the machine gun was not introduced to the German army until somewhat later than the other armies of Europe. In fact, it was mostly due to the efforts of Prince Wilhelm and the Kaiser himself that the weapon was introduced at all. The prevailing military tactical culture in Germany was much the same as that of the rest of Europe during this time. The emphasis on the offensive, the spirit of *élan*, and the gallant charges of infantry and cavalry, were every bit as influential in Germany as they were in the other European nations. Thus most German generals before the turn of the century, like their contemporaries, had little interest in this new weapon or its potential applications. The very first significant incorporation of the weapon did not occur until 1899, when a four-gun Maxim battery was added to each Jaeger battalion.³ Like in other nations, the introduction of this new weapon did not alter the overall concept of German infantry doctrine. The *Infantry Regulations of 1899* were very much in accordance with that of most European armies and emphasized the bayonet attack.

When the decision to assault originates from the commanders in the rear, notice thereof is given by sounding the signal 'fix bayonets'...As soon as the leading line is to form for the assault, all the trumpeters sound the signal 'forward, double time,' all the drummers beat their drums, and all parts of the force throw themselves with the greatest determination upon the enemy. It should be a point of honor with skirmishers not to allow the supports to overtake them earlier than the moment of penetrating the enemy's position. When immediately in front of the enemy, the men should charge with bayonet and, with a cheer, penetrate the position.⁴

Unlike the rest of Europe, once the Germans finally adopted and incorporated machine gun shortly before the Russo-Japanese War, they wasted little time in adapting it to both offensive and defensive roles within their overall doctrine. They emphasized the importance of the weapon's mobility and firepower, even to the point of accompanying

the infantry in a pursuit mission.⁵ If an attack succeeded, the machine guns were to move forward and assume a defensive position in order to deny the enemy the opportunity to recover and counterattack.⁶ This is interesting, since the Germans make this tactical innovation despite the fact that the machine guns themselves are no easier for them to maneuver around the battlefield than they are for any of the other armies of the day. In another marked difference from contemporary machine-gun doctrine, the Germans never considered the weapon to be an adjunct to the artillery. Rather, they were to supplement artillery support as covering fire when the artillery barrage had to lift in order to avoid fratricide. This mindset conferred another advantage to the advancing infantry, for if the attack failed, the machine guns would already be well positioned to cover the retreat.⁷

The Germans were not unmindful of the limitations of the weapon, however, particularly when it came to logistical concerns. They recognized that the weapon tended to use extraordinary amounts of ammunition, particularly when employed as part of a static defense. Thus, when on the defensive, commanders were urged to use their machine guns as much as possible as a fire reserve. Further, they were to be deployed only to cover important avenues of approach, maximizing use of cover, and then withdrawn as soon as practical to rejoin the main fight.⁸ They also understood the somewhat fragile nature of the weapon and its tendency to breakdown. As a result, the weapons were always employed as a section and the use of individual machine guns was “strictly forbidden.”⁹ Despite all this, the Germans considered the machine gun to be an important part of their overall formations and were not in the least bit hesitant to use it.

Reports and Observations from the Russo-Japanese War

In 1906, the German General Staff issued two pamphlets covering the experiences gathered from the Russo-Japanese War. In addition to other aspects of the war and their implications for the German army, the General Staff made several important observations about the machine gun. They even underlined certain passages of the reports about the machine gun to place special emphasis on the subject. For example, during the siege of Port Arthur on 20 August 1904, a German observer noted and the General Staff subsequently underlined that, “The first attack [upon Redoubts 1 and 2, which were part of the defensive works at Shui-shi-ying] took place at 4 a.m.; it was repulsed with heavy loss. Up to noon of the 22nd four more attacks were made, but all failed because of the Russian infantry and machine gun fire.”¹⁰ In another instance, on 20 September 1904, Russian machine guns entirely prevented Japanese reinforcements from moving up to support the attack on the Temple Height, just south of Shui-shi-ying.¹¹ This and other incidents led the General Staff to conclude and underline that, “These engagements show that notwithstanding the most splendid bravery on the on the part of the attack, a position weakly fortified, but equipped with rapid-fire machine-guns and defended by a staunch garrison, cannot be taken without sufficient artillery preparation.”¹²

During subsequent attacks on eastern front at Port Arthur, several Japanese assaults were defeated in whole or in great part due to machine-gun fire. In the reports there are several observations of this, such as:

In Fort 3 the Japanese reached the top of the rampart, but met such terrific infantry and machine gun fire from high emplacements that it was impossible for them to enter the works; after a long contest the Japanese were forced to withdraw...On the rampart they received a terrific machine gun and infantry fire from a small breastwork in the gorge. The assailants were taken aback, threw themselves on the ground...at 2:10 p.m. another assault was made on the right

wing; the infantry again gained the upper trench, but machine gun fire delivered from the summit... immediately forced them to fall back; the assault was over in five minutes.¹³

As a result of all these observations, the General Staff came to two important conclusions which were to help shape German thinking on the machine gun in the following decade. The first and more general of the two, was that “In passing judgment on the contest, the insufficiency of the means of attack over against the naturally strong position of the defense must always be borne in mind and general deductions be cautiously made.”¹⁴ The other one, directly relating to the machine gun, was “The defense was materially strengthened by machine guns. They are easily and quickly placed in position, offer a small target that is difficult to find, and are highly effective in repulsing assaults frontally as well as particularly from a flanking position.”¹⁵

The Transformation in Machine-Gun Employment

In the larger sense, the outcome of the Russo-Japanese War produced two changes in German military thinking that were far more advanced and prescient than those of the other European armies. While prevailing military tactical culture made them very unwilling to abandon the overall doctrine of the offensive, the Germans realized that new technologies, particularly rapid-fire heavy artillery and machine guns, had shown that the nature of modern warfare stood on the dividing line between a war of position and a war of maneuver.¹⁶ General Alfred von Schlieffen recognized this dilemma as well, and the implications that it had for the German army. However, like many of his contemporaries he bristled against the notion that offensive maneuver might give way to defensive positions. He thus exhorted his soldiers to redouble their efforts in the attack, advancing “from position to position, day and night, advancing, digging in,

advancing... The attack must never come to a standstill as happened in the war in the Far East.”¹⁷ The Russo-Japanese War also proved, at least to some, that given the sheer size of armies that could now take the field, the next war could hardly be as short and decisive as the rest of the world predicted.¹⁸ In fact, despite the influence of Schlieffen and the younger Moltke who, like Schlieffen, bristled against these implications, these new trends utterly dismayed many German military theorists. So much so that in 1909 it prompted one to assert that the battle of future would take on “all the splendor of a brawl for fortified positions.”¹⁹

With regard to the machine gun specifically, the Russo-Japanese War gave the Germans a fuller appreciation of the weapon’s destructive potential, particularly in a defensive role. German tacticians increasingly began to see this weapon as an indispensable element in the struggle for fire superiority.²⁰ Machine-gun doctrine thus came to stress the unification of psychological and material forces. The psychological effect of the machine gun was considered greater than that of artillery at ranges less than 1,500 meters, were it could produce a paralyzing fire effect on the enemy.²¹ As noted German machine-gun proponent Captain A. Fleck explained, “Losses inflicted on the enemy will shatter him faster if they occur within a short period of time.”²² Some German officers even went so far as to expand upon the idea of *Kaltbluetigkeit*, or “cold bloodedness,” which was considered a necessary personality trait of the machine gunner.²³ On the material side, the German machine-gun detachments were reorganized and reinforced. Concern had grown that the 1905 standard machine-gun detachment of four guns was not strong enough to provide the desired level of fire support, particularly since they themselves tended to draw a lot of attention and counter-fire from the enemy.

As a result, in 1907 the German army reorganized their existing machine-gun detachments into companies, each with six Maxim guns, and with six rather than four horses per gun which afforded the weapon greater mobility.²⁴ By 1908, each infantry and cavalry regiment was given its own company of Maxims, with a further company of six guns placed under the control of every army corps commander.²⁵ The Germans were the only army in this study to use this system of combining organic and separate corps detachments for the employment of machine guns.²⁶ This worked in concert with the post-Russo-Japanese War conceptual shift from employing the weapon as a mobile fire reserve to locating it with regular forces in the front lines.²⁷

Concurrent with these changes, the German army renewed its debate over whether the machine gun was more properly used in the defense or the offense. Much of the weight of evidence favored the defensive role, for the same age-old reasons of weight, size, and the difficulty of re-supplying the weapon while on the move. Noted German military thinker Friedrich von Bernhardi steadfastly maintained that “conditions favoring the effect of [machine guns] will generally be found only in the defensive.”²⁸ If nothing else, Bernhardi maintained that the defender’s machine guns had the huge advantage of firing at known ranges, between and over the heads of his own infantry, which were also in known, fixed positions.²⁹ Certainly the lessons of World War I seem to lend weight to this argument, as even a few surviving machine-gun nests, despite heavy artillery preparation, often effectively blocked an attacking force.³⁰ Unfortunately for the German infantry, it took their senior leaders the better part of two years from 1914 to 1915 to learn this and adapt their tactics accordingly.

However, the proponents of the offense countered that the Japanese had proved that machine guns could be used effectively in the offensive, as long as careful coordination took place to ensure that the gunners did not fire upon their own infantry during the assault.³¹ They also concluded that the machine gun's effectiveness in an offensive role depended largely on the terrain, the type of machine gun, and the initiative taken by subordinate commanders.³² Some even suggested that separate offensive and defensive machine-gun units should be created, with defensive units using the heavy, Maxim guns and offensive units using a lighter one.³³ By 1914 they had solved the problem in part, and were employing machine guns with two man teams in prone positions.³⁴ Despite their weight and bulkiness, the increased firepower gained from their employ was considered well worth the effort of muscling them around the battlefield.³⁵

By the eve of World War I, in and at least in part due to the lessons of the Russo-Japanese War, the machine gun had fully transitioned from a mobile fire reserve role to one of general support for its regiment. It was still considered "necessary and useful in the critical moments of battle," but it was now also just as vital during "normal periods of the fight as a support for infantry fire."³⁶ The weapons defensive power, particularly on the flanks, was also noted and generated considerable debate on the best tactics for defeating them.³⁷ As a result of all these and many other innovations, German machine-gun units became elite, highly effective organizations. During the war, individual gunners often displayed exemplary heroism, holding out to the last man and earning the admiration of both British and French foe alike.³⁸ As one British officer remarked, German machine gunners often "stayed on when all the other men had been killed or wounded, and would neither surrender nor escape."³⁹ Despite the fact that they still did

not fully appreciate the weapon's impact, the Germans were poised, more so than any other army at the beginning of the Great War, to be a dominating force on the battlefield.

¹John Ellis, *The Social History of the Machine Gun* (Baltimore: Johns Hopkins University Press, 1986), 60-61.

²Timothy T. Lupfer, *The Dynamics of Doctrine: The Changes in German Tactical Doctrine During the First World War* (Fort Leavenworth, Kansas: Combat Studies Institute, U.S. Army Command and General Staff College, 1981), 57.

³Ellis, *The Social History*, 61.

⁴*Ibid.*, 54.

⁵Antulio J. Echevarria, *After Clausewitz: German Military Thinkers Before the Great War* (Lawrence, Kansas: University Press of Kansas, 2000), 159.

⁶*Ibid.*, 159-160.

⁷*Ibid.*, 160.

⁸*Ibid.*

⁹*Ibid.*

¹⁰German General Staff, *Individual Contributions to the History of Wars: Experiences Gathered from Recent Extra-European Wars; from the Russo-Japanese War, 1904-1905*, trans. Paul T. Brockman (Berlin: Vitter and Son, 1906), 82.

¹¹*Ibid.*, 90.

¹²*Ibid.*, 91.

¹³*Ibid.*, 108-112.

¹⁴*Ibid.*, 121.

¹⁵*Ibid.*, 124.

¹⁶Echevarria, *After Clausewitz*, 157.

¹⁷Jack Snyder, *The Ideology of the Offensive: Military Decision Making and the Disasters of 1914* (London: Cornell University Press, 1984), 139.

¹⁸Echevarria, *After Clausewitz*, 157.

¹⁹Ibid., 157-158.

²⁰Ibid., 158.

²¹Ibid., 159-160.

²²Ibid., 159.

²³Ibid.

²⁴Ibid., 160.

²⁵David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, Connecticut: Greenwood Press, 1982), 162.

²⁶Ibid., 162.

²⁷Echevarria, *After Clausewitz*, 161.

²⁸Ibid., 161-162.

²⁹Ibid., 162.

³⁰Lupfer, *The Dynamics of Doctrine*, 3.

³¹Echevarria, *After Clausewitz*, 162.

³²Ibid.

³³Ibid.

³⁴A. Hillard Atteridge, *The German Army in War* (New York: McBride, Nast & Company, 1915), 89.

³⁵Echevarria, *After Clausewitz*, 162.

³⁶Ibid.

³⁷Ibid.

³⁸Ibid.

³⁹Ibid.

CHAPTER 6

THE AMERICANS

The United States Army is the final subject for this study, and a very interesting one for several reasons. For one, it is the only army considered here that is non-European. Therefore, the Americans were at least theoretically divorced from the prevalent European military tactical culture that eschewed the use of machine guns. America also had a somewhat different perspective on the Industrial Revolution and technology in general than Europe.¹ Due to its lack of a large skilled labor pool, the United States embraced the mechanization of labor earlier than most of Europe and was generally very interested in developing technological solutions to the day's problems,² of which military conundrums were no exception. Finally, all of the greatest pioneers of machine-gun development, Gatling, Maxim and Browning, were American. Despite all these theoretical advantages, however, the Americans were no more successful at fully integrating the machine gun into their doctrine and tactics than their European contemporaries. In the U.S. Army's case, this was primarily due to the stifling combination of bureaucratic resistance and logistical concerns. From the very first time that Richard Gatling tried to offer his newly invented weapon to the U.S. Army in 1862 on through to when the Americans entered World War I, the machine gun fought an uphill battle against these concerns that it never really won.

Use of the Machine Gun Prior to 1904

In the latter half of the nineteenth century, a technological revolution occurred in the fields of metallurgy and industrial engineering that enabled astonishing advances in

military hardware. As a result of these and other advances in technology, weapons such as the Henry repeating rifle, the British Whitworth rifled breech-loading artillery piece, and, of course, Dr. Gatling's machine gun became available to the U.S. Army. However, despite the drastic improvements offered by these weapons, the Union Army and the Confederate Army both finished the Civil War in 1865 armed with essentially the same weapons that they had begun the war with in 1861. The machine gun was no exception to this rule, for despite the pressure of several individual army commanders, the Gatling gun and other machine gun variants saw extremely limited service during the conflict. Part of the reason for this is that there was no real systemic pressure applied by the Army as a whole for change. Influential leaders such as George McClellan, Joseph Hooker and Ulysses S. Grant all considered their forces adequately armed.³ Given that these men had gained the bulk of their practical experience during the Mexican War, which was a victorious war fought prior to the technological innovations mentioned, this conclusion is not surprising. However, the bulk of the blame for failing to adopt and incorporate promising new weapons like the machine gun has to lie at the feet of the Bureau of Ordnance.

In the Bureau of Ordnance's defense, it must be understood that they were in many ways set up to fail at the task of evaluating and incorporating these new weapons. The Ordnance Corps lost almost one-quarter of its fifty-nine officers to the Confederate States, including some of their most capable ones such as Josiah Gorgas, who was later to become Chief of Ordnance for the Confederacy.⁴ Its officers were also clearly overwhelmed by the task that the war's outbreak had set before them. In effect, by August of 1861 the Bureau had to arm an army of over 480,000 men, which was up from

only 16,000 men four months earlier.⁵ This left little time for the testing and development of new weapons. However, probably the most important reason was the nature and structure of the Bureau itself. Since its inception in 1809, the Bureau of Ordnance had built up a formidable bureaucratic culture of fiscal restraint and a reluctance to change.⁶ Based on the limited demands of a small army who was chiefly concerned with policing the frontier and defending the coasts, this culture served the nation well and helped ensure that government funds were available for other pressing, developmental concerns. It was wholly inadequate, however, for the pressures of wartime, and its arcane regulations, understood by very few and glacial in their pace of execution, helped to keep Dr. Gatling's gun out of the U.S. arsenals.

In particular, the tenure of Brigadier General James W. Ripley as Chief of Ordnance during the war probably did more than any other single event to perpetuate bureaucratic resistance to the machine gun's adoption. Ripley had spent 47 years as an ordnance officer prior to this appointment and as a result, he was intimately familiar with all aspects of departmental regulations. Moreover, he religiously believed in following the letter and spirit of all of them.⁷ In fact, while Ripley was still a Lieutenant Colonel, General Andrew Jackson threatened to hang him for refusing to fill an irregular requisition submitted by a unit under his command.⁸ His faith in procedure apparently undiminished by the event, Ripley went on to husband the Army's ordnance assets throughout the Civil War. He made his position on the machine gun and other new weapons abundantly clear in a letter he sent to the Secretary of War in 1861:

A great evil now especially prevalent in regard to arms for the military service is the vast variety of new inventions, each having, of course, its advocates, insisting upon the superiority of his favorite weapon over all others and urging its

adoption by the Government. The influence thus exercised has already introduced into the service many kinds and calibers of arms, some, in my opinion, unfit for use as military weapons, and none as good as the U.S. musket, producing confusion in the manufacture, the issues, and the use of ammunition, and very injurious to the efficiency of troops. This evil can only be stopped by positively refusing to answer any requisitions for or propositions to sell new and untried arms, and steadily adhering to the rule of uniformity of arms for all troops of the same kind, such as cavalry, artillery, and infantry.⁹

As a result, those new weapons which were adopted during the war, the Henry rifle and Gatling gun among them, were only done so based on the personal initiative and often at the personal expense of individual unit commanders. They gained no wide exposure to or acceptance by the Army as a whole.

In 1864, Brigadier General Alexander B. Dyer relieved General Ripley as the Chief of Ordnance. Dyer had a completely different outlook than Ripley did, and thought that the new advances in small arms could prove to be of great benefit to the army. Dyer also managed to conduct several full-scale tests of different machine-gun designs of the day to include the Vandeburgh, Billinghamurst, Requa and Gatling guns. Unfortunately for General Dyer and the Army, the drop in available funds at the end of the Civil War nullified the effect of this momentary easement in bureaucratic resistance. The expenditures by the Ordnance Department dropped from \$43,112,531 in 1865 to \$16,551,677 a year later and by 1870 were down to \$2,442,345.¹⁰ That level of budget belt-tightening left little room for expanding the use of the Gatling gun or any other weapon. However, in August of 1866, the Ordnance Department did manage to purchase 100 Gatling guns of two different models, 1-inch and .50 caliber. It was an uncharacteristically bold move for the Bureau, since the guns were still ultimately experimental and no other army had expressed more than a passing interest in machine guns by that time. Still, Dyer and a few others thought that the guns had a lot of potential

and they wanted to ensure that the army had some available for further testing and experimentation.

As Isaac Newton said, “For every action there is an equal and opposite reaction.” This bold move by the Ordnance Department was to be followed by roughly 35 years of further budgetary restrictions on the purchase of new weapons and by a general feeling of apathy within the army towards the Gatling gun. There was simply no institutionalized intellectual or bureaucratic apparatus within the post-Civil War army that could enable an organized response to change. Thus, change came either piecemeal or not at all.¹¹ Additionally, most army officers saw little practical need for a weapon like the Gatling. After all, the late-nineteenth century US Army was, in essence, a constabulary force who was chiefly concerned with policing the frontier. Large, heavy, horse drawn weapons simply were not well suited to ranging over thousands of miles of prairie and the army saw no good reason to force the issue with the Gatling gun.

Logistical concerns continued to plague the weapon as well. Even with the advent of the center-fire primer and the drawn brass cartridge, which greatly improved the uniformity and reliability of ammunition, the Gatling still had several bugs that detracted from its usefulness. The weapon was prone to breakdown in field conditions, there was no effective way to traverse the weapon rapidly, and the sheer weight of the multi-barrel gun and its carriage made it as relatively immobile as an artillery piece. Frontier warfare called for highly mobile light cavalry units, not slow-moving artillery caissons. The army supply system had also still not developed to the point where it could ensure that ammunition supply would keep up with expenditure. An infantryman’s basic load for ammunition during the Civil War was 40 rounds, fired at the rate of about three rounds

per minute.¹² Thus even when the Gatling was using the same caliber ammunition as the infantry, at 200 rounds per minute a single Gatling gun could expend ammunition at a rate equivalent to an entire company. Even when fixes for these logistical problems could be identified, such as when Major Alfred Gibbs of the Seventh Cavalry recommended a new design for a lighter, more mobile gun carriage for the Gatling, they often were not acted upon.¹³ One major reason for this was the absence of an official bureaucratic mechanism for soldiers in the combat arms to influence the design or redesign of their equipment. Only the technical experts at the Bureau of Ordnance could do that. In such a setup, bureaucratic considerations such as cost, durability, and the availability of funds were at least as important if not more so than the needs of the field forces.¹⁴ Considering all of these bureaucratic and logistical factors in sum, it is no wonder that the US Army generally ignored the Gatling and other similar weapons. In fact, it was not until the Spanish-American War that the army got its first real insight on what a machine gun could do in combat.

Perhaps the single greatest advocate that the machine gun had within the US Army was Lieutenant John Henry “Machine Gun” Parker. Early on in his career, Lieutenant Parker seized upon what he believed to be a golden opportunity and became an expert in the workings and applications of the Gatling gun. He thought that the lack of tactical mobility was the single greatest obstacle preventing the large-scale use of the machine gun, and even went so far as to design a lighter, more mobile carriage to solve that problem.¹⁵ Initially his ideas gained little notice or acceptance, but not to be deterred he continued to articulately and persuasively push his ideas. With the assistance of John T. Thompson, then an ordnance officer in Tampa, Florida, he convinced General Shafter

to authorize the creation of his Gatling Gun Detachment and placed them with the Fifth Corps for the Cuban Campaign of 1898.¹⁶ Parker was thus finally going to get a chance to prove his theories in actual combat.

On July 1, 1898, and for possibly the first time in US Army history, Lieutenant Parker employed his Gatling guns in a truly offensive, infantry-support role. Covering the charge up Kettle and San Juan Hills, the Gatlings provided crucial fire superiority that greatly assisted several US Army elements. Among the units to benefit from Parker's actions was the First Volunteer Cavalry Regiment, better known as the "Rough Riders," which was under the command of Theodore Roosevelt. In his account of the war, he noted that at one point during the Battle of Santiago he raised the cry, "It's the Gatlings men! Our Gatlings! ... It was the only sound which I ever heard my men cheer in battle."¹⁷ Roosevelt also commented on the inventiveness and daring of Lieutenant Parker, saying that the Rough Riders strove to keep him and his guns as their constant companion.¹⁸

By far the most positive reports of the Gatling's performance, however, came from the captains who actually led the charge up Kettle and San Juan hills. Captain Lyman W. V. Kennon, Sixth Infantry, stated "From here could be seen the effect of the fire of our Gatling guns which had the range accurately and was sweeping along the trenches of the enemy with the utmost precision. It greatly demoralized the enemy, some of whom could be seen running from their places."¹⁹ More glowing was the report of Captain James B. Goe, who noted "The battery of the Gatling guns under Lieutenant Parker, Thirteenth Infantry, was opening fire on the enemy's trenches from a position on our right and rear. This fire had a magical effect, and the Spaniards were seen getting out

of their works with a rush and disappearing towards Santiago. If it had not been for the timely aid of Lieutenant Parker's guns, our loss would have been terrible during the remainder of the attack."²⁰

Unfortunately, the official reports of the more senior officers in Cuba generally did not focus on the actions of the Gatling guns. By the time that General Shafter made his report, the only mention of the Gatling detachment was that they rendered "most efficient service."²¹ To add to the problem, the ever ambitious and energetic Parker was unwilling to let the plodding army system notice the merits of the weapon in the fullness of time. Instead, he went to great lengths to broadcast his ideas to almost anyone who would listen, to include jumping the chain of command several times. At one point, he even wrote a letter directly to then President Theodore Roosevelt imploring his support for a new "Machine Gun Corps" within the US Army. His blatant attempts at self-promotion infuriated then Chief of Staff J. Franklin Bell, but thankfully not to the point where Parker was dismissed from service. In a letter to the Assistant Secretary of War, Bell wrote, "He's a pestiferous, immodest ass, but has much ability notwithstanding and his disagreeable tendencies must simply be tolerated for the sake of his usefulness."²²

Even discounting the distaste for Lieutenant Parker's methods, there were still four long-standing objections to the machine gun and its greater incorporation within the army. As described by officers in professional journals at the time, they were: 1) Machine guns, unlike the infantry rifle, could not be relied upon to score a hit with each separate shot and, therefore, wasted ammunition; 2) It was difficult [far more so than with artillery] to determine the range from the gun to its target; 3) The weapon was mechanically unreliable as demonstrated by its tendency to jam; and 4) Machine guns

used large amounts of ammunition in an era when re-supply of ammunition was difficult.²³ Interestingly, the problems with its weight and lack of mobility were not specifically addressed, probably because the Americans, like much of the rest of the world, still thought that the machine gun was a type of light artillery. Thus, the overall weight was just an accepted fact for an artillery piece. The Russo-Japanese War then, once again, should have been the perfect place to get more information about how this new weapon might work in a modern battle.

Reports and Observations from the Russo-Japanese War

Commentary on machine guns in the reports of the American military observers in Manchuria varied widely, as the War Department instructed each attaché to prepare his report on the Russian or Japanese arm that corresponded to that officer's own branch of service.²⁴ Since the machine gun had no real "home" within the US Army, none of the observers felt particularly compelled to comment upon its impact. In addition, since neither the Russians nor the Japanese had fielded an appreciable number of machine guns until 1905, the early observers of the war had little to say about the weapons.²⁵ The only real mention from the early part of the war came from Capt. Peyton C. March of the US General Staff. He noted that during the battle of Nanshan, "The situation at this point was very critical, and the independent cavalry brigade, under Prince Kanin, was swung around to the right on the 10th, coming up on the Russian left flank with 4 machine guns, enfilading the Russian position and really turning the tide of the fighting at that point in favor of the Japanese."²⁶ In his summation at the end of the report, he merely describes the type of machine gun that the Japanese were using, a domestically produced copy of

the Hotchkiss, and that “These guns were put in at advantageous points in the line of defense and were expected to give good results.”²⁷

Thankfully, the reports filed by later observers were a little more expansive on machine guns. Maj. Joseph E. Kuhn of the Corps of Engineers gave a detailed technical description of the Japanese Hotchkiss-type weapon, but he said almost nothing about their tactical utility. His comments on that subject were limited to, “Tactically the guns are used primarily for defense and reserve their fire for short and mid ranges, up to 600 or 800 meters,” that “Machine guns were popular in the Japanese army and were highly spoken of by the officers,” and that “Machine guns played an important part in the siege, being freely used by both sides.”²⁸ He later went on to summarize some of his comments in an index where he stated, “Machine guns, used sparingly at first, rapidly demonstrated their value and were deployed in increasing numbers in the later stages of the war. It seems certain that this weapon will play an important part in the future and the equipment and tactics of machine guns should receive serious and prompt consideration for our army.”²⁹ Since he was an engineer, it is doubtful that his observations had any real readership or impact outside his branch.

Officers from the combat arms branches were also impressed with the weapon.

Lieutenant Colonel Edward J. McClernand, First Cavalry, noted:

On the outbreak of the war the Japanese expected to largely limit the use of the machine gun to the defensive, but experience soon taught them to widen its field, and later it was used to great advantage on the offensive. Their rapid fire frequently silenced the fire of the Russian infantry, and caused the latter to crouch down in their trenches. When the guns stopped firing the Russians could be seen again popping their heads above the parapet. If the flanks of the line be weak, these weapons can be used there advantageously.³⁰

McClelland went on to describe that the Japanese placed a high value on machine guns and advocated their attachment to infantry units.³¹ Montgomery M. Macomb, however, filed by far the most detailed report on machine guns. He found that, “the machine gun played a useful but not great part in the war” and that it could best be employed as “a means of suddenly and unexpectedly increasing the volume of fire without overcrowding the firing line, thus greatly extending the scope and flexibility of the fire actions.”³² Accordingly, “the best organization is that which distributes the machine guns among the fighting units so as to take instant advantage of an opportunity without making a good target for the enemy.”³³ Based on all these observations, Kuhn, Macomb, and perhaps most importantly, Major General Arthur MacArthur, all called for “a careful and exhaustive investigation by the General Staff, as to the best type of gun, the organization of tactical units, and their distribution to commands.”³⁴

Unfortunately, none of the attachés made any specific recommendations in their reports about how to proceed with machine gun selection, organization, or distribution. Furthermore, these reports did little to address the standing US concerns about weapon reliability, ammunition expenditure, and the difficulty in ranging them effectively. That the General Staff had not apparently bothered to ask for such information was lost in the debate.³⁵

The Transformation in Machine-Gun Employment

Even with this ambiguity in the post-war reporting, the impact of the weapon in Manchuria increased pressure for the creation of a machine-gun organization within the US Army. In April 1906, the *Army and Navy Journal* reported that War Department officials regarded the question of the proper employment of machine guns to be of “...the

most serious and pressing importance...”³⁶ General Bell was also very aware of the virtual army limbo that the machine guns were in. After only sixteen days as the Chief of Staff of the Army, he noted that:

The War Department is now confronted with this situation: We have adopted a type of gun [by now it was the Maxim type], mount and pack outfit, and contracted for a considerable number, and actual deliveries are being made pursuant to this contract; but no plan for the distribution and use of these guns has been formulated. Meantime, the guns are of no value and must be stored and condemned to deterioration unless they are put in the hands of troops as fast as received.³⁷

Thus finally, in 1906, the weapon finally moved from the status of unwanted invention to standard equipment. In that year, each infantry and cavalry regiment fielded a provisional machine-gun platoon of 21 men employing two 1904-model Maxim machine guns.³⁸ This was still considered an interim organization, however, as the precise tactical role for the weapons, and their impact on the logistics system, had yet to be worked out. This action had the positive effect of cementing the role of the machine gun as an organic infantry and cavalry support weapon, instead of as an artillery weapon, but it also unfortunately spread out the available guns so much that there was little practical experimentation done with them.³⁹

In the years that followed the creation of these experimental platoons, War Department attempts at developing a standard machine-gun organization and doctrine met with little success. The limited and nonstandard nature of the platoon’s operations, combined with a lack of broad-based support within the army for their conclusions, rendered the experiments almost meaningless.⁴⁰ Faced with failure by early 1907, the War Department eventually turned to John Parker and a consulting board of officers to produce a machine-gun manual and organization. However, Parker’s continued advocacy

of a separate machine-gun service combined with shoddy staff work within the War Department prevented the success of the attempt.⁴¹

Still the army did not abandon the machine gun, as the work of the experimental platoons was enough to continue to stimulate interest in the weapon. By 1908, others officers like Lieutenant George R. Guild, Lieutenant H. R. Smalley and Lieutenant Harry L. Hodges joined Parker in submitting articles to professional journals extolling the virtues of the machine gun.⁴² Eventually and perhaps in exasperation, the army at least partially granted Parker his wish. On 12 December 1907, the War Department organized a provisional machine-gun company at the new US School of Musketry in California and gave the command to now Captain John Parker. The company's express purpose was to devise a standard machine-gun doctrine for the army.⁴³ By the end of the summer of 1908, they had completed the task and submitted the *Manual of Machine Gun Service for Machine Guns Attached to Infantry*, which was a comprehensive manual covering all manner of subjects including tactics, administration, training, and even the care of pack animals.⁴⁴

However, despite Parker's mandate to determine "the" solution for how to organize and employ machine guns, there were competing ideas. Two months after General Bell had received Parker's report, Major William H. Johnston of the General Staff also forwarded a recommendation on the machine gun and its organization entitled "Organization of Machine Guns for the United States Army: A Discussion of the Relative Value of (1) A Special Corps, (2) Regimental Detachments." In fact, rather than debating the tactics for how to use the machine gun, the question of organization became the central issue for the army. Parker tried to hedge his bet on the creation of a separate

service by providing an advance copy of his manual directly to President Roosevelt, bypassing all official channels. It almost worked, but in the end, Congress did not approve an increase in officer end-strength thus dooming Parker's proposal.⁴⁵ Ultimately, the General Staff with help from the School of Musketry re-worked Parker's original manual and issued a much-abridged version entitled *Drill Regulations for Machine-Gun Platoons, Infantry, 1909*. This set the size of the platoon at six guns and three officers each, eliminated all material on ancillary subjects, and in what Parker considered to be the ultimate insult but what was actually fairly standard policy, the manual gave Parker not one line of individual credit.⁴⁶

Between 1909 and the beginning of World War I, the future of the machine gun within the US Army for the most part centered on the future disposition of the newest model adopted, the Benet-Mercie.⁴⁷ Developed in France, the Benet-Mercie was a lightweight, air-cooled machine gun that appeared to have a lot of potential. However, during this period we find another classic example of how bureaucratic inefficiency and distribution delays can seriously delay important innovations in doctrine and tactics. The army officially adopted the Benet-Mercie as its standard machine gun in 1909; however, there was no push by the General Staff, or anyone else, to expand upon the doctrine and tactics of the *Drill Regulations for Machine-Gun Platoons, Infantry* until the new guns were received and could be experimented with. This did not occur until late 1911.⁴⁸ The only additional mention of the machine gun before then came in the *Field Service Regulations, 1910*, but the only mention of tactical application was limited to, "Machine guns materially increase the effectiveness of an advance guard. They are useful in holding bridges, defiles, etc., until reinforcements can be brought up."⁴⁹ Then, after the

guns actually were received, army attention was diverted from doctrinal and organizational matters by serious defects in the new weapon, particularly its tendency to jam frequently. Finally, when all efforts to correct these defects failed, army official interest shifted to trying to find a replacement machine gun.⁵⁰ The entire process lasted more than four years, and by that time World War I had already begun. Thus, the US Army entered the war without a reliable machine gun and no particularly good doctrine on how to use one even if they had it.

¹John Ellis, *The Social History of the Machine Gun* (Baltimore: Johns Hopkins University Press, 1986), 22.

²Ibid.

³David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, Connecticut: Greenwood Press, 1982), 5.

⁴Frank E. Vandiver, *Ploughshares Into Swords: Josiah Gorgas and Confederate Ordnance* (Austin: University of Texas Press, 1952), 52-53.

⁵Armstrong, *Bullets and Bureaucrats*, 10.

⁶Ibid., 7.

⁷Ibid., 8.

⁸Claude E. Fuller, comp., *Springfield Muzzle-Loading Shoulder Arms: a description of the flintlock muskets, musketoons, and carbines, and special models from 1795 to 1865, with Ordnance Office reports, tables, and correspondence, and a sketch of Springfield Armory* (New York: F. Bannerman, 1930), 100.

⁹J. W. Ripley, Letter to the Secretary of War, 11 June 1861, *Official Records of the Union and Confederate Armies*, ser. 3, vol. I., 264.

¹⁰United States War Department. *Annual Report of the Secretary of War, 1865*, vol. 2 (Washington, D.C., 1865), 994; *Annual Report of the Secretary of War, 1866*, vol. 1., 178; and *Annual Report of the Secretary of War, 1870*, vol. 1., 287.

¹¹Armstrong, *Bullets and Bureaucrats*, 51.

¹²R. Shawn Faulkner, Instructor, Department of Military History, U.S. Army Command and General Staff College, Ft. Leavenworth, KS, interview by author, 12 April 2005, Kansas.

¹³Armstrong, *Bullets and Bureaucrats*, 54.

¹⁴*Ibid.*, 55.

¹⁵*Ibid.*, 96.

¹⁶*Ibid.*, 98-99.

¹⁷Theodore Roosevelt, *The Rough Riders* (Barnes and Noble Publishing, Inc. 2004, 1899), 80.

¹⁸Roosevelt, *The Rough Riders*, 80.

¹⁹United States War Department. *Annual Report of the War Department, 1898*, vol. 1, part 2, Report of Captain L. V. W. Kennon (Washington, D.C., 1898), 288.

²⁰United States War Department. *Annual Report of the War Department, 1898*, vol. 1, part 2, Report of Captain J. B. Goe (Washington, D.C., 1898), 422.

²¹Armstrong, *Bullets and Bureaucrats*, 104-105.

²²Edward M. Coffman, *The Regulars: The American Army 1989-1941* (Cambridge, Massachusetts: The Belknap Press of Harvard University Press, 2004), 161.

²³J. E. McMahon, "The Role of the Machine Gun in Modern War," *Journal of the United States Infantry Association II*, July 1905, 26-28; John H. Parker, "Introductory Remarks on New Tactics – Machine Guns," *Journal of the Military Service Institution of the United States* 35 (November-December) 1904; 466 and E. R. Heiberg, "The Use of the Machine or Automatic Guns for Cavalry," *Journal of the United States Cavalry Association* 15 July 1904, 251.

²⁴Armstrong, *Bullets and Bureaucrats*, 138.

²⁵*Ibid.*, 139.

²⁶United States War Department General Staff. *Reports of Military Observers Attached to the Armies in Manchuria During the Russo-Japanese War* (Washington: U.S. G.P.O., 1906-1907), Part 1, 45.

²⁷*Ibid.*, Part 1, 51.

²⁸*Ibid.*, Part 4, 107-108, 196.

²⁹*Ibid.*, Index, 366.

³⁰Ibid., Part 5, 95.

³¹Armstrong, *Bullets and Bureaucrats*, 139.

³²John T. Greenwood, *The American military observers of the Russo-Japanese War, 1904-1905* (Ann Arbor, Michigan: University Microfilms, 1976), 446-447.

³³Ibid., 447.

³⁴Ibid., 463.

³⁵Armstrong, *Bullets and Bureaucrats*, 140.

³⁶Ibid.

³⁷Ibid.

³⁸Kenneth Finlayson, *An Uncertain Trumpet: The Evolution of U.S. Army Infantry Doctrine, 1919-1941* (Westport, Connecticut: Greenwood Press, 2001), 32.

³⁹Armstrong, *Bullets and Bureaucrats*, 143.

⁴⁰Ibid., 151.

⁴¹Ibid.

⁴²Ibid., 154.

⁴³Ibid., 156.

⁴⁴Ibid., 160.

⁴⁵Ibid., 163-164.

⁴⁶Ibid., 164-165.

⁴⁷bid., 171.

⁴⁸Ibid.

⁴⁹United States War Department, Office of the Chief of Staff, *Field Service Regulations, 1910* (Washington, D.C., 1910), 67.

⁵⁰Armstrong, *Bullets and Bureaucrats*, 171.

CHAPTER 7

CONCLUSION

Certainly, all of the military leaders between 1862 and 1914 were doing their utmost to properly man, train and equip their armies for success in future conflicts. They were diligent, professional and dedicated to the service of their nations. None of the armies in this study intentionally stifled internal debate nor did they willfully embark upon a course of action with regard to the machine gun that they knew was faulty. However, despite the impact of the Russo-Japanese War, the combination of their prevalent military tactical culture, bureaucratic pragmatism and logistical concerns led these leaders to all arrive at a conclusion that was different in the details but broadly similar in sum. This conclusion was that the machine gun might be worth having in the inventory, but effective as it could be under the proper set of circumstances, it would in no way alter the fundamental calculus of land warfare and thus was not a top priority for funding or the development of doctrine for its application.

Military Tactical Culture

The prevalent military tactical culture of the day was a decidedly important factor that prevented the earlier and more widespread adoption of the machine gun. This culture, which emphasized the offensive, the spirit of *élan*, the decisiveness of the attack with “cold steel” and the feeling that the only true variable in warfare among competently led troops was the relative moral superiority between opposing forces, formed the lens through which all the relative merits of the machine gun were viewed. The machine gun simply did not fit into the preconceived notions of the world’s armies on how wars

should be fought, and therefore the weapon's impact was, to varying degrees, dismissed. Even though the Russo-Japanese War appeared to show just how tactically important the machine gun was, this cultural mindset helped prevent the military leaders of the day from truly appreciating that fact. The antipathy of most of Europe and the apathy of the United States towards the machine gun not only stunted the development of doctrine and tactics for the weapon, but also in many ways helped to prevent the creation and adoption of solutions to the machine gun's noted logistical and even bureaucratic problems.

In Russia, this culture goes at least as far back as the early eighteenth century beginning with General Aleksandr Vasil'evich Suvorov's maxim that "the bullet's a fool, the bayonet's a fine lad."¹ In fact, Russian tacticians continued to emphasize the use of the bayonet over concentrated rifle fire or other methods of attack through World War I, despite their wartime experiences in Manchuria. As previously mentioned, Captain L. Z. Soloviev, a veteran of the Russo-Japanese War, confirmed as much in his memoirs when he said, "Let us now take another phase of infantry battle, the most decisive of all, for which preparations are made not only for several hours but several days, and the result of which gives always a decided and final preponderance to one side or the other. I mean the bayonet charge."² Despite the fact that the Russians used the machine gun to great effect during the Russo-Japanese War, none of them really challenged that fundamental precept. Therefore, the vast majority of their postwar debate on the weapon revolved around logistical and bureaucratic issues. There was no significant push to alter their standard tactics and doctrine for infantry based on this weapon. In fact, separate even from their preference for the bayonet, the structure of the Tsarist officer corps itself was such that they probably could not have devised any significant new tactics for the machine gun or

anything else. As a rule, Tsarist officers of this time period were concerned chiefly with the logistical well-being of themselves and their individual regiments. Officers who showed any real zeal for developing tactical skills were viewed as “restless” or “revolutionary,” and either interpretation was likely to impede promotion.³

In Great Britain and France, this culture of the offensive had probably the most influence of all the countries studied. In the case of Great Britain, the army’s senior officers fully embraced this culture. As an example of this, one can look once again at the comments of Brigadier General Sir Lancelot Kiggel. He was a junior member of the British General Staff before and during World War I, but he was also a protégé of Field Marshal Haig and his views were largely representative of the General Staff at the time. He said as late as 1910 that, “Victory is won actually by the bayonet, or by the fear of it, which amounts to the same thing so far as the conduct of the attack is concerned. This fact was proved beyond doubt in the late [Russo-Japanese] war.”⁴ This line of thinking was even formalized in the British Army regulations of the day. The *British Cavalry Manual of 1907*, published several years after the Russo-Japanese War, is an excellent example of how this culture shaped tactical thinking. One of its bedrock precepts was that, “It must be accepted as a principle that the rifle [and thus implying the machine gun], effective as it is, cannot replace the effect produced by the speed of the horse, the magnetism of the charge, and the terror of cold steel.”⁵

The impact of this culture on British military thought in fact was strong enough that it in many ways effectively resisted change even when faced with practical evidence of its errors. During actual field exercises held at the time the infantry had shown a tendency to get bogged down in fire-fights instead of advancing, and the tempo of field

tactics had slowed to a crawl as a result.⁶ The reaction to this was interesting, for despite some reforms that were instituted after the Boer War, often the “answer” to this dilemma was to find ways to force the infantry to advance rather than adapt the tactics to the observed conditions. The senior officers feared that operations reduced to a standoff would severely affect morale, and that eventually, a company would have to rise to its feet and take its chances. The most that could be done, it was felt, was to reduce their odds of being hit by emphasizing the speed of the advance.⁷

In France the situation was much the same, beginning at least as early as the influential theories of Ardant du Picq in the 1880s. The basic idea, advanced mostly by du Picq in the beginning, was that the “heart of man” remained the only unchanging and decisive factor in war. It was also felt that modern weapons such as the machine gun, being available to all sides, would not fundamentally alter the equation. Final victory was to rest on the moral effect of formed supports and reserves.⁸ The lessons of the Boer and the Russo-Japanese Wars brought a temporary appreciation for the strength of the machine gun and the defense in general, but the lessons of those wars proved to have little long-term influence on French military leaders. As the harshness of the war faded from the minds of the army, the proponents of the glorious offensive once again began to shape the French military’s cultural mindset. The French “Young Turks,” whose primary spokesmen were Ferdinand Foch and Francois Loyzeau de Grandmaison, were the champions of this concept. By emphasizing the offensive as the proper method to avenge France’s humiliation during the Franco-Prussian War combined with emotional rhetoric and references to France’s glory under Napoleon, they managed to push the development of French doctrine inexorably toward the concept of the *offensive a’ l’outrance*.⁹ French

officers were in fact so committed to this mindset that they in many ways simply dismissed the impact of modern weaponry. Foch himself blithely stated that, “any improvement of firearms is ultimately bound to add strength to the offense.”¹⁰

Bureaucratic Pragmatism

It goes virtually without saying that any organization will achieve little if its own internal bureaucracy is not supportive of the effort. Armies are no exception to this rule, and given that in the modern day they are often the largest single organization within a nation-state, they are perhaps the most susceptible to and reliant upon their bureaucratic processes. Even highly charismatic and popular leaders are at times ineffective at making changes when the bureaucracy is not supportive of the effort. For example, US Presidents Lincoln and Theodore Roosevelt were generally unsuccessful at making their army more fully adopt the machine gun due to bureaucratic resistance, despite their direct involvement on the issue. That is not to say that a bureaucracy in and of itself is a bad thing, or that it in any way capriciously aims to impede progress. After all, some apparatus is required to perform the administrative functions of staffing, equipment procurement, pay distribution, and a host of other things. However, the bureaucracy of an army is also not necessarily chiefly concerned with instantly providing its warfighting units with everything they desire to have. They have to work within the real-world and at times severe resource constraints levied by the government. Unfortunately, this can result in the army being equipped with less, more outdated, or simply cheaper equipment than they might otherwise desire to have. It also means that proper justifications have to be made by the army for things that it wishes to buy. If requisitions are not consistent with

the assigned mission, authorized structure, or overall governmental policy, it is unlikely that they will be filled.

The US Army's Bureau of Ordnance during the time period studied provides perhaps the best example of how a bureaucracy, despite its best intentions, can help create conditions that lead to overall failure. Since its inception in 1809, the Ordnance Department had built up a formidable bureaucratic culture of fiscal restraint and a reluctance to change.¹¹ Based on the limited demands of a small army who was chiefly concerned with policing the frontier and defending the coasts, this culture served the nation well and helped ensure that government funds were available for other pressing, developmental concerns. It was wholly inadequate, however, for the pressures of wartime, and its arcane regulations, understood by very few and glacial in their pace of execution, helped to keep weapons like the machine gun out of the US arsenals. This culture was even more solidified during the Civil War by the tenure of Brigadier General James W. Ripley as Chief of Ordnance. Given his real-world resource constraints and the task of providing weapons to an army that had increased more than ten-fold in a span of just four months, from approximately 16,000 men to over 480,000 men, Ripley was convinced that he had no other option but to eschew the adoption of new and untested weapons. After all, it was by no means clear initially that the Ordnance Department could fully arm the Union Army at all, let alone spend precious funds in the testing and development of experimental weapons.

Then, after the war was over and the army went back to its role of policing the frontier, there was simply no overarching requirement that could convince the Ordnance Department that a weapon like the machine gun was necessary. This is not surprising,

since the army itself never really attempted to provide such a justification. The soldiers in the combat arms were of generally the same opinion as those of Ordnance. Weapons like the Gatling gun, which were heavy, difficult to keep operational, and difficult to keep supplied with ammunition had little utility to their minds. At the very least, it was extremely difficult to haul the cumbersome weapon across the vast western stretches of prairie, and therefore few, if any commanders of the day, were interested in using it.

Bureaucratic resistance was not unique to the American Army. The British for example before the turn of the century were very much mindful of both the practical limitations of the machine gun and the potential impact of wasting precious funds on what was still basically an experimental weapon. Several articles in the professional journals of the day show that much of the army's debate revolved around which weapons the British should actually buy, given their inherent problems and limited financial resources, rather than how, when or if they might be a tactically important factor in the future.¹² Given all the variations which were available, the expense of obtaining them, and their questionable reliability, it was by no means clear that an additional investment in machine guns would yield a better "bang for the buck" as compared to, for instance, additional investments in quick-firing artillery. As a result, most machine-gun manufacturers who were attempting to interest the British army bureaucracy in their weapon received much the same response, which was, in essence, "Come back and see us once you have perfected your weapon."¹³

Logistical Concerns

Of all the reasons considered in this study, logistical concerns were perhaps the most universal elements that worked against the adoption of the machine gun. After all,

superior troop morale could not make the guns any lighter nor could any amount of bureaucratic wizardry make them less prone to malfunction. Far from being the light, efficient, man-portable weapons that modern day infantryman carry and operate alone, machine guns of the late nineteenth and early twentieth century were cumbersome contraptions that often were mounted on wheeled carriages and pulled by teams of horses. They also tended to be somewhat mechanically delicate, and could easily get out of order when operating for any length of time under field conditions. Finally, even when working exactly as designed, they used ammunition at rates that horrified organizations whose job it was to keep the army supplied. After all, a 200-round-per-minute rate of fire for a single Gatling gun was equivalent to the ammunition expended by an entire infantry company! As a result, even individuals within the various armies of the day who were enthusiastic about machine guns had to contend with how to solve these concrete, practical problems in order to use machine guns to their potential.

The Imperial Russian Army provides a good early example of this. Despite the fact that the Russians used the Gatling gun along with a domestically produced version known as the Gorloff to great effect in actual combat, specifically during the Russo-Turkish War,¹⁴ they ultimately decided that the gun's weight, lack of effective range as an "artillery" piece, and other technical difficulties rendered it impractical for field use. Thus, by the end of 1876 machine guns were used only as fortress armaments.¹⁵

The French also became painfully aware of this limitation after the dismal performance of the Montigny *mitrailleuse* during the Franco-Prussian War. The sheer weight and size of the *mitrailleuse*, approximately two tons including the gun, carriage, limber, and 2,100 rounds of ammunition, meant that only the French artillery branch had

the ability and experience to move and support the weapon.¹⁶ As the French learned, however, it was ill suited in its intended role as a counterbattery fire weapon, since it lacked the effective range required to engage enemy cannons.¹⁷

The Germans were markedly different from the rest of the armies in this study since they never considered the weapon to be an adjunct to the artillery. Rather, they were to supplement artillery support as covering fire when the artillery barrage had to lift in order to avoid fratricide. Irrespective of this, the Germans were not unmindful of the logistical limitations of the weapon. They recognized that the weapon tended to use extraordinary amounts of ammunition, particularly when employed as part of a static defense. Thus, when on the defensive, commanders were urged to use their machine guns as much as possible as a fire reserve. Further, they were to be deployed only to cover important avenues of approach, maximizing use of cover, and then withdrawn as soon as practical to rejoin the main fight.¹⁸ They also understood the somewhat fragile nature of the weapon and its tendency to breakdown. As a result, the weapons were always employed as a section and the use of individual machine guns was “strictly forbidden.”¹⁹

The logistical challenges of weight and lack of mobility were perhaps most poignantly realized, however, by the US Army. The late nineteenth century US Army was, in essence, a constabulary force who was chiefly concerned with policing the frontier. Large, heavy, horse drawn weapons were simply not well suited to ranging over thousands of miles of prairie. Additionally, even with the advent of the center-fire primer and the drawn brass cartridge, which greatly improved the uniformity and reliability of ammunition, the Gatling still had several bugs that detracted from its usefulness. As was

common with other machine-gun models of the era, the Gatling was prone to breakdown in field conditions, and there was no effective way to traverse the weapon rapidly.

The situation had not much improved by the early twentieth century either. As described by US officers in professional journals shortly before the Russo-Japanese War, there were still four long-standing objections to the pervasive adoption of the machine gun, three of which were based upon logistical concerns. They were: (1) machine guns, unlike the infantry rifle, could not be relied upon to score a hit with each separate shot and, therefore, wasted ammunition; (2) it was difficult [far more so than with artillery] to determine the range from the gun to its target; (3) the weapon was mechanically unreliable as demonstrated by its tendency to jam; and (4) machine guns used large amounts of ammunition in an era when resupply of ammunition was difficult.²⁰ In fact, even if the Benet-Mercie machine gun had lived up to its potential, none of these issues would have been solved and therefore it is unlikely that the US would have used machine guns in significant numbers prior to World War I.

The Russo-Japanese War in some ways might have allayed all these concerns, but the finer aspects of the issue still tended to be overlooked. Semipermanent defensive positions could have partially negated the problem of ammunition re-supply, as stockpiles could be built up in advance such as they were at Port Arthur. The greater availability of weapons in these positions also would mitigate the impact of a single weapon malfunctioning. For those adherents of the offensive, they also might have found, and sometimes did, inspiration in the Japanese use of their Hotchkiss-variant machine guns. However, none of the situations observed made enough of an impact to change the prevailing thinking about the machine gun's logistical challenges.

Potential Lessons for Today's Military

At the end of day, historical analysis is merely academic unless it can provide a context to help present day leaders make better, more informed decisions. It helps of course also to realize that historical analogies are never perfect or exact. There is always a complex, interwoven set of circumstances that led those historical figures to make the decisions that they made. Those circumstances are never likely to repeat themselves exactly or in their entirety, thus one must be careful when drawing lessons from the past and trying to apply them in the present. As long as the potential pitfalls are kept clearly in mind, however, and one conducts a sufficiently thorough study of the subject, one can often find some significant analogies between the past and the present which can aid in the decision making process.

Certainly, as one looks at all the issues surrounding the adoption of the machine gun between 1862 and 1914, one can draw parallels to today. At the very least, the army bureaucracies of today still face the same general challenges that they faced 100 years ago. Working within the budget and other real-world constraints, they still must man, train and equip their armies in the best manner possible. Priorities will still have to be set, they must still adhere to overarching guidance, and there still must be an objectively defined, important requirement to be met before embarking upon any course of action. Funds are after all as precious and finite today as they were in the 1800s.

Based on this study, there is at least one important lesson to be drawn from the analysis of bureaucracies and the introduction of the machine gun. It is simply that the army's bureaucracy and the fighting army must not operate independently of each other as they often did a century ago. Even in the US Army of today, disconnects between the

weapon designers and the soldiers remain. At times new systems make it all the way through development and into the field-testing phase before soldiers get their first exposure to them. This is not a recipe for success, for at the very least, without the “deck plate” perspective precious dollars can be wasted in the development phase on things that are not practical or functional. Therefore, the onus is upon the army to objectively evaluate its needs, without undue embellishment, and clearly articulate them to the bureaucracy so that they can provide the needed resources. It is then the bureaucracy’s task to rapidly and efficiently meet those requirements, as quickly as possible and without unjustified modification. If both institutions do not work together, then armies will continue to be equipped with the wrong items, not enough of them, or receiving them too late to make a difference. That is exactly how an army can receive an inferior weapon and behind schedule like the Benet-Mercie machine gun.

Solutions to logistical problems are also vitally important to the proper functioning of any army. Even the US Army of today, the most capable and powerful fighting force that the world has ever seen, constantly wrestles with logistical problems. The issue of how to get the right stuff to right place at the right time, and in great enough quantity to support combat operations remains as difficult to solve today as it was in the eighteenth century, or any century for that matter. When looking at the logistical problems that the machine gun proffered, they are not so different from those currently faced. Modern day armies still have equipment that is prone to breakdown in the field and is difficult to reposition or transport. The ability to keep the army supplied with ammunition is also obviously just as important now as it was then. Perhaps the best logistical lesson to draw from these historical events does not lie in the realm of

techniques or procedures, but in philosophical outlook. Just because the current logistical system does not seem to offer a good solution to the problem at hand, does not mean that no good solution exists. It is at least possible that a good objective look at Lieutenant Parker's or Major Gibbs' light-weight Gatling carriage could have solved the mobility problem much earlier than it was, or at least stimulated enough interest in the issue for a better solution to be developed. One must constantly search for the best way of accomplishing a goal, whether it fits within the current system of doing business or not. At the very least, it will help enable one to make a conscious decision not to do something new.

A look at how the world viewed the Russo-Japanese War itself can also be instructive. All of the major world powers were either participants in the war or sent military contingents to observe the war's conduct and report on its events. However, rather than discerning new, tactically relevant items such the dramatic impact of the machine gun on the battlefield, they often tended to see what they wanted to see and then fit those "lessons" into their preconceived doctrine and notions of warfare. "Fighting the last war" generally will not position an army for victory. Certainly when provided the opportunity to observe and evaluate how current wars are being fought, military commanders must force themselves to objectively evaluate what they see and adapt their tactics, techniques, procedures, systems and organizations to meet the newly observed challenges.

Finally and most importantly, a professional organization like the army must always be willing to objectively evaluate its tactics, techniques, and procedures in the light of current technology, realistic battlefield conditions, and the actions of the enemy.

Blind adherence to doctrine for reasons of tradition, romantic ideals, or simple stubbornness and disconnected from the realities of the battlefield is a sure recipe for getting soldiers killed unnecessarily. God only knows how many soldiers might have been saved on the Somme and other early World War I battlefields if the officers in command merely had the moral fortitude and intellectual capacity to question their assumptions about the nature of the “glorious offensive” and change their tactics to fit the realities they observed. Commanders are fond of saying that “no plan survives first contact with the enemy.” The same can be true of any regulation or way of doing business, and it is incumbent upon the leaders of the army to continually seek out new and better ways of fighting and winning wars in order to avoid recklessly hazarding the lives of their soldiers. It literally is a matter of life and death; the soldiers as well as their nations deserve no less.

¹Bruce W. Menning, “Train Hard, Fight Easy: The Legacy of V. A. Suvorov and his ‘Art of Victory’,” *Air University Review*, Vol. 7 (November-December 1986): 83.

²L. Z. Soloviev, *Actual Experiences in War: Battle Action of the Infantry; Impressions of a Company Commander* (Washington: U.S. G.P.O., 1906), 22.

³John Bushnell, “The Tsarist Officer Corps, 1881-1914: Customs, Duties, Inefficiency,” *The American Historical Review* 86 (February-December 1981): 765.

⁴Martin Samuels, *Command or Control?: Command, Training and Tactics in the British and German Armies, 1888-1918* (London and Portland: Frank Cass, 1995), 102.

⁵John Ellis, *The Social History of the Machine Gun* (Baltimore: Johns Hopkins University Press, 1986), 55.

⁶Shelford Bidwell and Dominick Graham, *Firepower: British Army Weapons and Theories of War, 1904-45* (London: Allen and Unwin, 1982), 31.

⁷*Ibid.*

⁸Joseph C. Arnold, "French Tactical Doctrine: 1870-1914," *Military Affairs* 42, no.2 (April 1978): 62.

⁹*Ibid.*, 63.

¹⁰*Ibid.*, 64.

¹¹David A. Armstrong, *Bullets and Bureaucrats: The Machine Gun and the United States Army, 1861-1916* (Westport, Connecticut: Greenwood Press, 1982), 7.

¹²Michael D. Welch, *Science in a Pickelhaube: British Military Lesson Learning at the RUSI (1870-1900)* (London: Royal United Services Institute for Defense Studies, 1999), 35.

¹³*Ibid.*, 36.

¹⁴Ellis, *The Social History of the Machine Gun*, 66.

¹⁵Bruce W. Menning, *Bayonets Before Bullets: The Imperial Russian Army, 1861-1914* (Indianapolis: Indiana University Press, 1992), 33.

¹⁶Armstrong, *Bullets and Bureaucrats*, 60.

¹⁷*Ibid.*, 61.

¹⁸Antulio J. Echevarria, *After Clausewitz: German Military Thinkers Before the Great War* (Lawrence, Kansas: University Press of Kansas, 2000), 160.

¹⁹*Ibid.*

²⁰J. E. McMahon, "The Role of the Machine Gun in Modern War," *Journal of the United States Infantry Association II*, July 1905, 26-28; John H. Parker, "Introductory Remarks on New Tactics – Machine Guns," *Journal of the Military Service Institution of the United States* 35 (November-December) 1904; 466 and E. R. Heiberg, "The Use of the Machine or Automatic Guns for Cavalry," *Journal of the United States Cavalry Association* 15 July 1904, 251.

APPENDIX A

TIMELINE AND MAP OF THE RUSSO-JAPANESE WAR

24 January 1904	Japan breaks diplomatic relations with Russia
25 January	Admiral Togo conducts a surprise torpedo attack on the Russian fleet anchored at Port Arthur. Russian resistance prevents the Japanese from seizing the port, but they effectively bottle-up the remaining Russian fleet in the harbor.
15 March	General Kuropatkin arrives in Manchuria to assume command of the Russian field army (leaving his post as War Minister). Russian forces initially only possess a total of eight Maxim machine-guns.
29 March	The Japanese Guards Division lands at Pyongyang to serve as a screening force to General Kuroki's 1 st Army as they marched northward toward Antung.
17 – 18 April	After successfully covert preparations, General Kuroki's army attacks and decisively defeats General Zasulcih's Russian forces on the western side of the Yalu River, gaining them access to Manchuria.
02 – 07 May	Japanese 2nd Army under General Oku cuts the rail line between Port Arthur and Liaoyang, then swings southwest to attack the Kwantung Peninsula and Port Arthur.
12 – 13 May	Battle of Nanshan. General Oku commences his attack with 35,000 troops and 48 Hotchkiss machine-guns. Opposing are Colonel Tretiakov with 3500 men and 10 Maxim machine guns. At 1530 on the 13th, General Oku, in desperation to advance, turns his 4th Division into "human bullets" by attempting a daring envelopment through the surf at Tretiakov's left flank. After 1800, an orderly retreat turns into a rout as General Fock's supporting Russian forces, unbeknownst to Colonel Tretiakov, had withdrawn earlier.
14 May	General Oku seizes Dal'nii unopposed. He then turns north toward Liaoyang with his 2nd Army, leaving remnants for General Nogi to incorporate into his 3rd Army.

27 May	General Kuropatkin sends General Shtakel'berg's 1st Siberian Corps south to try and provide relief for Port Arthur as well as to prevent Oku's 2nd Army from reaching Liaoyang.
01 – 02 June	1 st Siberian Corps and the Japanese 2nd Army engage in the vicinity of Telissu, with the Russians eventually forced to withdraw. Russians lose 3,500 men to Japan's 1163. The Russians also fail to halt General Kuroki's 1st Army at Motien Pass, dubbed by some "the Thermopylae of Manchuria."
04 July	The Russians attempt to re-take the Motien Pass, but are unsuccessful.
09 July	General Oyama is appointed Commander-in-Chief of all Japanese forces in Manchuria.
25 July	Siege of Port Arthur commences. Russian forces, commanded by General Kondratenko include nearly 42,000 men and 62 machine-guns, with 47 machine-guns allocated to the defense of the landward side of Port Arthur and 10 machine-guns in reserve. Against them were General Nogi's 3rd Army of approximately 80,000 men and an unknown number of machine-guns.
27 July	General Nogi's army finally seizes two hills overlooking the port. Japan loses 1280 men to the Russian 450.
03 August	Russians refuse a surrender ultimatum from General Nogi.
06 August	General Nogi begins his "First Storm" general assault on the port. Despite a particularly heavy artillery preparation of the Waterworks Redoubt and Fortification #3 (from before dawn until 1500), wave after wave of Japanese infantry are unable to take the positions due to concentrated rifle and machine-gun fire from the Russians.
10 August	"First Storm" of the Japanese attacks against Port Arthur culminates with Japan losing 16,000 men to Russia's 3000. Port remains in Russian hands. The loss of 13 machine guns leaves the garrison with 53.
12 August	Beginning of the Battle of Liaoyang. General Kuropatkin with 158,000 men face General Oyama and 125,000

	Japanese. This was the second largest recorded concentration of forces in the history of war. Russians fight from defensive positions mostly, given their overall strategy of biding time to build-up more forces.
15 August	Russians fall back to secondary defensive positions in the Battle of Liaoyang, keeping 46-66 percent of their total force in reserve (immense fear of being enveloped).
17 August	The 6th Japanese Division slams into the Russian right flank at Liaoyang. On the extreme right, the Japanese are stopped cold and unable to approach closer than two kilometers thanks to the efforts of a machine-gun detachment. The Japanese fail to turn the right flank as a result.
19 August	Russians fall back to main defensive positions at Liaoyang.
20 August	Russians attempt an envelopment at Liaoyang, but Japanese seizure of key high ground the night before and confusion among the troops at their jump-off points before foils the plan.
21 August	End of the Battle of Liaoyang. General Kuropatkin orders a general withdrawal to Mukden despite having fought the Japanese to a standstill. Russians lost 16,000 troops to the Japanese 23,000, but the constant retreating was beginning to affect Russian morale. Japanese forces are unable to pursue, leaving the retreating Russian army intact.
06 September	“Second Storm” of attacks commence against Port Arthur. A six-hour artillery preparatory fire occurs with more than 1000 rounds falling on the Waterworks Redoubt alone. Still the initial attack after the artillery fire fails, prompting the Japanese to move their field guns even closer to try to destroy Russian machine-gun emplacements. (Japan seizes the redoubt by the next day).
09 September	“Second Storm” ends leaving the Japanese in control of the Waterworks and Temple Redoubts and Long Hill, but with 203 Meter Hill still controlled by the Russians. Japan loses 7500 troops to Russia’s 1500, but Russia could not replace them.
22 September	General Kuropatkin’s forces have increased to 195,000

	troops and 32 machine-guns (among other forces) and he attacks south from Mukden toward the Sha-ho River.
22 – 27 September	Battle of the Sha-ho (Russian offensive). Russians divide forces into a western and eastern contingent, but veto power over disposition remains with Kuropatkin which hamstrings command and control. In addition, the attempted flanking maneuver over rough terrain is ill conceived as the terrain slows progress and eventually dooms the attempt.
27 Sep – 04 October	Battle of the Sha-ho (Japanese counter-offensive). General Oyama counter-attacks to the west and center of the Russian lines, but they fight to a bloody stalemate and conclusion on the banks of the Sha-ho. Total Russian casualties were 41,351 to the Japanese 20,000 (approx.).
13 October	After a month of “sapper” and other siege-style earthworks activity, the “Third Storm” begins at Port Arthur with a four-day artillery preparatory fire.
17 October	“Third Storm” ends with Russia still in control of Port Arthur. Both sides are getting desperate as the Russians are starting to run out of supplies and the Japanese are growing impatient with the amount of resources committed to the siege that are sorely needed elsewhere.
13 November	“Fourth Storm” commences at Port Arthur with a three-hour artillery preparatory fire. Opening attacks fail again, and Japan loses another 4500 men to the Russian 1500.
22 November	Japanese finally take 203 Meter Hill, sealing the fate of Port Arthur. The battle for this one hill claimed 4500 Russian dead and wounded and over 10,000 Japanese dead and wounded.
22 December	General Strossel formally surrenders Port Arthur along with its remaining 23,481 men and equipment.
23 December	General Kuropatkin orders General Mishchenko to gather a force of 7500 cavalry in order to attempt a large-scale raid into the Japanese rear, with the hopes of destroying their supply lines and regaining the initiative.
30 December	Mishchenko’s forces arrive in position to attack Inkou

	Station, but only after losing the element of surprise along the way. Resulting Battle of Inkou only manages to disrupt Japanese communications and supplies for six hours.
03 January 1905	In an attempt to prevent General Nogi's 2nd Army from moving north out of Port Arthur and reinforcing General Oyama, General Kuropatkin then orders Mishchenko to attempt an envelopment near the village of Sandepu.
11 – 15 January	Battle of Sandepu. Russian attack ultimately fails as it generally lacks heart, preparation and unity of effort.
05 – 12 February	Beginning of the Battles of Mukden, the last major operation of the war. 270,000 Japanese troops and 254 machine-guns face 276,000 Russians and only 54 machine-guns. Russians begin with an offensive on the right of their formations. Despite gaining success, General Kuropatkin cancels the offensive in order to provide relief to his extreme left, which was under pressure of General Kawamura's 5th Army.
12 – 22 February	Three of the battles unfold at Mukden. After Russian forces move to re-enforce in the east, General Nogi's 3rd Army commences an envelopment to the west. By 16 February, it becomes clear to Kuropatkin that the envelopment was threatening but his countermeasures prove indecisive. By 22 February, General Kuropatkin has to withdraw his forces to shorten his defensive lines.
23 – 27 February	Concluding Battles of Mukden. After several probing attacks, Japanese forces manage to penetrate and exploit the center of the Russian defensive line on 24 February. General Kuropatkin orders a withdrawal without knowing about the breakthrough, which forces his army to fight a series of rearguard engagements while withdrawing.
28 February	General Kuropatkin manages to keep his forces from collapsing and re-establishes defensive positions on the Chai-ho. Russia suffers 59,000 casualties and 31,000 taken prisoners of war. The Japanese incur 70,000 casualties.
03 March	General Kuropatkin is relieved of command but remains in Manchuria in a subordinate capacity, while the remnants of the Russian forces withdraw north to await the arrival of the Baltic Fleet.

14 May

Admiral Rozhstvenskii's Baltic Fleet is utterly defeated by the Japanese at the Tsushima Straights.

05 September

Russia accepts American mediation that ends the war with the Peace of Portsmouth. Officially, the war was recorded as a draw. In reality, it was a significant Japanese victory over the largest army in Europe.

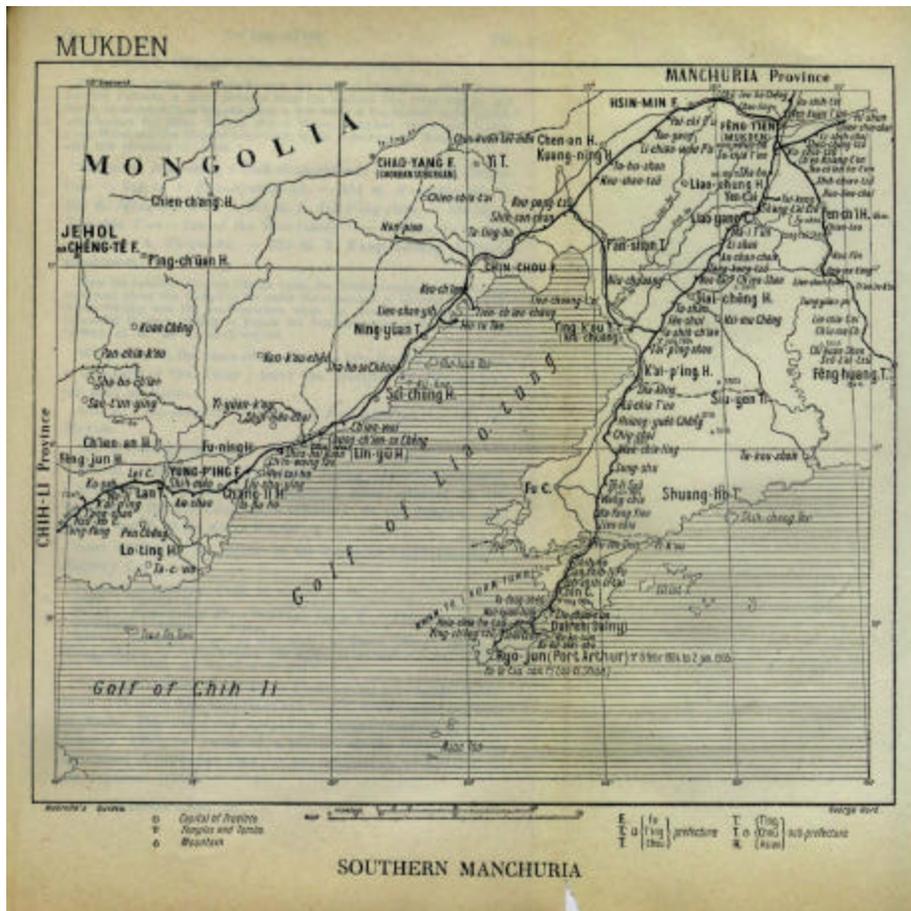


Figure 1. Historical Map of Manchuria (1912)

Source: University of Texas Libraries, "Manchuria, Southern 1912" [image on-line]; available from http://www.lib.utexas.edu/maps/historical/south_manchuria_1912.jpg; Internet; accessed 9 June 2005.

APPENDIX B

MACHINE-GUN WEAPONS COMPENDIUM



Year: 1909
Caliber: .30-06
Action: Gas-operated
Length: 46.75 inches
Weight: 27 pounds
Rate of Fire: 600 rounds per minute

Figure 2. Benet-Mercie

Sources:

Liberatorcrew.com, "Hotchkiss Benet-Mercie Model 1909" [image on-line]: available from http://www.liberatorcrew.com/Images_1919A4/Postcards.htm; Internet; accessed 9 June 2005.

Ian Hogg, *Machine Guns: The Standard Reference to Machine Guns and Their Development* (Iola, WI: Krause Publications, 2002), 293.



Year: Various models; statistics here are for the 1874, .45 caliber model
Caliber: .45
Action: Hand-crank
Length: 59.41 inches
Weight: 444 pounds
Rate of Fire: 400 rounds per minute

Figure 3. Gatling

Sources:

Thelegendbegins.com, "Colt Gatling gun" [image on-line]; available from http://www.thelegendbegins.com/weapons_of_tremors4.html#Gatlinggun; Internet; accessed 9 June 2005.

Ian Hogg, *Machine Guns: The Standard Reference to Machine Guns and Their Development* (Iola, WI: Krause Publications, 2002), 297.



Year: Various models; statistics here are for the 1909 model
Caliber: 8x50R
Action: Gas-operated
Length: 46.75 inches
Weight: 27 pounds
Rate of Fire: 500 rounds per minute

Figure 4. Hotchkiss

Sources:

Norres.bfcentral.se, "Hotchkiss mitraljöse m/1898 Heavy machine gun" [image on-line]; available from http://norres.bfcentral.se/images/Hotchkiss_m.jpg; Internet; accessed 9 June 2005.

Ian Hogg, *Machine Guns: The Standard Reference to Machine Guns and Their Development* (Iola, WI: Krause Publications, 2002), 298.



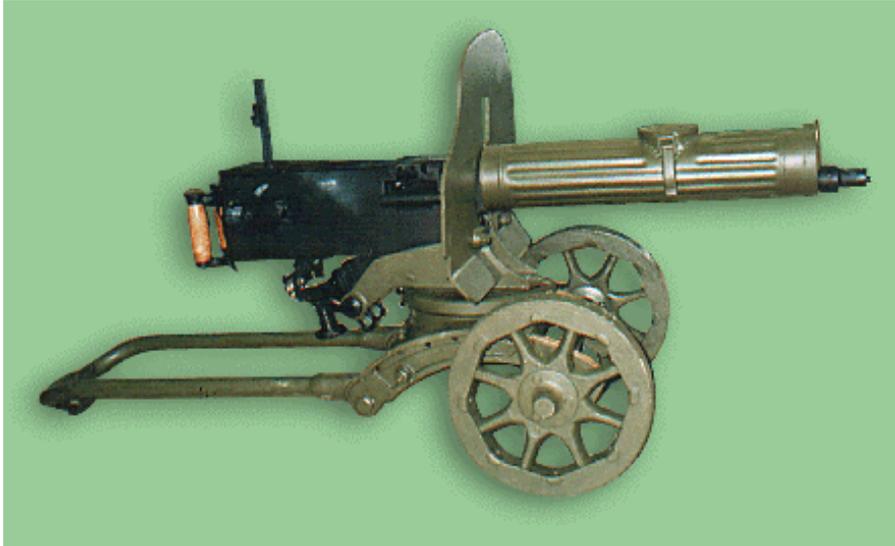
Year: Various models; statistics here are for the 1914 model
Caliber: .303
Action: Gas-operated
Length: 50.63 inches
Weight: 25.25 pounds
Rate of Fire: 550 rounds per minute

Figure 5. Lewis

Sources:

Relics.org, "Lewis Infantry Machine Gun" [image on-line]; available from <http://www.relics.org.uk/p0152.htm>; Internet; accessed 9 June 2005.

Ian Hogg, *Machine Guns: The Standard Reference to Machine Guns and Their Development* (Iola, WI: Krause Publications, 2002), 299.



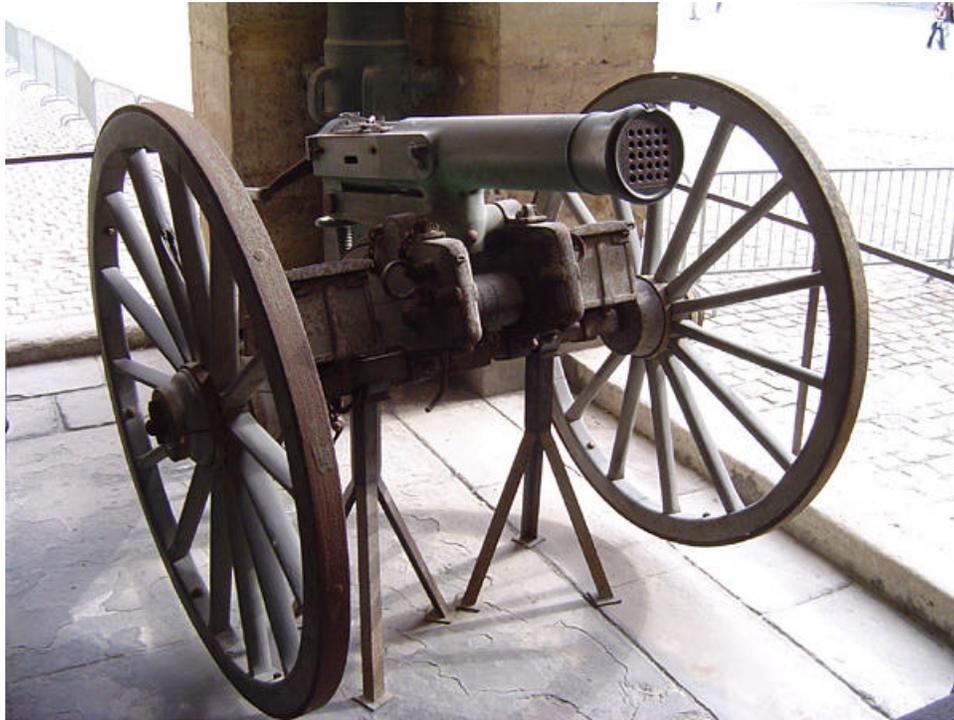
Year: Various models; statistics here are for the 1904 model
Caliber: .30-06
Action: Recoil-operated
Length: 48 inches
Weight: 68.5 pounds
Rate of Fire: 600 rounds per minute

Figure 6. Maxim

Sources:

Prodiz.ru, "7.62-milimeter heavy Maxim machine-gun" [image on-line]; available from <http://www.prodiz.ru/katalog/maketi-E.html>; Internet; accessed 9 June 2005.

Ian Hogg, *Machine Guns: The Standard Reference to Machine Guns and Their Development* (Iola, WI: Krause Publications, 2002), 299.



Year: 1870
Caliber: 11 mm
Action: Hand-operated
Length: Not available
Weight: ~ 4000 pounds including gun, carriage, limber and 2100 rounds of ammunition
Rate of Fire: >300 rounds per minute (est.)

Figure 7. Montigny Mitrailleuse

Sources:

Cwbullet.org, "French Mitrailleuse Gatling Gun" [image on-line]; available from <http://www.cwbullet.org/french-mitrailleuse-gatling-gun-vp7199.html>; Internet; accessed 9 June 2005.

Geoffrey Wawro, *The Franco-Prussian War: The German Conquest of France in 1870-1871* (Cambridge, UK; New York: Cambridge University Press, 2003), 53.



Year: Various models; statistics here are for the 1898 model
Caliber: .303
Action: Hand-crank
Length: 41.25 inches
Weight: 98 pounds
Rate of Fire: >300 rounds per minute

Figure 8. Nordenfelt

Sources:

Nmm.ac.uk, "E0067_2.jpg" [image on-line]; available from <http://www.nmm.ac.uk/server.php?show=conMediaFile.1504>; Internet; accessed 9 June 2005.

Ian Hogg, *Machine Guns: The Standard Reference to Machine Guns and Their Development* (Iola, WI: Krause Publications, 2002), 300.

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