The U.S. ARMY Ordnance Department — at the Dawn of the Civil War —

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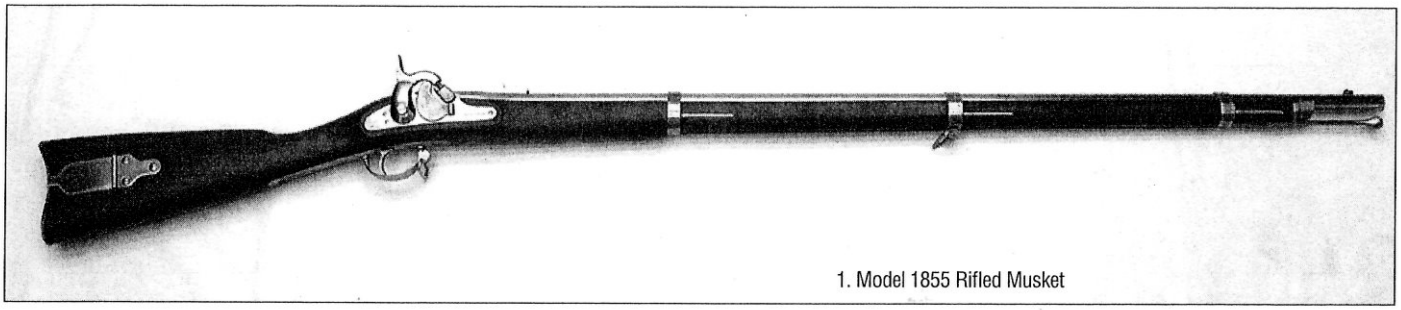
> The mission of the Ordnance Department is "to provide and furnish ordnance and ordnance stores of every description for the use of the regular troops, and for the permanent fortifications and other military posts of the United States; also the annual supplies for arming and equipping the whole body of the militia."

Prior to the Civil War, the Ordnance Department was a small, but highly trained and experienced group of Army officers. Many of whom participated in the Mexican War or had devoted their energy to technological ordnance research. By the start of the Civil War, this research had resulted in the M1855 Rifled Musket, one of the best rifled muskets in the world. Brigadier General James W. Ripley, who became the Chief of Ordnance in 1860, played a key role in developing the new rifled musket during his tenure as Superintendant of Springfield Armory. His advocacy of the M1855 Rifled Musket over breech-loading rifles and carbines was the culmination of a long standing debate within the Ordnance Department and the U.S. Army.

To Provide and Furnish Ordnance

In 1858, the Ordnance Department had a total of 41 officers; however they would need an additional 33 officers to staff all its billets. The Ordnance Department maintained 22 arsenals, 1 depot at Fort Leavenworth, 2 armories, an office staff, and an Inspector of Armories and Arsenals. Additionally, officers were detailed to the Utah expedition, special duty and sick leave, and duty in the Judge Advocate General office.

The 1808 Militia Act established the guidelines for supply to the state militias; representation in Congress determined the apportionment of rifled muskets to state militias. In the 1858 annual report, the top three recipients in descending order were New York, Pennsylvania, and Ohio. Ranked 4th, Virginia was the highest ranking southern state. In regard to sectional controversies, the annual report did not reflect any hesitancy to provide arms to southern state militias. However, it did reflect the bias toward the M1855 rifled musket. It stated that other weapons "are more suitable for predatory warfare and personal rencontres than for the use of militia of the country." As for heavy



1. Model 1855 Rifled Musket

ordnance, the Ordnance Department worked to develop a stronger gun metal which can withstand the higher explosive power of the current gunpowder. Conversely, it also examined longer burning powder to maintain explosive power with less stress on the cannon. Nine howitzers and 6 six-pounder guns were issued to the militia. The Army received 13 howitzers and 2 guns (1 six-pounder and 1 twelve-pounder). The report urged the construction of a national foundry.

The 1859 annual report revealed that the Ordnance Department was being forced to react to emerging technologies like breech-loading carbines. At Watervliet Arsenal, Major Alfred Mordecai developed a more efficient means of producing ammunition with his new bullet press machine. It increased production from 290,000 rounds per month to 714,000 rounds per month. The report confirmed that rolling welding vice hammer welding was much stronger and would be instituted at Springfield Armory and introduced at Harper's Ferry Armory soon.

The 1860 annual report did not make any overt indication of the imminent Civil War. However, in his last annual report, Colonel Henry K. Craig discussed the need to drastically increase the number of rifled muskets on hand which could be issued to federal and state militias. He stated that the stores of all types of muskets (smoothbore and rifled) did not exceed 530,000 in all the arsenals in the country. He compared this to past inventories when there were more than 700,000 muskets and this amount was not considered excessive. The report stated that Ordnance Department gave 8,827 rifles and rifled-muskets to the state militias.

Ordnance Department Officers

Ordnance officers in the Army consisted of a small coterie of professional soldiers who had devoted their lives to the Army. These soldier-scientists played a crucial role in American industrialization, often termed the American System of Manufacturing. The leading soldier-scientist at the start of the Civil War was Major Alfred Mordecai; however, in addition to Mordecai, many ordnance officers and civilians (George Bomford, Thomas J. Rodman, Robert Parrot, John Hall, Simeon North) left their indelible mark on American industry. In addition to science, the Mexican War and frontier duty created an experience which left a mark on the ordnance officers, not incomparable to its effect on the senior Union and Confederate leadership in the Civil War. In 1847, Army and Navy officers in Mexico City established the Aztec Club. The roster of original members numbered 160 officers; only Mexican War veterans could join. There were six Ordnance officers among the original members. Of these Ordnance officers, five would become generals in the Civil War.

Rifled Muskets and Breechloaders

For the first half of the nineteenth century, the standard service weapon was the M1816 smoothbore musket. The M1835 and M1842 muskets descended directly from the M1816 musket; indeed, some historical records do not even make a model distinction, but simply refer to them as successive iterations of the M1816 musket. On the M1835 musket, parts interchangeability was emphasized, but the construction of the M1842 was based on it. In addition, the M1842 introduced the percussion cap for increased firing reliability over the flintlock.

The M1855 rifled-musket was a significant leap forward in technology and capability, and became the penultimate example of a muzzle-loading rifled musket. It introduced rifling as a standard characteristic. The greater accuracy and range of a rifled barrel had long been known, but it had been slow to reload and often jammed after repeated firing. French Army Captain Claude-Etienne Minie solved this problem. By utilizing the Minie ball with rifling, the M1855 could achieve ranges 4-5 times further than the smoothbore musket. In addition, in an attempt to improve the percussion cap system, the M1855 introduced the Maynard tape primer.

With the adoption of the Minie Ball and rifled muskets by the United States and European countries, attention turned to its effect on infantry tactics. British military strategists doubted the effect of the rifled musket because their calculations included additional variables which affected its firepower; such as weather, foliage, and the conduct of the Soldier in battle. In contrast, continental writers were more enthusiastic about its capabilities. They debated the extent to which rifled muskets would revolutionize previous volley-fire tactics, and how it would affect the relevance of artillery and cavalry on the battlefield. American military strategists adopted the continental viewpoint. In 1855, Major William J. Hardee issued Rifle and Light Infantry Tactics based on a close translation of French manuals. This book became the standard manual for Union and Confederate forces.

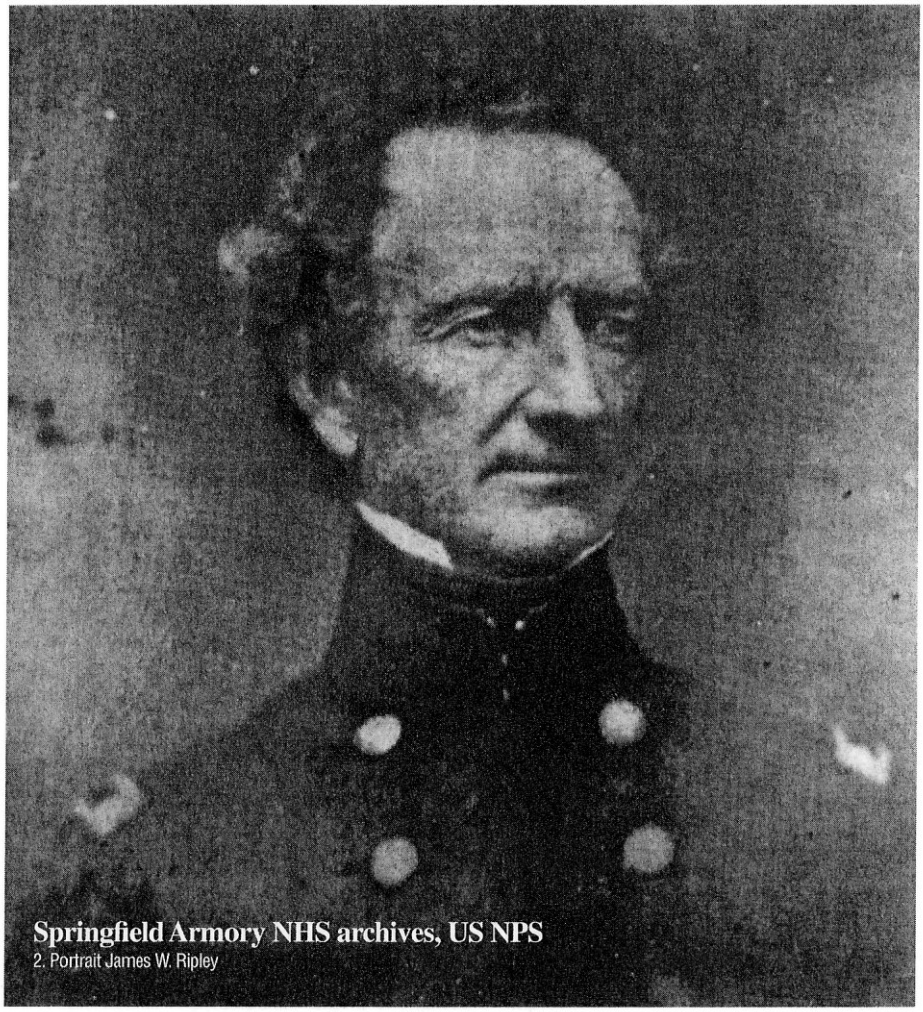
The acceptance of breech-loading weapons suffered from a number of opponents for a variety of reasons. One of the chief opponents was Brigadier General James W.

Ripley, the Chief of Ordnance during the first two years of the Civil War. Even earlier, he disregarded breech-loading as unnecessary. He led the Springfield Armory as its Superintendant from 1841-1854 and played a leading role in the development of the M1855 rifled musket. He considered it the definitive standard service weapon and believed there was no rival in its capability. In addition to his technological bias, he believed it would lead to a breakdown in firing discipline due to its excessive use of ammunition. For him, this would be the first step in undermining basic discipline of modern strategy based on infantry tactics.

Ripley's opposition was not out of step with the larger Army. Breech-loading weapons had received considerable opposition. The Inventor, John H. Hall and Colonel George Bomford, Chief of Ordnance (1832-1848), had been supporters of breech-loading technology, but their advocacy passed when they died. Afterwards, proponents of breech-loading weapons had a difficult time overcoming the obstruction of the conservative officer corps. The Ordnance Department was hesitant to test new weapons solicited to them by inventors, and when they did test breechloaders and they proved to be capable, the Ordnance

Table 1. Ordnance duty stations at the outbreak of the Civil War.[14]

LOCATION	COMMANDER	CIVIL WAR DUTY
Chief of Ordnance, Washington, D.C.	Colonel Henry K. Craig	Advisory capacity to Union Army until 1863
Inspector of Armories and Arsenals, Washington, D.C.	James W. Ripley	Chief of Ordnance, USA, 1861-1863
Springfield Armory	Isaac H. Wright (Superintendant)	Springfield Armory
Harper's Ferry Armory	Alfred M. Barbour (Superintendant)	Joined CSA as Major in Quartermaster Corps
Watervliet Arsenal	Major Alfred Mordecai	Resigned commission
Washington Arsenal	Brevet Major George D. Ramsey	Chief of Ordnance, USA, 1863-1864
Alleghany Arsenal	Major John Symington	Daughter married Ordnance officer William R. Boggs, Symington's subordinate at Alleghany. Boggs will become CSA General.
Fort Monroe Arsenal	Captain Alexander B. Dyer	Chief of Ordnance, USA, 1864-1874
St. Louis Arsenal	Major William H. Bell	Resigned at Civil War due to his southern sympathies.
Frankford Arsenal	Brevet Major Peter V. Hagner	Brevet Brigadier General, USA
New York Arsenal USA	Brevet Major William A. Thornton	Brevet Brigadier General at New York Arsenal,
Watertown Arsenal	Captain Thomas J. Rodman	Brevet Brigadier General, USA
Benecia Arsenal	Captain Franklin D. Callender	Brevet Brigadier General in Missouri, USA
Mount Vernon Arsenal	Brevet Captain Jesse L. Reno Mountain, USA	Brevet Major General killed at Battle of South
North Carolina Arsenal	Captain James A. Bradford Colonel in artillery.	Resigned commission and joined CSA as
Charleston Arsenal	Captain Josiah Gorgas	Chief of Ordnance, CSA.
Texas Arsenal	Captain Robert H.K. Whiteley	Brevet Brigadier General, USA
Baton Rouge Arsenal	Theo. J. Lewis	unknown
Vancouver Depot	Lieutenant William T. Welcker	Resigns commission and joins CSA



Springfield Armory NHS archives, US NPS
2. Portrait James W. Ripley

Department remained slow to order and issue them.

When Ripley became Chief of Ordnance, he used the 'advantages' of bureaucracy to hinder the acquisition and implementation of breech-loaders. However, his opposition cannot be considered whimsical. Breech-loading weapons were technologically more complex and more expensive to produce. Gas leakage and less power compared to the M1855 rifled musket were well-known problems.

In the beginning of the Civil War, Ripley faced the dilemma of quantity and capability. Indeed, there was a shortage of M1855 rifled muskets and the Ordnance Department could not supply enough weapons to match the number of troops called up for service, not to mention a desire to arm them with more sophisticated weapons requiring more time to manufacture. The U.S. Army was not able to supply rifled muskets to all its units until 1863.

At the outbreak of the Civil War, the Ordnance Department possessed a staff of very capable officers and a remarkable service rifled musket. Yet even with these advantages, the exigencies of the Civil War's dimensions, the advent of new technology, and length of conflict would put demands upon the Ordnance Department which were previously inconceivable.

— ENDNOTES —

The U.S. Army Ordnance Department at the Dawn of the Civil War

1. U.S. Department of War, *Annual Report of the Chief of Ordnance to the Secretary of War* (Washington: George W. Bowman, 1860).
2. John Hall's M1819 breech-loading rifle was adopted by the Army, but it never supplanted the M1816 smoothbore musket as the standard weapon.
3. Earl J. Hess, *The Rifled Musket in Civil War Combat: Reality and Myth* (Lawrence: University Press of Kansas, 2008), 25. The Model 1861 rifled musket replaced the Maynard tape primer with a percussion cap system. With this replacement and a few other minor changes with a view on swift production, the M1861 rifled musket is essentially the same as the M1855 musket and became the ubiquitous weapon of the Civil War.
4. Ibid., 27.
5. Carl L. Davis, *Arming the Union: Small Arms in the Civil War* (Port Washington: National University Publications, 1973), 129.
6. Ibid., 118. The only branch which saw any regular use of them was U.S. Army Dragoon units in Florida. However, despite their use of them, the Dragoon units were among the conservative element which opposed their further adoption.
7. Hess, *The Rifled Musket*, 35. Despite an exponential growth of contracts given to private manufacturers, many of them did not meet their contractual deadlines for weapons on a chronic basis. Also, Springfield Armory was struggling to increase production rates to meet the demand for rifled muskets. President Lincoln issued a call for 75,000 volunteers in April 1861. In May, he followed up with a call for 100,000 more volunteers. The Confederacy issued a call for 100,000 volunteers, as well. These numbers vastly exceeded the supply of all types of small arms owned by the government, north or south.
8. U.S. Department of War, *Annual Report of the Chief of Ordnance to the Secretary of War* (Washington: James B. Steedman, 1858.)
9. Ibid. Although the apportionment was outlined, actual delivery amounts within those guidelines varied.
10. Ibid. The annual report did not disclose which state received the howitzers and cannon.
11. U.S. Department of War, *Annual Report of the Chief of Ordnance to the Secretary of War* (Washington: George W. Bowman, 1859).
12. Annual Report of the Chief of Ordnance, 1860.
13. Among the original members were Robert E. Lee, Pierre G.T. Beauregard, William T. Sherman, Franklin Pierce, Zachary Taylor, and Ulysses S. Grant. These six Ordnance officers were Charles Pomeroy Stone, Peter Valentine Hagner, Benjamin Huger, John Bankhead Magruder, Jesse Lee Reno, and Thomas Grimke Rhett. An additional three original members would later participate in Ordnance assignments; Samuel Gibbs French, William Joseph Hardee, and George Washington Rains. Some Ordnance officers did not join the Aztec Club; for instance, Josiah Gorgas served at Vera Cruz and Franklin Callendar served in the Howitzer and Rocket Battery.
14. Based on 1860 Annual Report of Chief of Ordnance.