

The Organizational History
of
FIELD ARTILLERY
1775–2003



Janice E. McKenney

**Field Artillery
1775–2003**



Civil War Flag (nonregulation), with battle honors for Battery B, 1st Regiment of Artillery

ARMY LINEAGE SERIES

The Organizational History
of
Field Artillery
1775–2003

by
Janice E. McKenney

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FOREWORD

The Organizational History of Field Artillery, 1775–2003, traces the evolution of one of the U.S. Army's premier combat arms—field artillery, the King of Battle. For over 230 years, the artillery force has supported Army ground troops during the struggles to preserve and expand the fledgling nation and then during the wars abroad to provide lasting security for both the country and the larger international community. Organized initially into companies supporting infantry battalions and brigades, artillerymen—the Army's Redlegs—eventually manned battalions, regiments, groups, and brigades to support the growing number of combat divisions, corps, and armies with the battlefield fires necessary to ensure tactical victory.

Janice E. McKenney's study is a systematic account of the organization of artillery units, both field and coast (until their separation in the early twentieth century) and then field artillery alone until 2003. Tracing the development of one of the Army's most complex arms, the author highlights the rationale behind each major change in the branch's organization, weapons, and associated equipment, and lays out for all field artillery soldiers the rich heritage and history of their chosen branch. The work also complements the forthcoming revised edition of the lineage volume *Field Artillery*. In sum, today's decision-makers and force planners may find the challenges of providing a seemingly narrowly constrained military institution with the flexibility and responsiveness needed to adapt to an ever-changing and uncertain global environment both inspiring and instructive.

Washington, D.C.
9 May 2006

JEFFREY J. CLARKE
Chief of Military History

PREFACE

The volume published by 1st Lt. William E. Birkhimer on the history of artillery in the United States Army was the standard work on the subject for over one hundred years. In his preface, Birkhimer stated that he had had a desire to learn something of the artillery arm soon after joining the Army in 1870 but that the official record was sparse and, sometimes, glaringly erroneous. Experienced artillery officers could give him little information, and Birkhimer thought it strange that so little attention had been paid to the organization and administration of the arm. While much had been said and written of the military establishment as a whole during the Civil War and while considerable interest had been given to military matters in Congress, he felt that legislation would be useful and enduring if more were known of the history of the Army, especially its combat arms.¹

Lieutenant Birkhimer's history is a valuable contribution to understanding the background of artillery in the United States through the Civil War period, but artillery has changed radically since its publication. This volume, *The Organizational History of Field Artillery, 1775–2003*, addresses the need for a modern work that records the historical structure, strength, disposition, materiel, and technical and tactical doctrine of artillery in the U.S. Army. It complements the lineage volume on Regular Army and Army Reserve field artillery regiments, published in 1985 but currently being updated to include commands, brigades, groups, and regiments in all three components. In the last thirty years, several books on field artillery have appeared, some popular histories and a few scholarly works, but the focus of this volume is on the organizational structure of U.S. Army artillery rather than its weapons or its operations. In the main, the narrative is chronological, with nuclear missiles and rockets covered separately because their history did not follow that of cannon artillery.

The term *artillery* originally referred to all engines of war designed to discharge missiles, such as the catapult, ballista, and trebuchet, among others. Toward the end of the Middle Ages, weapons employing gunpowder superseded such engines of war, and in a more restricted sense, artillery came to mean all firearms not carried and used by hand. By the mid-twentieth century, it included all manner of large guns (as distinguished from small arms), howitzers, rockets, and guided missiles, and also came to be applied to the personnel who transport and service the weapons and to the organization and branch of the Army to which the personnel are assigned.

By contrast, the term *field artillery*, which includes weapons mobile enough to accompany an army in the field, is a more recent innovation. The ancient engines of war, as well as the early cannon of the Middle Ages, were siege weapons or those

¹ William E. Birkhimer, *Historical Sketch of the Organization, Administration, Materiel, and Tactics of the Artillery, United States Army* (Washington, D.C.: James J. Chapman, 1884), p. v.

used to defend fixed positions. This volume deals with both field and position artillery in the United States Army from 1775 to 1901, after which the two concepts were recognized as sufficiently different to warrant division into branches, and with field artillery from the latter date through the 1990s. Position artillery from 1901 and its evolution into anti-aircraft artillery more appropriately belongs in a history of air defense artillery.

Footnotes citing works that are included in the bibliography give the full name of the author; the complete main title (no subtitle) of the book, article, or dissertation or thesis; the publication and/or university data; and the relevant page number(s). Works not listed in the bibliography are cited in full at first mention in each chapter, with subsequent references in the same chapter shortened. Dissertations or theses are identified as such to avoid any confusion with articles. All abbreviations used in the footnotes are explained in the list of abbreviations and acronyms.

Many individuals are deserving of mention for their assistance and support over the years of researching and writing this volume. I would like to thank the late Brig. Gen. James L. Collins, USA (Ret.), who as Chief of Military History and as a former field artillery officer often shared his broad professional knowledge and experience, as well as Stanley Russell Connor, coauthor of the lineage volume *Armor-Cavalry*, who as former Chief, Organizational History Branch, and Supervisory Historian, Historical Services Division, offered excellent improvements for the narrative and provided overall guidance and inspiration for revising the entire series. I also benefited from the perceptive comments and suggestions of many colleagues in the historical community: Dr. Allan R. Millett; Lt. Col. William G. McAninch, USA (Ret.); the late Mary T. Cagle; U.S. Army Field Artillery School personnel, including Dr. Boyd L. Dastrup; the late Billy C. Mossman; Dr. Richard J. Sommers; and Dr. Daniel Beaver. Finally, I am indebted to the Center of Military History review panel—the late Dr. Robert W. Coakley, chairman, who also shared his experiences as a member of a fire direction center during World War II; the late Lt. Gen. David E. Ott, USA (Ret.); Dr. Jay Luvaas; Lt. Col. Charles R. Shrader, USA (Ret.); George L. MacGarrigle; Dr. Graham A. Cosmas; Dr. Norman M. Cary Jr.; and Joanne Fringer. The critiques were helpful and constructive, making it possible for me to improve the manuscript considerably.

Another team of professionals at the Center of Military History, Library of Congress, and National Archives assisted in readying the manuscript for publication—an intense process spearheaded by my editor Joanne M. Brignolo, who demonstrated a remarkable capacity for coming to terms with a complex subject and provided critical input for shaping the final narrative and supporting graphics to achieve overall precision and consistency, and Alisa Robinson who ushered the manuscript through its final production stages. The mutual quest for verification and accuracy of textual details and sources made it necessary to rely on the technical expertise and indispensable assistance of Walter H. Bradford, Miguel Valdez, Edgar F. Raines, Frank R. Shirer, James B. Knight, Patricia A. Ames, Darren R. Jones, Michael P. Musick, and Mitchell Yockelson. I would like to express special appreciation to John A. Paschal for his support in locating many of the illustrations and also to the production designer Gene Snyder for creating a handsome final product.

To all of those involved in the completion of the volume through their knowledge, advice, and encouragement, I am sincerely grateful. But despite their best efforts on my behalf, I alone assume full responsibility not only for the interpretations and conclusions reached but also for any errors that may be found.

Washington, D.C.
31 May 2006

JANICE E. MCKENNEY

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**Field Artillery
1775–2003**

CHAPTER 1

The Beginnings

Before the Revolutionary War, a few of the major towns along the North Atlantic seaboard had organized artillery units for coastal defense, but field artillery was virtually nonexistent. The regiment that fought at Bunker Hill in June 1775 had been organized only some months before the battle and reflected the inexperience of the colonists with military organization and discipline. During the fighting, five of the six artillery pieces were lost, in part because of poor leadership and training. Fortuitous circumstances allowed Henry Knox, the young Bostonian bookseller with noteworthy volunteer service, to take over the artillery in late 1775. That Knox was able to create a cohesive artillery force for the Continental Army, capable of facing one of the best armies in the world, impressed many, including the Marquis de La Fayette. As La Fayette later remarked, “The progress of artillery during the Revolution was regarded by all conversant with the facts as one of the wonders of that interesting period.”¹

Artillery Organization

The colonists used a British precedent—the Royal Regiment of Artillery’s subordinate companies—for organizing their artillery units, and British officers served as instructors for several of them. In 1745, New England volunteers participated in capturing the Louisbourg fortress that the French had built as a strategic base on the eastern side of Isle Royale (now Nova Scotia’s Cape Breton Island), and later some colonial units fought in the French and Indian War.²

In 1775, Massachusetts took the lead in preparing for armed resistance against England, and that colony’s artillery became the nucleus of the Continental artillery. On 23 February, the Massachusetts Committee of Safety distributed field guns to selected militia regiments, and on 13 April of that year, the Massachusetts Provincial

¹ William E. Birkhimer, *Historical Sketch . . . of the Artillery, United States Army* (Washington, D.C.: James J. Chapman, 1884), p. 183.

² *Ibid.*, p. 1; Francis S. Drake, *Life and Correspondence of Henry Knox . . .* (Boston: S. G. Drake, 1873), p. 126; Joseph Johnson, *Traditions and Reminiscences, Chiefly of the American Revolution in the South* (Charleston, S.C.: Walker and James, 1851), pp. 206–09. Of the colonial units, both the Artillery Company of Westerly, Charlestown, and Hopkinton (organized in 1775 in the Rhode Island Militia) and the Artillery Company of Charleston (organized in 1756 in the South Carolina Militia) still survive in the Army National Guard.

Congress authorized the formation of six artillery companies, increased to ten the following month, for the already established Massachusetts Train of Artillery.³ Richard Gridley, who had been appointed chief engineer of the Massachusetts forces in April, was commissioned as a colonel of artillery in May and took command of the ten-company militia regiment. An officer on half pay from the British army, Gridley had commanded the artillery during the siege of Louisbourg in 1745 and had taken part in the second siege in 1758. His regiment in 1775 was part of the army that General George Washington took under his command in July.⁴

Colonel Gridley's regiment was modeled on the British artillery battalion and its companies. Most European regiments contained at least two battalions, but the English regiment (and eventually the American one) contained only one, leading to the synonymous use of the terms *battalion* and *regiment*. Unlike infantry regiments, however, the Royal Regiment of Artillery, organized in 1727, consisted of four battalions of eight companies each at the outbreak of the Revolutionary War. Gridley's regiment was authorized ten artillery companies, along with a regimental staff and a company of artificers to perform maintenance functions. As in the British army, the American artillery regiment was an administrative organization. The basic tactical organization in both armies was the company (*Table 1*).⁵

The enlistments of most of the troops in New England expired at the end of 1775, and a new regiment had to be organized to replace Gridley's. Despite the success of his fortifications at the battle of Bunker Hill, Gridley was sixty-four years old and had been wounded during the fighting. His influence on the artillery regiment's discipline appears to have been poor, and the general consensus was that he should be replaced in some honorable way. On 17 November, Henry Knox, who was only twenty-five years old, was selected as Gridley's replacement, receiving a commission as colonel in the Continental artillery. Knox, the proprietor of a successful bookstore, was widely read, especially in field artillery, and was a member of the militia in Boston; he had also assisted in building the fortifications around Boston as a volunteer civilian engineer. In the meantime, Gridley, who had become the chief engineer of the Continental Army in June

³Peter Force, comp., *American Archives* . . . , 4th ser., 6 vols., and 5th ser., 3 vols. (Washington, D.C.: M. St. Clair and Peter Force, 1837–53), 4/1:1362 and 4/2:759, 790, 801, 807. An artillery train was generally a regiment of artillery; it also referred to heavy guns and other pieces or ordnance belonging to an army in the field.

⁴*Ibid.*, 4/2:1349, 1354, 1433–34, 1436, 1440; Francis B. Heitman, *Historical Register of Officers of the Continental Army* . . . , rev. ed. (Washington, D.C.: Rare Book Publishing Co., 1914), pp. 24, 262; Allen French, *The First Year of the American Revolution* (1934; reprint, New York: Octagon Books, 1968), pp. 73, 751–52.

⁵Birkhimer, *Historical Sketch*, pp. 331–32; Force, *American Archives*, 4/2:759; Francis Duncan, comp., *History of the Royal Regiment of Artillery*, 3d ed., 2 vols. (London: J. Murray, 1879), 1:436–37; Edward E. Curtis, *The Organization of the British Army in the American Revolution* (New Haven, Conn.: Yale University Press, 1926), pp. 2, 6; Robert K. Wright, *The Continental Army* (Washington, D.C.: Center of Military History, United States Army, 1983), p. 14. An artificer was a military mechanic or skilled craftsman, in this case one who primarily maintained the weapons.

Table 1—Artillery Organization, 1775–1780

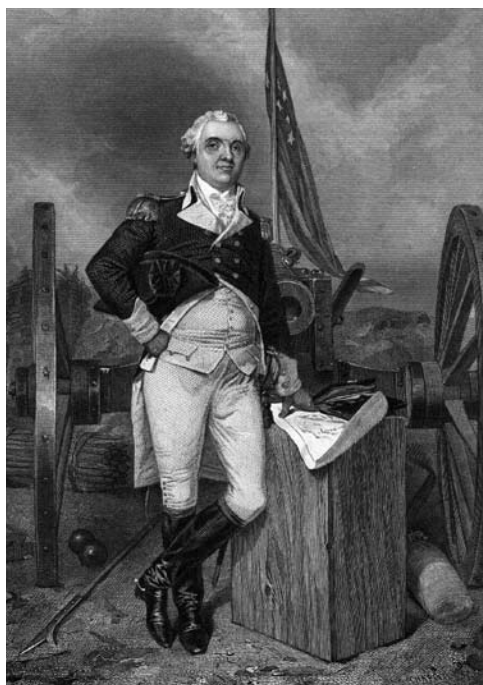
	<i>1775 Bn Royal Arty</i>	<i>1775 Gridley^a</i>	<i>1776 Knox^a</i>	<i>1777 Harrison</i>	<i>1777 Lamb</i>	<i>1777 Crane</i>	<i>1777 Proctor</i>	<i>1778</i>	<i>1780</i>
<i>Command and Staff</i>									
Colonel	1	1	1	1	1	1	1	1	1
Lt Colonel	1	1	2	1	1	1	1	1	1
Major	1	2	2	1	1	1	1	1	1
Adjutant		1	1	1	1	1	1	1 ^b	1 ^b
Quartermaster		1	1	1	1	1	1	1 ^b	1 ^b
Paymaster				1	1	1	1	1 ^b	1 ^b
Surgeon		1	1	1	1	1	1	1	1
Surgeon's Mate		2	1	1	1	1	1	1	1
Chaplain			1						
Cadet		2							
Conductor ^c		4							
Storekeeper		1							
Clerk		2							
Sgt Major				1	1	1	1	1	1
QM Sergeant				1	1	1	1	1	1
Drum Major			1	1	1	1	1	1	1
Musicians							12		
Fife Major			1	1	1	1	1	1	1
Total	3	18	12	12	12	12	24	12	12
<i>Company</i>									
Captain	1	1	1	1	1	1	1	1	1
Capt Lt	1	1	1	1	1	1		1	1
1st Lt	2	1	1	1	1	1	1	1	1
2d Lt	2	2 ^c	2	1	3	3	1	3	3
Lt Fireworker							1		
Sergeant	4	4	4	1	6	6	4	6	6
Corporal	4	4	4	4	6	6	4	6	6
Bombardier	9	6	8	4	6	6		6	6
Gunner	18	6	8	8	6	6		6	6
Drummer	2		1		1	1	1	1	1
Fifer			1		1	1	1	1	1
Matross	73	32	32	48	28	28	60	28	39
Total	116	57	63	69	60	60	74	60	71
Companies in									
Bn or Regt	8	10	12	10	12	12	8	12	10
GRAND TOTAL	931	588 ^d	768	702	732	732	616	729	719

^aThe exact composition of Gridley's regiment in 1775 and Knox's in 1776 is unclear. For example, on 3 May 1775, ten companies of fifty men each were authorized, plus five officers, six bombardiers, six gunners, three sergeants, three corporals, and thirty-two matrosses. Documents dated 12 May 1775 show the same organization except that the number of sergeants and corporals was not specified. On 19 May, the ten companies were established, each with five officers, four sergeants, four corporals, a fifer and a drummer, and thirty-two matrosses. The returns of 26 June 1775 show five officers in each company, but widely varying numbers of enlisted men (with no breakdowns). See Force, Massachusetts Revolutionary Military Affairs, nos. 42, 78, 84, 276, Ms Div, LC.

^bDuties performed by a company officer as an additional assignment.

^cAlso fireworkers.

^dThe artificer company is not included.



Major General Henry Knox
by Alonzo Chappel

1775, continued to serve as an engineer until 1 January 1781.⁶

After Gridley's organization was mustered out, the new regiment was formed primarily with discharged soldiers who reenlisted; it also included a company of Rhode Island artillery that had served with Gridley at Boston under the command of Maj. John Crane. The Continental Congress formally prescribed the composition of the new organization on 2 December 1775. Two additional artillery companies were authorized, bringing the total number in the regiment up to twelve. The regiment formally entered service on 1 January 1776 for one year.⁷

Although the regiment was authorized a personnel strength of over 700 and although it was augmented with two New York companies, led respectively by Capt. Alexander Hamilton and Capt. Sebastian Bauman, detachments from the main body kept the usual number of officers and men well below 600. For most of 1776, Colonel Knox had only

ten companies directly under his control, two being detached for service in the north.⁸ In June, Knox reported that he had 250 men fit for duty and that he would require 600 more if General Washington "should think it proper that all the artillery should be manned at the same time."⁹ In July, he recommended the creation of another artillery

⁶ George Washington, *The Writings of George Washington . . . , 1745–1799*, 39 vols. (Washington, D.C.: U.S. Government Printing Office, 1931–44), 4:74, 158; Force, *American Archives*, 4/2:1079, 1477–78, 1705, 3:1921, 4:217, 263; Drake, *Life of Henry Knox*, pp. 17, 21; Christopher Ward, *The War of the Revolution*, 2 vols. (New York: Macmillan, 1952), 1:123; Noah Brooks, *Henry Knox* (New York: G. P. Putnam's Sons, 1900), p. 19; North Callahan, *Henry Knox* (New York: Rinehart, 1958), pp. 19, 34; Jared Sparks, ed., *Correspondence of the American Revolution . . .*, 4 vols. (Boston: Little, Brown, and Co., 1853), 1:91; Massachusetts Orderly Book of Adjutant [Jeremiah] Niles, Headquarters, Cambridge, 1775, pp. 37, 54–55, Ms Div, LC.

⁷ Worthington Chauncey Ford et al., eds. *Journals of the Continental Congress, 1774–1789*, 34 vols. (Washington, D.C.: U.S. Government Printing Office, 1904–37), 3:399; George Washington, *The Writings of George Washington . . .*, 12 vols. (Boston: American Stationers' Co., John B. Russell, 1834–37), 3:148; Massachusetts Orderly Book, 1775, p. 57, and *ibid.*, Nov '75 to Jan'y 1776, p. 8, Ms Div, LC.

⁸ Roll 116, Jacket 19–1, Microfilm 246, Revolutionary War Rolls, Continental Troops, 1775–1783, RG 93, NARA; Force, *American Archives*, 4/6:893, 1121.

⁹ Force, *American Archives*, 4/6:920–21 (quotation) and 5/1:502; Drake, *Life of Henry Knox*, p. 121.

regiment, utilizing three independent militia companies, Captain Bauman's attached company, and eight companies drawn from men drafted from the infantry. Because of preoccupation with campaigning, however, his recommendation went unfulfilled.¹⁰

With enlistments due to expire at the end of 1776, preparation for reorganizing the army began in the early fall of that year. Washington wished to increase the strength of the Continental Army, and his generals agreed. Knox had asserted that five artillery regiments were necessary to support the full army, and Washington forwarded his plan to Congress, adding his own view that three regiments were sufficient to support both his main forces and those in the northern colonies. Washington also recommended that Knox be promoted to brigadier general. Congress authorized the three regiments Washington recommended and promoted Knox, designating him as Chief of Artillery.¹¹

Washington, on his own authority, had already ordered Knox to begin recruiting three regiments to support the main army. The structure of these regiments was similar to the regiment of the previous year, although one change included regrouping the enlisted men in each company to provide crews for as many as six guns, an increase of two field pieces. The new organizations, however, unlike Knox's original regiment, were designed to last, with the men enlisting for three years or for the duration of the war.

The first of the three units was Col. John Crane's artillery regiment, which was almost a continuation of the Gridley-Knox organization. Crane had commanded the Rhode Island company that had served with Gridley, and he had been a major with Knox in 1776. In 1777 Crane, as Knox before him, had fewer companies under his control than authorized, for three of the twelve authorized companies had been formed into a separate corps under Maj. Ebenezer Stevens for service in the



The Noble Train of Artillery
by Tom Lovell, depicting Knox and his men
bringing artillery from Fort Ticonderoga
to Cambridge

¹⁰Force, *American Archives*, 5/1:502; Washington, *Writings of Washington, 1745–1799*, 5:134–35, 318, 322–24; Ford et al., eds., *Journals of the Continental Congress*, 5:607.

¹¹Washington, *Writings of Washington, 1745–1799*, 6:266, 279–82, 401; Ford et al., eds., *Journals of the Continental Congress*, 6:1043; Wright, *Continental Army*, pp. 98, 101–03; Knox Plan, [18 Dec 1776], encl to Ltr, Washington to Continental Congress, [20 Dec 1776], George Washington Papers, Microfilm Roll 39, Ms Div, LC. The plan is also reproduced in George Washington, *The Papers of George Washington, Revolutionary War Series Vol. 7, October 1776–January 1777*, ed. Philander D. Chase (Charlottesville: University Press of Virginia, 1997), pp. 386–87.

north. Stevens's corps operated as a separate unit for almost twenty months before it was incorporated into Crane's regiment in the fall of 1778.¹² After a reorganization that same year, recruits came from the states at large, but throughout the war, Massachusetts provided most of the regiment's experienced officers and men.

Col. John Lamb, who had led his independent New York company to Canada during the first year of the war, commanded the second artillery regiment. Lamb had been wounded and captured during the assault on Quebec in December 1775. Although Congress appointed him major of artillery in the Northern Department the following month, he did not return to duty until an exchange of prisoners took place a year later. Upon his exchange, Lamb became colonel of the new artillery regiment and appointed members of his old New York company and officers from Hamilton's and Bauman's companies to key positions in the organization, which also included companies from Connecticut, New Jersey, and Pennsylvania.¹³

Because of various political and economic constraints, the third regiment desired by Washington was never organized, and in 1777, he adopted an artillery battalion from Pennsylvania commanded by Col. Thomas Proctor. Proctor had originally commanded an independent artillery company in Philadelphia and later a two-company battalion from Pennsylvania. This battalion provided the colonel, lieutenant colonel, major, and four captains to the eight-company battalion the state authorized on 6 February 1777.¹⁴

Two other artillery regiments supported the forces in the south. In November 1776, Congress had authorized an artillery regiment in Virginia under the command of Col. Charles Harrison. Harrison formed the regiment around a nucleus of two Virginia artillery companies and recruited from that state and Maryland.¹⁵ The 4th South Carolina Regiment, which had been organized in 1775 from Charleston's militia artillery, manned fortifications in that beleaguered city. The South Carolina regiment served only in defense of Charleston and fell with the city to the British in 1780. It was never considered to be a Continental Army artillery regiment like Crane's, Lamb's, Harrison's, and Proctor's.¹⁶ Individual states raised other artillery units. Although some received Continental pay, they were not expected to move beyond their immediate state boundaries, and Knox never exercised any control over them.

The four Continental regiments were at first designated by the names of their colonels, but in August 1779, they received numerical designations based on the

¹² Ford et al., eds., *Journals of the Continental Congress*, 10:150; Birkhimer, *Historical Sketch*, pp. 336–40.

¹³ Isaac Q. Leake, *Memoir of the Life and Times of General John Lamb . . .* (1857; reprint, Glendale, N.Y.: Benchmark Publishing Co., 1970), pp. 149–50; Sparks, ed., *Correspondence*, 1:157; Washington, *Writings of Washington, 1745–1799*, 10:279; Roll 103, Item 29688 (“Present State of the Corps of Continental Artillery, With Proposals for Augmentation, 2 January 1778”), Microfilm 859, Miscellaneous Numbered Records (The Manuscript File), Revolutionary War Records, 1775–1790s, RG 93, NARA.

¹⁴ Force, *American Archives*, 5/1:1293, 1317; Washington, *Writings of Washington, 1745–1799*, 8:414–15; Birkhimer, *Historical Sketch*, p. 345; Wright, *Continental Army*, p. 102.

¹⁵ Roll 116, Jacket 20–1, Microfilm 246, Revolutionary War Rolls, Continental Troops, 1775–1783, RG 93, NARA; Ford et al., eds., *Journals of the Continental Congress*, 4:212, 365 and 6:981.

¹⁶ Wright, *Continental Army*, pp. 72–73.

relative seniority of their commanders. In October 1780, Congress assigned each regiment to the quota of regiments maintained by the states, each of which, to some extent, furnished its troops with food and clothing. Harrison's Virginia regiment became the 1st; Lamb's New York regiment, the 2d; Crane's Massachusetts regiment, the 3d; and Proctor's Pennsylvania battalion, the 4th.¹⁷

Of these four Continental artillery regiments, only two were organized in the same manner. The Continental Congress authorized Harrison's regiment ten companies, Lamb's and Crane's twelve companies each, and Proctor's eight. Washington prepared on 8 January 1778 to bring all four to the standard of Lamb's and Crane's to promote uniformity and to provide much needed artillery forces. Congress then authorized each of the four regiments twelve companies. Two Maryland companies were assigned to Harrison's regiment to bring it up to twelve, but Proctor's regiment remained with only eight.¹⁸ The Continental Congress made another attempt to standardize the four regiments by the acts of 3 and 21 October 1780, establishing the number of companies in each regiment at ten and increasing the strength of each company by the addition of eleven *matrosses*—the term used for artillery privates who assisted in loading, firing, and sponging cannon and in manning dragropes. Two companies were reassigned from Lamb's regiment to Proctor's, while the remaining reductions were made through attrition.¹⁹

Artillery regiments in the Revolutionary War were administrative organizations. When first organized, each regiment controlled its own promotions, and a litany of complaints surfaced when those of less experience were promoted in one regiment before others in other regiments. Eventually, the four Continental regiments came to be considered a brigade under Henry Knox. Field-grade officers, originally promoted within their own regiments, were later promoted within the brigade at large, whereas company officers continued receiving their promotions within their respective regiments.²⁰

The standard crew for a 6-pounder field gun or 5.5-inch howitzer during the Revolutionary War numbered fifteen men. In 1777, Washington declared that twelve men per piece were sufficient.²¹ In practice, the size of the crew depended upon the

¹⁷ Ford et al., eds., *Journals of the Continental Congress*, 28:893–94; Washington, *Writings of Washington, 1745–1799*, 20:157–64.

¹⁸ Ford et al., eds., *Journals of the Continental Congress*, 11:540; Washington, *Writings of Washington, 1745–1799*, 10:279; Roll 103, Item 29688 (“Present State of the Corps of Continental Artillery . . .”), Microfilm 859, Miscellaneous Numbered Records (The Manuscript File), Revolutionary War Records, 1775–1790s, RG 93, NARA.

¹⁹ Washington, *Writings of Washington, 1745–1799*, 20:157–64, 177–280; Ford et al., eds., *Journals of the Continental Congress*, 28:893–94, 960.

²⁰ Precise information concerning the brigade as a legal entity is lacking. Available sources, however, imply that it was considered as such. See “Ledger of Military Stores, 1780–1783,” Entry 36, RG 93, NARA; Washington, *Writings of Washington, 1745–1799*, 26:35–36; Birkhimer, *Historical Sketch*, p. 15.

²¹ Washington, *Writings of Washington, 1745–1799*, 8:456. According to Harold L. Peterson, *Round Shot and Rammers* (Harrisburg, Pa.: Stackpole Books, 1969), p. 66, the ideal number of men for the 6-pounder gun crew was fifteen, while Birkhimer, *Historical Sketch*, p. 312, gives seventeen. In William Stevens, *A System for the Discipline of the Artillery . . .* (New York: William A. Davis, 1797), p. 48, eight men served as the standard crew for the favored 4-pounder gun.

size and type of the artillery piece as well as the number of men available. Gunners were supposed to be versed well enough in mathematics to calculate distances and elevations. They also rammed, aimed, and sponged the cannon. Bombardiers, artillerymen employed with mortars and howitzers, tended the vents at the top of breeches; handled the final assembly of ammunition; and placed the ammunition in the muzzles for the gunners to fire. Loading and firing were slow, as the barrel had to be swabbed after each round to prevent any residue of burning gunpowder from exploding prematurely. Matrosses, besides managing the dragropes, passed ammunition. A commissioned officer, a sergeant, and a corporal normally supervised each piece.²²

Artillery Weapons

The Continental Army used a variety of muzzleloading smoothbore artillery pieces during the Revolutionary War, but their number and types were not uniform among the regiments. Classified as guns, mortars, and howitzers, cannon were made of either bronze or cast iron. Most cannon in American service during the Revolutionary War were made of bronze, with the exception of the largest—the 32-pounder gun. Bronze was more resistant to corrosion and metal fatigue. The only limitation was the short supply of the constituent elements of copper and nickel, foreign metals that had to be imported into America. Bronze cannon were lighter than iron, which made them more maneuverable in the field. For siege weapons or for those in permanent fortifications, where weight was not an issue, cast iron was more often used.²³

The artillery pieces were carried on carriages, consisting of a framework of timbers bolted together, built after English models. A small quantity of ammunition was kept in side boxes on the carriage, but most of it was carried in tumbrels, carts, or wagons.²⁴ Civilians served as drivers for the artillery teams of horses or oxen, either under contract for a period of time or hired for temporary service. Horses were sometimes purchased for the artillery and sometimes were impressed into service.²⁵

Guns, which fired with low and relatively flat trajectories, were designated by the weight of solid shot they fired, for example, a 4-pounder. Solid shot was favored for use against cavalry, troops in column, and flanked infantry lines, but not recommended for use at very long ranges unless the ground was suitable for ricochet fire and the enemy was densely massed. Accuracy tended to decrease with range, and identifying targets beyond 1,000 to 1,200 yards was difficult.²⁶

²² Ralph Willett Adye, *The Bombardier and Pocket Gunner*, 1st American ed. (Boston: Printed for E. Larkin by William Greenough, 1804), pp. 100–103; Stevens, *System for the Artillery*, pp. 45–56.

²³ Birkhimer, *Historical Sketch*, pp. 257–59; Jac Weller, “The Artillery of the American Revolution,” pt. 1, *Military Collector and Historian* 8 (Fall 1956): 62; Albert Manucy, *Artillery Through the Ages* (Washington, D.C.: U.S. Government Printing Office, 1949), pp. 38, 44–46; Peterson, *Round Shot*, p. 72.

²⁴ Weller, “Artillery,” pt. 1, pp. 100–101.

²⁵ Birkhimer, *Historical Sketch*, p. 228; Peterson, *Round Shot*, p. 66; Manucy, *Artillery*, p. 10.

²⁶ Weller, “Artillery,” pt. 1, pp. 62, 64; Manucy, *Artillery*, pp. 31, 32, 63.

Mortars, short and squat in appearance, fired explosive shells with high-curved trajectories from fixed positions. Because shells of the same diameter could be of various weights, mortars were designated by the diameters of their bores. One advantage shells had over solid shot was that their noise and flash unnerved both men and horses. Shells were used primarily on field fortifications and large targets, such as enemy artillery emplacements.²⁷

Howitzers, introduced in the seventeenth century, shared some characteristics of both the gun and mortar. Lighter than guns in proportion to their projectiles, howitzers used smaller charges but fired projectiles larger than those shot by field guns of similar weight. Like mortars, they were designated by the diameter of their bores, for those of the period were not designed to fire solid shot. Although both were designed for catapulting explosive shells behind enemy fortifications, howitzers were more mobile. Unlike mortars, they could also fire grapeshot and canister directly against enemy soldiers.²⁸

The Continental Army depended primarily upon old British artillery pieces, either imported during the colonial period or captured during the first two years of the war. Some iron guns were manufactured domestically, but most of these were heavy pieces limited to fortifications. Most of the cannon used in the field were 3- and 6-pounder guns and 5.5-inch howitzers, although artillerists sometimes employed larger weapons. Congress established a foundry at Philadelphia, and General Washington relied upon its production and foreign imports to provide lighter cannon. The imported weapons came primarily from France, with the 4-pounder, originally produced in Sweden, being the most widely regarded because it combined both power and mobility better than other field guns. For mounting these weapons and for casting their own cannon, the Continental Army adopted as a handbook the work *A Treatise of Artillery* by John Müller of the Royal Academy of Artillery. Published in London in 1757, the book had greatly influenced the British artillery system and, in turn, the American artillery. The treatise was reprinted in Philadelphia in 1779 and dedicated to George Washington, Henry Knox, and the officers of the Continental artillery.²⁹

Artillery Employment

During the eighteenth century armies used linear tactics, whereby two or three ranks of infantry soldiers in long lines could cover a wide front with continuous fire within ranges of 50 to 100 yards. Mass fire could then compensate for the inherent deficiencies in the infantry muskets of the period.³⁰ The maximum range of

²⁷ Manucy, *Artillery*, pp. 31, 32, 58; Peterson, *Round Shot*, p. 33; Weller, "Artillery," pt. 1, p. 64.

²⁸ Peterson, *Round Shot*, p. 36; Weller, "Artillery," pt. 1, pp. 62, 64; Manucy, *Artillery*, pp. 31, 32, 56. Grapeshot, or grape, was a group of iron balls clustered around a central wooden spindle or disc held together by a canvas cover and lashings. Canister, or case shot, was a metal cylinder containing metal fragments that were scattered when the cylinder broke, causing injury or death to enemy personnel.

²⁹ Wright, *Continental Army*, pp. 104–05, 150.

³⁰ B[asil] P. Hughes, *Open Fire* (Chichester, Sussex, England: Antony Bird Publications, 1983), pp. 7–10; idem, *Firepower* (1974; reprint, New York: Sarpedon, 1997), pp. 26–28.

field artillery cannon, depending upon size, was from 1,200 to over 2,000 yards; however, with untrained soldiers and imperfect weapons, the effective range was actually about 400 yards.³¹ Gun batteries were distributed along the lines of the defense at points where their objectives were clearly visible. Gunners aligned their targets visually, using designated marks on the cannon; gun sights were rare. Because of the limitations of direct fire (where the gunner could see the target) and means of communication and the necessity of relaying the piece after each firing due to recoil, guns and their detachments were more often decentralized rather than grouped together for mass fire. Cannon, often employed in pairs, were normally placed on the flanks to maximize enfilade fire, enabling them to sweep across the line of opposing infantry or cavalry.³²

Commanders used field cannon to protect an army's deployment and to prepare for the advance of troops by firing on enemy formations. During the battle artillery aimed at the advancing infantry or cavalry; artillery was not very productive at knocking out enemy guns. Firing from the flanks of the infantry, the artillery could produce a cross fire over their front until the infantry was within 100 yards of the objective. By then the enemy would be within small-arms range. Although the artillery could not fire without hitting their own troops, they could guard the flanks and intervene with firepower given the opportunity.³³

Cognizant of prevailing European practice, Washington at the beginning of the war recommended that Congress authorize the procurement of enough field guns to supply two for each infantry battalion. King Gustavus Adolphus of Sweden (1594–1632) usually dispersed two light guns to each infantry regiment, and such decentralized employment at the regimental or battalion level continued in Europe from the Thirty Years War through the French Revolution. By 1775, however, given serious shortages in personnel and weapons, Congress adopted a plan to attach a detachment of artillery with two or three field pieces to each infantry brigade. In this situation, tactical control over the artillery fell to the local commander, and only administrative control remained with the parent artillery regimental commander.³⁴

Any cannon not being used by detachments attached to infantry brigades or those in garrison furnished general support as part of the artillery park. A park attached to an army in the field was supposed to have twice as many pieces as the army had infantry battalions. Knox's estimate in 1778 was for the artillery park to have two heavy 24-pounders, four medium 12-pounders, four large 8-inch and eight smaller 5.5-inch howitzers, ten 6-pounders, and ten 3- or 4-pounders. An unmanned reserve of about thirty-five field pieces was also authorized. While each artillery detachment

³¹ Weller, "Artillery," pt. 1, p. 62.

³² Hughes, *Open Fire*, pp. 11–13; idem, *Firepower*, p. 33. Enfilade fire is gunfire directed from either flank along the line of troops.

³³ Hughes, *Firepower*, p. 106; idem, *Open Fire*, p. 20; Birkhimer, *Historical Sketch*, p. 10; Weller, "Artillery," pt. 1, p. 97; Adye, *Bombardier*, pp. 21–27.

³⁴ Washington, *Writings of Washington, 1745–1799*, 5:37–38 and 406–07, 7:234–35, 8:70–71, 15:187, 28:59; Force, *American Archives*, 5/3:1590; Matti Laurema, *L'Artillerie de campagne française pendant les Guerres de la révolution* (Helsinki, 1956), pp. 39, 65.

supported its battalion or brigade, the artillery park supported the army as a whole and retained a reserve consisting of about one-sixth of the park.³⁵

Few Continental Army officers had a clear understanding of the proper role of artillery, and Knox struggled throughout the war to create a unified system of organization and employment. He and a few others had gained some experience prior to the war in the Massachusetts Train of Artillery, which had drilled under British instructors with both siege and field pieces. Members of the few units organized in the larger coastal cities had also received some training, but otherwise the officers and men had little practical experience. One of Knox's greatest contributions was his insistence on the highest standards for his artillery officers. To attain this goal, he suggested in a letter to a congressional committee on 27 September 1776 the establishment of artillery schools. Although not enacted during the war, Congress on 13 February 1779 authorized that the commander of artillery should send artillery officers to visit laboratories, foundries, and factories with the intent of learning about the mechanical aspects of their profession. In addition, while stationed with the artillery park, the men received training, a situation that was reinforced each winter when all artillery commanders that could be spared were relieved from the brigades and concentrated in the park for schooling.³⁶

Despite the difficulties in organizing a new technical arm, the Continental artillery served well during the Revolutionary War. The brisk fire of the artillery at Trenton in December 1776 cleared the streets of Hessian troops attempting to form and accounted for the quick decisive outcome of the battle.³⁷ The artillery arm also distinguished itself at Monmouth on 28 June 1778. The two-gun detachments usually attached to the infantry brigades were borrowed for mass fire and afterwards returned to their own units. After the battle, Washington expressed his approval: "It is with peculiar pleasure . . . that the Commander-in-Chief can inform General Knox and the other officers of the Artillery that the enemy have done them the justice to acknowledge that no artillery could be better served than ours."³⁸

The service of the Continental artillery was distinguished in the northern campaigns, but the nature of the fighting in the south limited the effectiveness of field artillery. Operations in the southern campaigns were conducted over greater distances and over roads that made movement of even light artillery extremely difficult.

³⁵ Adye, *Bombardier*, pp. 8–9; Stevens, *System for the Artillery*, pp. 147–50; Peterson, *Round Shot*, p. 57. An artillery park was a place to encamp army artillery, equipment, and ammunition, as well as the unit for its defense.

³⁶ Birkhimer, *Historical Sketch*, pp. 112–13, 120–21; Don Higginbotham, *The War of American Independence* (New York: Macmillan, 1971), p. 93.

³⁷ Ward, *War of the Revolution*, 1:291–305; William S. Stryker, *The Battles of Trenton and Princeton* (Boston: Houghton, Mifflin and Co., 1898), pp. 145, 151–52, 155–78, 356–58; Jac Weller, "Guns of Destiny," *Military Affairs* 20 (Spring 1956): 1–15; "Battle of Trenton, December 26, 1776," *Freeman's Journal*, 21 January 1777, reprinted in Frank Moore, ed., *Diary of the American Revolution From Newspapers and Original Documents*, 2 vols. (New York: Charles Scribner, 1858), 1:364–66.

³⁸ Washington, *Writings of Washington, 1745–1799*, 12:131 (quotation); William S. Stryker, *The Battle of Monmouth* (Princeton: Princeton University Press, 1927), pp. 193, 200–201, 212–14, 234, 278.



Merry Christmas 1776 by Charles McBarron, depicting Continental artillerymen firing during the battle of Trenton

The artillery experienced its greatest success in the south during the battle of Yorktown in 1781. There the French and Americans conducted the siege in accordance with accepted siege warfare techniques handed down during the previous century by military engineer and fortification/siege-craft master Sébastien Le Prestre de Vauban (1633–1707). Vauban had conducted numerous sieges, forty of which he directed without a single failure. No innovator, he improved on and modified existing ideas with such consummate skill that his system continued practically unchanged into the nineteenth century. His most important work was in the attack of fortified positions, which he reduced to a scientific method. The whole problem of siege craft centered around artillery. The besiegers had to bring up enough cannon to overpower those of the defense and breach the walls while protecting themselves and their weapons.³⁹

Vauban's methods introduced order into the previously chaotic methods used in sieges. Although the effective range of artillery was 600 to 700 yards, it had been customary to establish batteries at 1,000 yards from the objective. But at that range cannon made little more than noise. Vauban's first object was to establish batteries within cannon range of the attacked fortification for enfilading fire. After

³⁹ John W. Wright, "Notes on the Siege of Yorktown in 1781 . . .," *William and Mary Quarterly Historical Magazine*, 2d ser. 12 (October 1932): 229–49.

the defender's artillery had been subdued, if not silenced, it was necessary to push the trenches forward so that the guns might be moved into breaching positions. For this purpose, Vauban devised parallels, first used in 1673 at the siege of Maastricht in the Netherlands. Parallels were simply trenches dug parallel to the line of the defense and connected by approach trenches, or saps, dug in a zigzag pattern. The effect was to provide successive protective positions for cannon and assault troops. The first parallel, a trench 12 to 15 feet wide and nearly 3 feet deep, was dug within cannon range of the objective, while the excavated earth was thrown forward to make a parapet 3 to 4 feet high. The batteries of the first artillery position were placed in front of the parallel behind the excavated earth. While these batteries were engaged in silencing enemy artillery, saps were dug further forward. Another parallel with connecting saps was dug, and then another, until the guns and troops were in breaching positions. Sieges became highly formalized, and the success of such tactics reinforced the trend toward limited warfare.⁴⁰

At Yorktown, the artillery of the French army comprised twenty large guns and sixteen howitzers and mortars for siege use, as well as thirty-two large guns and four howitzers for field use. By comparison, the American train of artillery had French cannon and some cast in the colonies, but most were guns with which the British had armed the colonies or that the rebels had captured. The American artillery included twenty-three large guns, twelve light guns, and twenty-one mortars and howitzers. From casualties and hard service, the artillery was below strength, even though every effort had been made to muster the number of men authorized by the reorganization of 1780.

The Americans, directed by General Knox and Brig. Gen. Louis Duportail, a French engineer, began constructing parallel entrenchments on 6 October 1781 to secure the peninsula, and three days later, they opened fire with tradition crediting Washington as touching off the first American piece. After over a week of constant firing by the American forces and their allies, the battle ended on 17 October. In the following month, Knox was promoted to major general.⁴¹

Artillery forces, along with the rest of the Continental Army, gradually disbanded after the battle of Yorktown. The 1st and 4th Artillery Regiments remained in the south, where they ceased to exist as organized units by the end of 1783. The 2d and 3d Artillery Regiments, which remained in the West Point area, were slightly more active. In April 1783, the two regiments reported a total of 862 artillerymen.

⁴⁰ Ibid.; John Keegan, *A History of Warfare* (New York: Alfred A. Knopf, 1993), pp. 326–27; T. Harry Williams, *The History of American Wars From 1745 to 1918* (New York: Alfred A. Knopf, 1981), pp. 6–7.

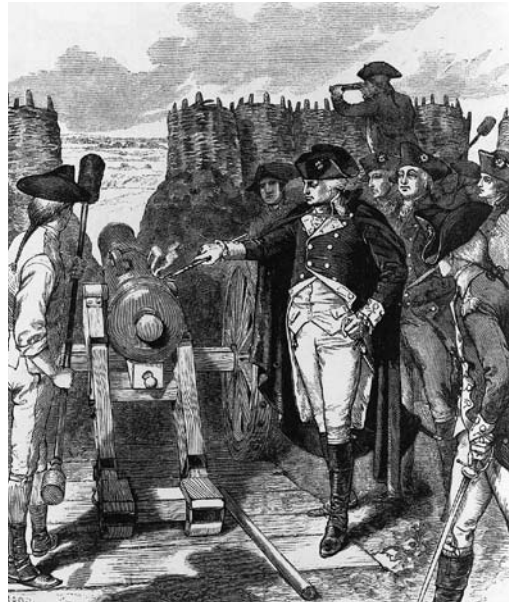
⁴¹ Information on the battle of Yorktown is compiled from George Washington, *The Diaries of George Washington, 1748–1799*, 4 vols. (Boston: Houghton, Mifflin and Co., 1925), 2:263–69; Ltr, Henry Knox to John Jay, in Drake, *Life of Henry Knox*, pp. 70–72; and Henry P. Johnston, *The Yorktown Campaign and the Surrender of Cornwallis, 1781* (1811; reprint, New York: Da Capo Press, 1971), pp. 105–09, 113, 119, 125, 130–50. According to Wright, “Siege of Yorktown,” p. 249, the battle concluded without an American attack advancing beyond the stage of constructing the second parallel and its batteries.

By July, only five artillery companies remained, two from the 2d and three from the 3d.⁴²

On 24 September 1783, Congress authorized Washington “to discharge such parts of the Federal Army that remained in service as he deemed proper and expedient.”⁴³ Washington informed the president of Congress on 21 December that he had directed Knox to reduce the size of the army to one infantry battalion, consisting of 500 men and about 100 artillerymen.⁴⁴ On 3 January 1784, Knox reported to the president of Congress that he had retained “one regiment of infantry . . . and a corps of artillery under the command of . . . [Maj. Sebastian] Bauman of about one hundred and twenty” (actually a total of 12 officers and 126 enlisted men remained in the artillery).⁴⁵

This action marked the first instance of what was to become a familiar occurrence at the end of every major war undertaken by the United States until the mid-twentieth century—the reduction of troops to the barest minimum when there was no longer the immediate danger of war.

While artillery units in the Continental Army were rarely manned to full strength and while the cannon were seldom uniform, they performed reasonably well. The organizational structure proved sound. The assignment of an artillery company to each infantry brigade increased cooperation among the arms, and the massing of artillery in battles such as Monmouth demonstrated the potential of artillery firepower. This potential was neglected, however, for over fifty years as the country struggled to organize itself into a new nation and protect its borders from attack.



General Washington Firing the First Gun at the British Works by *H. A. Ogden*

⁴² Charles H. Lesser, ed., *The Sinews of Independence* (Chicago: University of Chicago Press, 1976), pp. 250–51, 254–55; Washington, *Writings of Washington, 1745–1799*, 27:32–35.

⁴³ Ford et al., eds., *Journals of the Continental Congress*, 25:606.

⁴⁴ Washington, *Writings of Washington, 1745–1799*, 27:256, 279–80; Ford et al., eds., *Journals of the Continental Congress*, 25:807. Knox was to be in command of the peacetime army after Washington stepped down in November 1783.

⁴⁵ Roll 45, Item 38 (Ltr, Henry Knox to George Washington, 3 Jan 1784), Microfilm 247, Papers of the Continental Congress, pp. 375–95 (quoted words, p. 375), RG 360, NARA.