A Compendium Of Information Pertaining To The Composition And Operation Of Civil War Mounted Artillery Batteries

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This work was originally just a collection of notes I had made from various sources for my own purposes. After several requests were made to see my notes I decided to organize them and clean up the wording and abbreviations and that has led to creating this document. As it isn't an academic work or intended for publication I've not included footnotes. That would be more work than I wish to do so the reader will just have to trust that if something is stated as a fact or statistics are provided that the source for these can be found in one or more of the references provided in the bibliography.

I've also not included illustrations as that would require permissions and also be more work than I wish to do as well as making the piece longer than it needs to be. Several very useful web sites are noted in the bibliography. And there is a wealth of images and videos easily accessible on the internet.

My hope is that this work will be a useful guide and reference for someone with some knowledge of the American Civil War and an interest in field artillery used in that conflict. While my goal was to condense a lot of material into a relatively small space this work is not intended to be encyclopedic and some assumptions are made regarding what the reader is likely to already know.

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Some Terms

Cannon: a smooth-bore piece of artillery.

Howitzer: a shorter-barreled cannon with a more curved trajectory, similar to that of a mortar. Howitzers were most commonly used at close ranges to place case and shell (see Ammunition) behind fortifications or other physical barriers but could also fire canister and solid shot.

Rifle: a piece of artillery with a rifled barrel. Rifled guns had greater range and accuracy than smooth-bore guns. However, rifles fired smaller projectiles and could not deliver as large a load of canister as the smooth-bores. Thus, they were best employed in longer range, offensive firing.

Gun: a general term for a piece of artillery (i.e. cannons or rifles) other than howitzers or mortars.

Battery: a group of guns commanded as a single unit. For field artillery batteries these were composed of four or six guns and their associated crews and equipment. At the beginning of the war a battery would have had a mix of cannons and howitzers. Before long, though, howitzers were generally abandoned by the Union and replaced with Napoleons (see Common Guns). Union batteries were also most commonly equipped with either rifles or cannons but not both (although some mixed batteries did exist). The Confederacy, however, continued to employ a mix of cannons, rifles, and howitzers throughout the war.

Carriage: the wheeled, mostly wooden part of a gun that supported the barrel (often called the tube).

Limber: a two-wheeled cart to which the horses were hitched and which pulled a gun or a caisson. It also carried one ammunition chest on which three crew members could sit (although it was a perilous ride).

Caisson: a two-wheeled cart which was hauled behind a limber and carried two ammunition chests and a spare wheel. Three crew members could also sit on the caisson's first ammunition chest as well as on its limber's chest.

Fuze (the spelling used at the time): fuzes were inserted into a projectile and where what caused the projectile to explode (see Notes Regarding Ammunition and Fuzes).

Vent: the hole in a gun's barrel into which a friction primer was inserted to ignite the powder.

Worm: a wood pole with a pointed iron tip consisting of two branches twisted in a screw-type fashion, used to clean debris from the barrel of a gun.

Ammunition train: the supply wagons dedicated to carrying ammunition (for artillery and small arms). The supply trains were often miles long with thousands of wagons and were kept well behind the lines so as not to be captured. Ammunition trains were usually the first in line if a battle was expected. When heavily engaged a battery might have to send caissons back to the train to be re-stocked as a battery could only carry a limited supply of ammunition.

Types Of Artillery Batteries

Foot Artillery
The official but seldom used term for what was commonly called "heavy" artillery. Foot batteries generally manned coastal, river or town fortifications and were equipped with one or a combination of three types of weapons: large, immobile guns; medium-sized pieces known as siege guns mounted on semi-movable carriages; or mortars. The men manning these batteries typically did not carry side arms or swords.

Field Artillery
The official term for batteries assigned to operate in the field with infantry or cavalry (sometimes incorrectly referred to as "light" artillery which is actually horse artillery). Field artillery is subdivided into horse and mounted artillery.

Horse Artillery
The official term for field batteries assigned to operate with cavalry (unofficially sometimes also called "light" or "flying" artillery). On the Union side these were only in the Army of the Potomac (AOP) and manned almost entirely by regulars. In order to keep up with the troopers all the men in these batteries were mounted. These batteries were typically armed with light-weight ordnance rifles (or perhaps howitzers in the Confederate army) which also had lighter ammunition chests. If Napoleons were used then eight-horse teams might be employed (and certainly no fewer than six per team). The men in these batteries carried side arms and sabers and could function as cavalry if needed.

Mounted Artillery
The official term for field batteries assigned to operate with infantry. The term "mounted" comes from the 1830s when the drivers served in a different branch than the cannoneers and doubled as cavalry (i.e. mounted troops). The men in these batteries typically did not carry side arms or swords although such were initially issued to officers. Mounted artillery is the focus of this work.

Artillery Organization

Before 1863 field batteries were assigned to infantry brigades or divisions with some kept as a reserve. While artillery was sometimes massed early in the war lack of a centralized command made concentration of fire and command difficult so this was changed to group four batteries into an artillery battalion in the Confederate army and four to five batteries into an artillery brigade in the Union. There was one battalion assigned to an infantry division in the Confederate army and one brigade assigned to a corps in the Union armies. There was also a reserve that could be assigned where needed although the AOP eliminated theirs in 1864 (prior to that the AOP reserve was five brigades). The Confederate Army of Northern Virginia (ANV) reserve was composed of two battalions assigned to each corps (though the Confederacy had initially also had an army-level reserve). Artillery brigades and battalions typically supported infantry divisions. Brigades were commanded by a colonel, lieutenant colonel or a major and battalions by a colonel or a major.

Early in the war Union batteries had a mix of smooth-bore guns and howitzers but by 1863 were mostly standardized with six guns, all of the same type, although there were still some four-gun batteries. Confederate batteries, with about 2/3 of their guns captured from the enemy, almost always had four guns which were usually of mixed type and caliber.

Composition Of A Mounted Artillery Battery
(common to both armies)

- The battery was commanded by a captain.
- Each two-gun "section" was commanded by a 1st or 2nd lieutenant ("section chief") who was responsible for inspections and requisitioning ammunition, supplies, and rations. He could take over command of the battery if necessary and rode abreast of his section when on the march.
- A 2nd lieutenant ("chief of the line of caissons") who had overall command of the caissons, their drivers, the chiefs of the caissons (corporals), the caisson horses, and ordnance. He was the junior officer in the battery and might serve as adjutant (i.e. personnel manager).
- Each piece was commanded by a sergeant ("chief of piece") who commanded the men and equipment of one platoon (a gun, its limbers and caisson and horses for them, the gunner corporal, and the privates). In a four-gun battery he might also fill the quartermaster position. On the march he rode beside the left lead horse and served as a guide for his platoon. When the battery was in action he was dismounted (see Loading and Firing).
- A first/orderly sergeant who assisted the captain, was responsible for training, and did battery paperwork. He was the ranking non-commissioned officer (NCO).
- A quartermaster sergeant who was responsible for drawing and issuing clothing, gear, and rations to the men and for the wagons and their drivers. He kept the appropriate records and received his orders from the captain or the orderly sergeant.
- Two corporals per gun: a gunner and a chief of the caisson. The gunner had command of his gun's crew, aimed the piece, and controlled the rate of fire as per the chief of piece's commands. He issued all commands to the gun crew. The chief of the caisson took care of the limbers and the caisson for his gun and made sure the ammunition was properly packed and in good condition. On the march he walked near the caisson.
- One or two buglers (the 1861 manual called for two). Buglers were privates but rode with the captain and were on his staff. In camp they could be assigned orderly or clerk duties.
- One guidon (flag) carrier. He was a private and carried and took care of the battery flag as well as serving as a marker for directing platoons on the march and positioning the battery for action. He rode with the captain and was on his staff. In camp he could be assigned orderly or clerk duties.
- Privates to serve as drivers for the gun and caisson teams. Each six-horse gun and caisson team had three drivers, each in control of two horses, who rode the left-hand team horses (lead, swing, and wheel front to back). Drivers were also responsible for care of their horses and harnessed and un-harnessed the horses when needed. During combat they might lie down and hold the reins of the horses (they were left tethered during combat). Drivers were under the command of the chief of the line of caissons.
- Privates to serve as teamsters/wagoners to drive the battery wagon, forge, baggage wagon(s), forage wagon(s), and ambulance. They also cared for those vehicles and their contents and took care of the battery's extra horses. Most were paid extra at the rate of corporal. Teamsters/wagoners were under the command of the quartermaster sergeant.
- A saddler, a carriage maker, a smith, and a farrier (smith and farrier were usually one and the same), all referred to as artificers. They repaired the vehicles and tack and kept all the horses and mules shod. They were privates but most were paid extra at the rate of corporal. They were under the command of the first sergeant.

- Unassigned privates to fill in where needed (such as guard duty) and replace casualties. These were usually under the command of the chief of the line of caissons and walked with the caissons when on the march. Some, however, might be detailed to the quartermaster sergeant.

The 1861 manual called for 25 to 30 men per gun with a minimum of 25 per gun.
Thus, full manual strength was 100 for a four-gun crew and 150 for a six-gun crew. In practice Confederate batteries rarely if ever had that many men and most Union batteries had fewer until quite late in the war.

In March, 1862 McClellan had 92 batteries with 520 guns, 12,500 men, and 11,000 horses. That's 136 men and 120 horses per battery. At Gettysburg the AOP had 370 guns and 6,948 artillerists or 19 per gun and 107 per battery (65 batteries; 50 six-gun). The ANV had about 270 guns and 6,080 artillerists or 23 per gun and 92 per battery (67 batteries; 54 four-gun).
Five strength reports from 1861 to 1863 reveal an average of about 19 men per gun or about 115 per six-gun battery for the AOP.

An estimated minimum for a fully-functional six-gun battery:

- 1 captain, 4 lieutenants, 8 sergeants, two artificers, 1 bugler, 1 guidon carrier.
- 39 drivers for the limbers, caissons, battery wagon, forge (assume one baggage wagon, no ambulance, and six-horse gun and caisson teams). Six for each gun and caisson and one each for the wagons.
- 12 corporals (two per gun/caisson pair)
- 42 privates for the gun crews (six seven-man crews)

Allow 10% of the above total for extra privates not assigned other duties and to replace casualties

110 & 11 extras = 121 total
98 & 10 extras = 108 total if four-horse gun and caisson teams used

In a pinch the first and quartermaster sergeant position could be combined, the caisson corporals eliminated, and six-man crews used for the guns. With those reductions the minimums would be 107 if six-horse teams were used for the limbers and caissons and 94 if four-horse teams used (still allowing for 10% of the total for extra privates).

The 1861 manual showed how the gun could be manned with fewer than seven privates but the fewer the crew the slower the possible rate of fire and the quicker crew members would tire.
So, it would seem that any fewer than 94 would mean the battery might not be able to move all the guns and caissons, repair the battery assets or adequately man the guns.

An estimated minimum for a fully functional four-gun battery:

- 1 captain, 3 lieutenants, 6 sergeants, 2 artificers, 1 bugler, 1 guidon carrier
- 27 drivers for the limbers, caissons, battery wagon, forge (assume one baggage wagon, no ambulance, and six-horse gun and caisson teams). Six for each gun and caisson and one each for the wagons.
- 8 corporals (two per gun/caisson pair)
- 28 privates for the gun crews (four seven-man crews)

Allow 10% of the above total for extra privates not assigned other duties and to replace casualties

75 & 8 extras = 83 total
67 & 7 extras = 74 if 4-horse gun and caisson teams used

If the same reductions were made regarding sergeants and gun crews as with the six-gun battery then the minimums would be 73 if six-horse teams were used and 64 if four-horse teams used (allowing for 10% of the total for extras). So, it would seem that any fewer than 64 would mean the battery might not be able to move all the guns and caissons, repair the battery assets or adequately man the guns.

For a battery of Napoleon smooth-bores the 1861 manual called for six-horse teams for the guns, caissons, and wagons or 150 total. In practice batteries rarely had that many. One AOP strength report from 1863 showed about 109 horses per battery, another about 128, and one from 1865 showed about 122.

If necessary four horses could be used for the guns and caissons (common in Confederate batteries) and mules could pull the wagons (common in both armies) although with heavier guns it would he hard on the horses over rough ground or for prolonged periods. Small howitzers (12-pdr) and 3 inch guns were light enough that it could be done regularly although it still would have been more of a strain on the horses.

An estimate of the minimum needed for a six-gun battery (74 horses & 14 mules):

- two six-horse teams per gun (one for limber and gun, one for limber and caisson)
- a four-horse or mule team each for the forge and battery wagon
- one or two horses for an ambulance
- six horses or mules for each supply wagon
- 17 total for officers, sergeants, bugler(s), and the guidon-bearer
- 10 spares

Each six-gun battery would thus need a minimum of 113 horses (with one supply wagon and no ambulance) or 99 if mules were used to pull the wagons. If four-horse teams were used for the guns and caissons it would reduce the number to 89 (75 if mules were used for the wagons).

If two of the sergeant positions were combined then the numbers could be reduced by one. Thus, fewer than 74 horses and 14 mules would begin to make it impossible to move or command the battery.

An estimate of the minimum needed for a four-gun battery (43 horses & 14 mules):

- two six-horse teams per gun
- a four-horse or mule team each for the forge and battery wagon
- one or two horses for an ambulance
- six horse or mules for each supply wagon
- 12 total for officers, sergeants, bugler, guidon bearer
- 7 spares

Each four-gun battery would thus need a minimum of 81 horses (with one supply wagon and no ambulance) or 67 if mules used for the wagons. If four-horse teams were used for the guns and caissons it would reduce the number to 58 (44 if mules were used for the wagons).

If two of the sergeant positions were combined then the numbers could be reduced by one. Thus, fewer than 43 horses and 14 mules would begin to make it impossible to move or command the battery.

Horses were preferred for the guns, limbers and caissons because mules were too skittish under fire. A horse can generally pull three times its weight on good surfaces, two times its weight on

bad or hilly surfaces, and its own weight on very bad surfaces or in mountains but only about half that if it also carries a rider. Since the average horse weighs about 900 to 1,100 pounds that's about 3,000 pounds on good roads, 1,900 on bad roads, and maybe 1,000 on very bad or steep ground and half that with a rider (as with limbers and caissons). The military's goal was to proportion loads so as to not be more than 700 pounds per horse.

The average artillery horse lasted about eight months. On campaign they were often not fed or cared for as well as needed. They were also specifically targeted by the enemy because without horses a battery couldn't move, couldn't easily bring ammunition from the caissons, and couldn't re-supply ammunition from the ammunition train.

At best a battery could make about five miles an hour on good, level surfaces and with good horses but not for sustained periods. About two miles per hour for six hours (15 miles per day) would have been average and twenty to twenty-five miles per day would have been the typical maximum (although there are reports of up to as many as 37 miles in one day).

Accessory Equipment

At a minimum:

1 caisson and 2 limbers per gun
1 battery wagon with a limber
1 forge with a limber

and maybe also:

extra caissons (the 1861 manual called for one extra per gun; rarely that many in practice)
1 to 5 supply/baggage wagons (three seemed to be the dedicated number for the AOP)

1 ambulance

Limber, Caisson, and Ammunition Chests

Each limber had one ammunition chest, a grease bucket, a couple of canvas water buckets, gunners tools, and a tarpaulin strapped on top. A limber weighed 695 lbs without a chest, 1,510 pounds with equipment and a chest filled with ammunition for a Napoleon gun.

Each caisson had two ammunition chests, axes, a shovel, buckets, and a spare pole, handspike, and wheel. A caisson weighed 792 lbs by itself and 3,811 lbs with equipment, limber and three chests filled with ammunition for a Napoleon gun (slightly lighter for rifles).

An ammunition chest weighed 182 lbs and carried 490 lbs of ammunition for a Napoleon (672 pounds total when full) and was covered in sheet copper to prevent embers from setting it on fire.

Rounds per chest:

6-pdr 50
12-pdr Napoleon 32
12-pdr howitzer 39
24-pdr howitzer 23
32-pdr howitzer 15
3-inch ordnance rifle and 10-pdr Parrott 50
20-pdr Parrott 25

Types of rounds per chest:

6-pdr - 25 solid shot; 20 spherical case; 5 canister.
12-pdr Napoleon - 12 solid shot; 12 spherical case; 4 shells; 4 canister.
24-pdr howitzer - 15 shells; 20 spherical case; 4 canister.

Each chest also contained two spare cartridges, friction primers, and appropriate fuses.

Rounds per gun:

Armies reported taking 200 to 270 rounds per gun on campaign (the 1861 manual stipulated 200 each be carried by the battery and 224 total per gun, the extra carried by the ammunition train or extra caissons). 250 seems to have been the standard.

A 12-pdr battery carried 128 rounds with the battery so the rest would have to travel with the ammunition train which could carry 112 rounds per wagon. Thus .6 - 1.25 wagons would be needed to carry the extra rounds for the battery (or an extra caisson or two with the battery). A rifled gun battery could carry 200 rounds with the battery so half a wagon (or an extra caisson) would be needed to carry the extra rounds.

Battery Wagon and Forge

The battery wagon was towed by a limber and carried oil and paint, spare gunner's tools, axes, spare stocks and spokes, over 200 pounds of spare harness, scythes, spades, picks, and forage in the rack on the back. The chest of the limber contained carriage maker's tools - planes, saws, chisels, etc. - and a set of saddler's tools. Total weight of the limber, wagon, and equipment was 3,574 pounds.

The forge was towed by a limber and carried tools, coal and supplies including horseshoes, nails, spare hardware and iron. Its limber contained the smith's hand tools. Total weight of the limber, forge, and equipment was 3,383 pounds.

Bringing The Battery Into Action

The site selected for the battery might have to first be cleared of interfering brush and trees. The guns could then be brought into approximate position so that they faced the enemy.

The guns were then unlimbered and the limbers dropped about six yards behind the guns (with the end of the limber pole to the end of the trail handspike on the gun being six yards).

The limber was turned around by the crew so that members 6 and 7 (see Loading and Firing) would be facing the gun and the ammunition chest would open with the copper-covered top protecting the contents.

The caisson and its limber and the horses would be positioned somewhat to the rear and, if possible, behind some natural cover (33 yards to the rear as per the 1861 manual but it varied in reality). While the gun was in action the horses remained harnessed.

The gun was supplied from its limber chest. When the gun's limber chest was empty the caisson's limber was moved forward to replace the gun's limber which was then hitched and moved back to the caisson.

Once at the caisson, the empty chest was removed from the gun limber and the caisson's rearmost chest was moved onto the limber. Keeping the gun's limber chest supplied was necessary so that there would adequate ammunition with the gun should the gun have to be moved suddenly. Often a section was served from a single caisson, the other moved to the rear for more protection.

The caisson team would travel to the ammunition train to get more chests if the first four were depleted.

It was reported that a good crew could unlimber and fire a round in twenty six seconds. Guns could also be fired as the battery retreated by pulling the gun with the prolonges (ropes) behind a limber with the crew walking beside the gun, loading as they went (see Use Of The Prolonge).

Loading and Firing

A full gun crew consisted of seven men, each with specific functions, whose positions were simply numbered one through seven, and one gunner. Number one was in front of the wheels on the right and two was in front of the wheels on the left, both near the gun's muzzle. Number three was behind the wheel on the right so as to service the vent. Number four was behind the gun and off to the left. Number five was behind number four and delivered the ammunition from the limber. Numbers six and seven prepared the rounds at the limber. The gunner sighted the gun and gave the commands. The following is the sequence followed to load and fire the gun.

On the "load" command:

1. the chief of piece determined the type of ammunition to use and told the gunner
2. the gunner determined the range
3. the gunner communicated the round type and range to 6
4. 6 read the elevation needed from the table in the limber, relayed that to the gunner, and then set the fuze (could be assisted by 7) and gave the round to 7
5. 4 hooked the lanyard to a primer and waited
6. 5 got the round from 7 at the limber and carried it to the gun in a leather pouch
7. 3 cleaned the vent and covered the vent with the thumbstall (a leather thumb cover)
8. 2 cleaned the bore with the worm if it was thought debris remained in the tube. Note that there seems to be some disagreement about if the worm was used on every shot. Use of the worm is not mentioned in the 1861 or 1864 manual (although the worm is listed as a standard piece of equipment for a gun).
9. 1 sponged the bore using two turns of a wet lamb's wool sponge mounted on a long pole
10. 5 showed the round to the gunner
11. 2 received the round from 5 and placed it in the muzzle, then stepped away so as not to be exposed should there be a premature detonation of the round
12. 5 returned to his station between the gun and the limber
13. 1 rammed the round to the rear of the barrel and stepped away
14. after the round was seated 3 went to the trail to move gun right or left as directed by the gunner
15. the gunner inserted the sight and aimed, raising both hands to signal he was done

On the "ready" command:

the gunner removed the sight and stepped back

16. 1 and 2 stepped clear
17. 3 pricked the powder bag by poking a special tool down the vent
18. put the primer in the vent and hooked on the lanyard (if not already done)
19. held the primer in place so the lanyard could be extended while 4 moved to the rear with the lanyard

On the "fire" command:

20. 3 stepped clear and all leaned away and covered one ear
21. when 3 was clear of the wheel 4 pulled the lanyard downward and to the rear

A good crew could fire two solid rounds or three of canister per minute with a smoothbore gun although typically the pace was more like one round every one to three minutes so as to aim and not use up ammunition too quickly. Rifled guns required more time to load as the powder and the projectile were loaded separately.

In the heat of battle loading and firing might not be performed by the manual as men sometimes knelt or dispensed with steps to reduce their chances of being hit. For instance, if subject to being overrun a crew might dispense with sponging so as to fire more rapidly although this would have been dangerous.

The space needed for a six-gun battery left to right as directed by the 1861 manual was two yards for each gun with 14 yards between for a total of 82 yards or 246 feet wide and 33 yards deep (not counting caissons). Captain J.F. Rusling, quartermaster, reported in 1865 that on the march a six-gun battery was about 300 yards in length.

Batteries were generally not placed along, directly in front or behind the infantry line but batteries could be placed between regiments or brigades if such were dispersed or separated. If so placed, they generally were sited 60 yards in front of the line of battle.

Batteries were thought best placed on the flanks of a corps so as to provide converging fire. Also, oblique angles of fire were considered best as more of the target was exposed.

As a battery needed an avenue of retreat, the ground behind it needed to be easily traversed.

Hard ground was best for a battery location to allow recoil and easy movement of the gun and limber.

Batteries were best not placed on rocky ground or behind stone walls due to fragmenting of the rock. Stone walls also impeded loading and swabbing. Being close to trees was also avoided due to splinters and falling limbs.

A battery might be placed so as to take advantage of protective cover such as buildings.

Placement behind a slight rise (about two feet or less) protected against solid shot as it would skip over.

Siting on the reverse side of a slight rise with the gun muzzles looking over the crest was desirable as this protected the guns and limbers although the horses and caissons might still be exposed.

A battery was best only placed on slopes the battery could itself defend (i.e. that allowed for direct fire to the base of the hill). When protecting high ground, it was best placed lower on the slope.

Best slope placement would be on ground where the height of the guns above the target would be about 1% of the distance to the target. For example, at 800 yards that would be 24 feet.

Putting the battery in front of rolling ground could mask dust caused by the impact of the enemy's rounds thus making it hard for the to enemy to sight in.

Guns could be lowered slightly by digging a hole about 1 ½ feet deep that sloped slightly to the rear and lowered their profiles.

Mixed batteries presented problems ensuring the right ammunition combination was available and necessitated less than ideal placement due to the differences in effective ranges of the different guns.

A battery had to be able to see its target from its location and long-range fire was to be avoided generally as it wasted ammunition and accuracy suffered. Most field artillery was employed at ranges of less than 1,000 yards.

Salvo fire - i.e. simultaneous firing of all the battery's guns - was to be avoided as it wasted ammunition, did not allow for sighting corrections, and left all the guns empty at the same time. Against another battery it was advised to concentrate on one or two guns at a time.

One round per minute was the best rate of fire unless the enemy was within 350 yards. If so, then canister was used at two rounds per minute.

Double canister was used if the enemy was within 150 to 160 yards (one charge, two cans) at two to three rounds per minute.

The doctrine of the day was that artillery used on the offensive should be directed against enemy batteries, a function ideally suited to the longer-range rifled guns. However, when used offensively batteries tended to use up ammunition with less effectiveness due to the ranges which were necessary so as to not be within range of rifled muskets. Used defensively, though, gunners could wait for the enemy to reach the ideal range before opening fire and could employ canister using the larger smooth-bore guns. Thus, many felt that artillery was best employed on the defensive and historians seem to agree that is how it was most effectively utilized.

Some felt that artillery was best used against infantry or cavalry and not against other batteries because anti-personnel fire caused more casualties and was directed against the front of the attacking forces. Counter-battery fire and battery duels were nevertheless fairly common.

It was not advised to fire case or shells over friendly troops as inconsistent fuses could cause premature detonation. Even solid shot fired too close to friendly troops could rain pieces of debris on them (sabots, metal bands).

Batteries were weakest on their flanks and were typically protected there by cavalry or infantry, cavalry being thought best on open ground due to its greater mobility and infantry best on broken ground.

Defensive or offensive uses combined, it's estimated that only about ten percent of the casualties in the civil war can be attributed to artillery. This does not mean artillery was not effective, just that it didn't cause as many casualties as small arms fire. Even if it didn't directly kill, artillery fire could demoralize attacking troops causing them to take cover or divert their attack. Used against cavalry it could also cause the horses to panic.

Howitzers were used somewhat like mortars because their high trajectory was ideal for use against troops behind works or terrain features but also put a battery at somewhat of a disadvantage due to their short range and relatively light projectile. Confederate General Edward Porter Alexander was fond of turning howitzers into mortars by digging a trench for the tail and putting the carriage wheels up on skids. This pointed the barrel upward and by using a reduced powder charge the howitzers became mortars.

If guns had to be abandoned they were usually spiked which involved driving a metal spike - often carried with the gun for that purpose - into the vent hole and then using a rammer to bend it

inside the gun so it couldn't be pulled out. In a pinch any piece of metal that could be crammed into the vent could be used if an actual spike wasn't available. Spikes could be removed with the right tools but obviously not during a battle. If time permitted, the guns were dismounted and the carriage wheels destroyed or a solid shot was wedged in the bottom of the bore by wrapping it with felt.

Use Of The Prolonge

The prolonge, a 26 foot 7 inch long rope, was used to pull a gun over terrain where it was not possible to maneuver when hitched to a limber and to move the gun and fire while retreating (using the prolonge was a quicker maneuver than hitching the trail to the limber). On one end there was an iron bar, about seven inches long, and at the other end and iron ring, about four and a half inches in diameter. The iron ring was placed over the limber's pintle hook and the iron bar went through the lunette of the cannon.

In a retreat the gun was hauled backwards with the crew loading and firing on the move. Recoil would hasten the movement. After the gun had fired the driver would walk the team slowly forward taking up the slack caused by the recoil while the crew reloaded the gun. Once the gun was reloaded, the team was stopped for the next shot. The prescribed method was usually to withdraw one two-gun section to the rear of another section that remained stationary and firing. Once the first section had passed the second section, it would be able to cover the withdrawal until it was time to leapfrog again.

Early Guns

Initially a mix of 6- and 12-pd smooth-bores left over from the Mexican war were commonly used by both sides although that generally changed quickly.

1841 6-pdr
- Bronze
- 884 lb. tube & 900 lb. carriage = 1,784 lbs total
- 3.67 in. bore & 6.1 lb. projectile
- Effective range less than 1,500 yards.
- Most were quickly abandoned by both sides and melted down to make Napoleons although a few remained in service. There was one at Gettysburg.

James conversion rifles (often called type I rifles)
- Pre-war 6-pdr bronze guns retro-rifled by boring them out in the James rifling pattern; early attempt to get rifled guns.
- 3.67 in. bore; 12 lb. James or Schenkl projectile
- The bores wore out after about 400 rounds and they quickly fell out of use.

Common Guns

1857 12-pdr "Napoleon" (named for Napoleon III) or **Light 12-pdr**
- Bronze (the Confederacy made some 120 iron Napoleons starting in 1864 after their only copper mine was lost with the fall of Chattanooga)
- 1,227 lb. tube & 1,128 lb. carriage = 2,355 lbs total
- 4.62 in. bore & 12.3 lb projectile; 2.5 lbs powder charge for shot, 2.0 lbs for canister
- Shot and shell accurate to 1,600 yards; canister to 300 yards.
- The most common smooth-bore on both sides.

10-pd Parrott rifle
- Cast iron with a wrought iron band around the breach
- 890 lb. tube & 900 lb. carriage = 1,790 lbs total
- Model 1861 had a 2.9 in. bore and Model 1863 had a 3 in. bore. After 1864 Union batteries were standardized with the 1863 model but the Confederacy continued to use both (sometimes creating a problem because different ammunition was required).
- Parrott and Absterdam shells used; the Confederacy produced some others such as the Reed shell. 1,900 yard range (canister to about 150 yards). It used a one-pound powder charge.
- Common though not well liked as they tended to burst; phased out in favor of the ordnance rifle.

1861 3-inch ordnance rifle
- Wrought iron
- 816 lb. tube & 990 lb. carriage = 1,716 lbs total
- 3.0 in. bore & 10 lb. projectile; one pound powder charge. Hotchkiss and Schenkl shells used but could also fire Parrott shells. Extremely accurate to 1,850 yards (canister to about 150 yards), reliable, and lighter than a Parrott.
- The ordnance rifle was the most widely used rifled gun on both sides.

20-pd Parrott rifle

- Cast iron with a wrought iron band around the breach
- 1750 lb. tube & 1,128 lb. carriage = 2,878 lbs total
- 3.67 in. bore & 20 lb. projectile. Parrott and Absterdam shells used; the Confederacy also produced Reed shells. This gun used a two pound powder charge.
- 2,100 yard range
- Not used as often as 10-pounders in AOP field batteries due to the weight but more common than the 1841 guns. The Confederate Army of Tennessee (AOT) only had six. They had the same bursting problem as the 10-pdr.

1841 12-pdr

- Bronze
- 1,757 lb. tube & 1,175 lb. carriage = 2,932 lbs total
- 4.62 in. bore & 12.3 lb. projectile
- 1,600 yards effective range
- Used by both sides but not generally in field batteries as they were too heavy. Most were replaced by the Napoleon which was as effective and lighter. It required an eight-horse team.
- (it had lifting handles on the tube like the 24-pdr howitzers)

1841 12-pdr howitzer

- Bronze
- 4.62 in. bore & 8.9 lb. projectile; one pound powder charge.
- 788 lb. tube & 900 lb. carriage = 1,688 lbs total
- 1,000 yards maximum range; effective range more like 775 yards
- Very effective against troops at ranges under 400 yards.
- The Confederacy continued to use them throughout the war but most Union guns were melted down to make Napoleons although howitzers were favored in the west due to better mobility.

1841 24-pdr howitzer and Austrian 24-pdr howitzer

- Bronze
- 1,318 lb. tube & 1,128 lb. carriage = 2,446 lbs total
- 5.82 in. bore & 18.4 lb. projectile
- 1,322 yard range
- Its weight was a problem for field batteries so they were more commonly used in fixed defensive positions and field fortifications. Most in Union service were eventually replaced by Napoleons but the Confederacy continued using them throughout war.
- (1841 24-pdr guns can be identified by the lifting handles on the tube)

24-Pdr Coehorn mortar (12 pounders were also used but were fairly rare)

- Bronze (a few iron, and even a few improvised wood, guns were used but were also fairly rare)
- mounted on a wood block with handles; 296 pounds total and moved by four men.
- 5.82 in. bore, 16.8 lb. projectile
- 1,200 yard maximum range although typically used at shorter ranges. Range was

regulated by altering the powder charge. Used by both sides but considerably more by the AOP. Light enough to be part of a field battery these became more common later in the war as entrenching and sieges also became more common.

Rare Guns

James rifle (often referred to as type II or "true" James rifles)
- Bronze or (rarely) steel
- 915 lb tube & 900 lb. carriage = 1,815 lbs total
- 3.8 in. bore & 14 lb. projectile; James shell used; 0.75 pound powder charge.
- 1,530 yard range
- Later-produced guns that were manufactured new (about 400 made); none were made after 1862.
- Not widely used once Parrott and ordnance rifles became available although one Union battery had them at Gettysburg.

Blakely rifle
- Wrought iron or steel; had an extra band encompassing the trunnions.
- 800 lb tube & 900 lb. carriage = 1,700 lbs total
- 3.5 in. bore & 12 lb. bolt projectile most common; other calibers made. One pound powder charge
- 1,850 yard range
- English made and imported by the Confederacy only. Very rare but the ANV had four at Gettysburg. About 400 total were made.
- Light tube and carriage weight caused severe recoil that tended to damage the carriage.

Whitworth rifle
- Steel
- 1,000 lb. tube (could not find specifications on the carriage)
- 2.75 in. bore & 12 lb. projectile; 1.75 pound powder charge.
- Breech loading and used special shell that fit the hexagonal bore.
- 2,800 yard effective range but could travel close to twice that
- Only used by the Confederacy in the field although the Union had a few. Rarely used as the ammunition was hard to get and manufacture and the mechanism not reliable.
- The ANV had two at Gettysburg. Only 50 are known to have existed.

Armstrong rifle (sometimes called the Armstrong twelve-pounder)
- Steel reinforced with wrought iron bands.
- 975 pd. tube
- 3.0 in. bore & 10.8 - 11.4 lb. studded Armstrong projectiles
- (can find no specifications for weight of the carriage)
- 3,400 yard range
- English made and imported only by the Confederacy.
- Only a few used; very rare.

Other oddities, calibers, and shell types were made and used but the above represent the overwhelming majority of the guns used in field batteries by both sides.

Effective ranges are less than possible ranges due to reduced accuracy at increasing distances, crude sights, and the necessity of being able to see the target. Exact ranges cannot be stated absolutely as each gun performed slightly differently than others of the same model, there were differences in powder, and variations in weather conditions. In general the effective range of smoothbore howitzers was three quarters of a mile, that of smoothbore cannons one mile, and that of rifled three-inch guns one and a half to two miles.

Smooth-bores were preferred for close-range use because they delivered larger projectiles and larger and better-distributed loads of canister. Rifles were preferred when engaging enemy batteries or other long-range targets because they were more accurate and had greater range than smooth-bores.

Shot (called a "bolt" with rifled guns)

- Solid.
- Used against fortifications, buildings, wagons and guns or massed troops at ranges of 350 to 650 yards. Round shot would skip along the ground which made it very effective against troops but bolts tended to dig in and not skip so were not a good choice against infantry or cavalry.

Shell

- Hollow and filled with powder; exploding.
- Used against troops behind obstacles or against wooden buildings to set them on fire.
- Used against targets at 650 to 1,500 yards.
- Shells were aimed and timed to explode about 15 feet above troops so as to rain the fragments down. It was not as effective against troops as was case due to the small number of fragments, their less-directed pattern, and lower velocity of the pieces. It was reportedly more effective against cavalry as it spooked the horses.

Case (or "spherical case" with smooth-bores)

- Hollow, exploding, and filled with lead (Union) or iron (Confederate) balls packed in sulfur. Used against troops at 650 to 1,500 yards.
- Fuzes were difficult to precisely time so it was rarely used if the enemy was quickly closing.
- Case was aimed to explode above and in front of the troops (50 to 75 yards) so as to fan the shrapnel down and out.
- There are records of case for rifles sometimes being used without a fuse as a substitute for shot.

Canister

- A can filled with twenty-seven lead (Union) or iron (Confederate) balls.
- It could be fired from smooth-bores and rifles but the pattern in rifles was negatively affected by the rifling and smooth-bores delivered a much larger load.
- It was only effective at a maximum range of 350 to 400 yards for smooth bores and perhaps half that for rifles. There are reports of case being fired without a fuse (so as to explode in the gun or at the muzzle) as a substitute for canister although it would have been a dangerous practice.

Notes Regarding Ammunition and Fuzes

Smooth-bore rounds were attached to a wooden sabot and the powder bag was tied to a groove in the sabot so the rounds could be loaded as one piece. Powder and round were loaded separately for rifled guns. Powder bags were made of serge, merino wool or close-textured flannel.

There were two basic types of fuzes: timed fuzes which were lit by the flame as the round left the barrel of the gun and percussion fuzes which caused detonation upon impact. Smooth-bore ammunition used time fuzes only while rifled gun ammunition could be fitted with either timed or percussion fuzes. The most common timed fuzes were made of paper cylinders packed with a slow-burning powder. The burn time was adjusted by cutting the fuze using a marked guide

stored in the limber. The Bormann timed fuze, used for smooth-bore shells and case ammunition, was also common but it was metal and screwed into the shell of the ball. Powder was held in an internal circular tube and times were marked on the surface. To set the Borman fuze a hole was poked at the desired time mark and that allowed flame to enter the fuze. Ammunition for rifled guns was often fitted with more complicated timed fuzes than the simple paper ones, some peculiar to a specific gun.

Fuse failure was a continual problem for both sides but more so for the Confederacy. Union Bormann and Parrott fuzes had an overall failure rate of about 25% while paper fuzes on both sides had a failure rate closer to 50%. Confederate Bormann fuzes were so defective that they were often removed and replaced with a plug fitted to accept a timed paper fuze. Rifle rounds would sometimes tumble which often prevented their concussion fuzes from working and their tight fit in the barrel sometimes prevented ignition of timed fuzes as the required flame might not pass the round and reach the fuse. Inconsistent and imprecise burn times were also problems as rounds would often detonate too early or too late which was a prime reason not to fire over friendly troops.

Confederates had a problem for a while with fuzes that had inconsistent burn times. Prior to the summer of 1863 the ANV got its fuzes from the Richmond arsenals. Due to shortages after Chancellorsville fuzes were also made in Charleston, SC and Selma, AL. Those proved to have longer burn times (one second longer for a given length) so would cause shells to explode later than Richmond fuzes of the same length. This was largely corrected by January, 1864 but Confederate ammunition was never the same general quality as that of the Union.

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