

Introduction

This procedure for artillery instruction and drilling is based on the 1860s US manual, Andrews, Patten's Artillery Drill, other various manuals of the period, and follows the military protocol of Teaching, Practicing, and Demonstrating the loading and firing of artillery "**by Detail**". Loading "**by detail**" need not be used in the field, unless a slow controlled fire is required. **The NCWAA has never required the use of loading by detail**, other than while teaching and drilling. Many commanders find this to be a safer method for reenacting, and allows them more control over their guns and detachments. Though not a requirement, it is a recognized and acceptable safe method for use in reenacting. For simplicity, this manual dispenses with the use of numeric steps and breaks the drill down into small, easy to follow verbal commands and steps. This better allows the training of all positions simultaneously. Necessary steps have been added to address specific safety issues that were not addressed in the original drill. The original procedure had inadequate concern for the safety of the cannoneers on the gun, and none for those in front of the guns. **In the spirit of honoring those who fought in this terrible conflict, both the Drill and/or the Procedures, have been kept as close to the original procedure as safety will allow.**

Remember

Drill means to teach, practice, or demonstrate. And is performed by Detail!

A "Procedure or Standard Operating Procedure" is a method of performing a task or group of tasks in a specific order.

A military procedure is taught, practiced, and demonstrated by drilling by detail.

- A task is the steps for doing a particular piece of work. Procedures are activities made up of a series of tasks. A process is an upper level description of a series of activities required to accomplish an objective. Processes are made up of procedures or tasks.
- Please Note: The Mortar and Mt Howitzer drills are adaptations of the full scale field gun drill. This was done to allow the transfer of skills, muscle memory, and safe practices to these applications. These drills and procedures can be downloaded from the download section of the NCWAA.com web page.
- **For living histories and demonstrations** with only one or two pieces, no one in front of the gun, and spectators well behind the gun or gun line, the **placement of implements on the hub may not be required**. This implement telemetry is required for reenactments or anyplace where there may be people in front of or around the gun line. Then, implements were never placed on the hub, as this would have telegraphed the readiness of the artillery line to the enemy. Today, this practice alerts all those in front of and around the gun line to the gun's status and danger level. It also allows the commanders of long artillery lines to assess the readiness and condition of their gun line.
- For living histories and demonstrations where the gun will not be fired, original period drills and procedures may be demonstrated without modification. This applies to non-firing demonstrations only. At all other times certain modern safety modifications must be in place. *For those who have a preferred manual, any one of the original period drill manuals can be used if the NCWAA safety precautions and procedures are incorporated into that drill and firing procedure.*
- For simplicity and use of modern terminology, the term "Gun Detachment" and "Crew" will be considered interchangeable..

Important Notice: The information presented in this manual is intended for use with proper instruction, other information, and materials, and is **not a standalone document. The drill described in this manual is not the only safe method for loading and firing artillery and may not be the best procedure under all circumstances. This manual assumes that all artillery is of modern construction and in good working order, all loads are well constructed and will not leak powder** when rammed and that other safety equipment and procedures are utilized. It is also assumed that users have a good working knowledge of artillery and have received instruction in the use of this manual. *The firing of cannon is dangerous and can cause the loss of life and limbs if done incorrectly or as the result of numerous unforeseen phenomena.*

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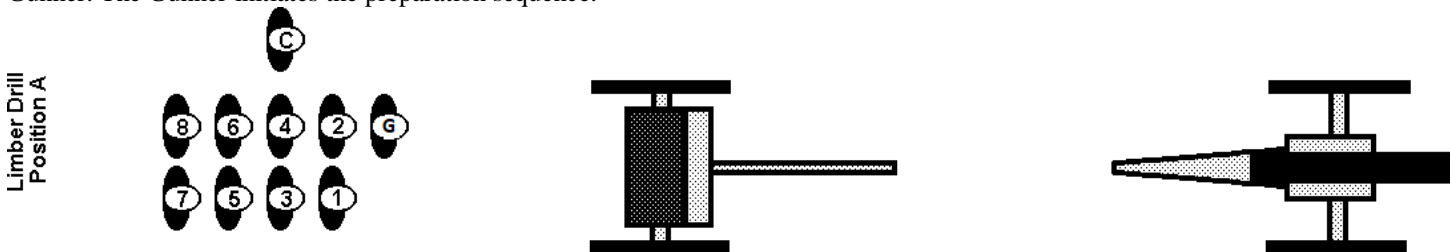
This training manual is based upon a culmination of original period drill manuals with obvious additions and alterations to provide extra layers of safety and address modern guidelines. No drill or procedure is 100% safe, as **firing muzzle loading artillery is at best a hazardous endeavor**. These drills and procedures were developed by and with input from hundreds if not thousands of artillerymen from across the US, over the past 30 plus years. Many of the changes were made to address specific accidents that have happened through the years.

These drills and procedures are not for live fire. They were developed by Civil War reenactors for reenacting. The original Civil War period drill manuals can be found on the NCWAA site but are posted for reference only. The period drill and procedures should only be used for living history demonstrations and not for reenacting, as they do not properly address the safety of those on the gun and are meant to kill all those in front of the gun..

THE NATIONAL CIVIL WAR ARTILLERY ASSOCIATION
SCHOOL OF THE PIECE
LIMBER DRILL

The procedures and commands presented below are recommended and endorsed by the National Civil War Artillery Association, in the preparation of the gun crew at the limber, prior to posting on the gun. All commands are CAPITALIZED while descriptions of the action are in normal print. When specific cannoneers are involved in the action, the individuals illustrated are darkened.

Position A: With gun and limber previously placed, the Gunner or Chief-of-the-piece has moved the gun crew (detachment) into position to begin the manning of the piece. The detachment is at rest. The command of the detachment has been relinquished to the Gunner. The Gunner initiates the preparation sequence.

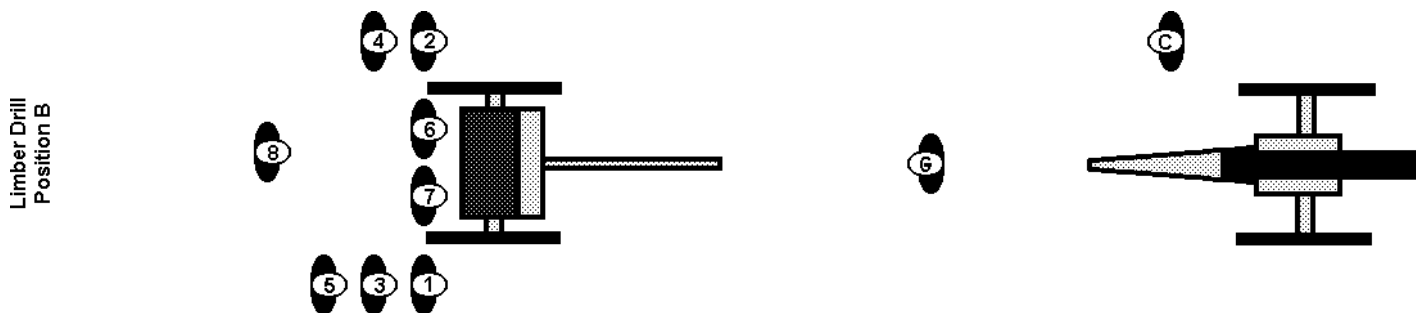


Gunner orders: DETACHMENT, ATTENTION, POST ON THE LIMBER, MARCH.
 (Gun detachment advances to Position B)

Position B: Numbers 1 and 2 locate themselves near the outside rear of the right and left limber wheels followed by 3, 4, and 5. The Gunner advances to a position between the limber and gun and then faces the limber. Numbers 6 and 7 locate themselves close to the rear of the limber chest. Number 6 unlocks the chest assisted by 7 who holds open and closes the chest as necessary. Number 8 locates himself so that he may observe the equipment exchange and the activities of the spectators

Gunner orders: DISTRIBUTE EQUIPMENT

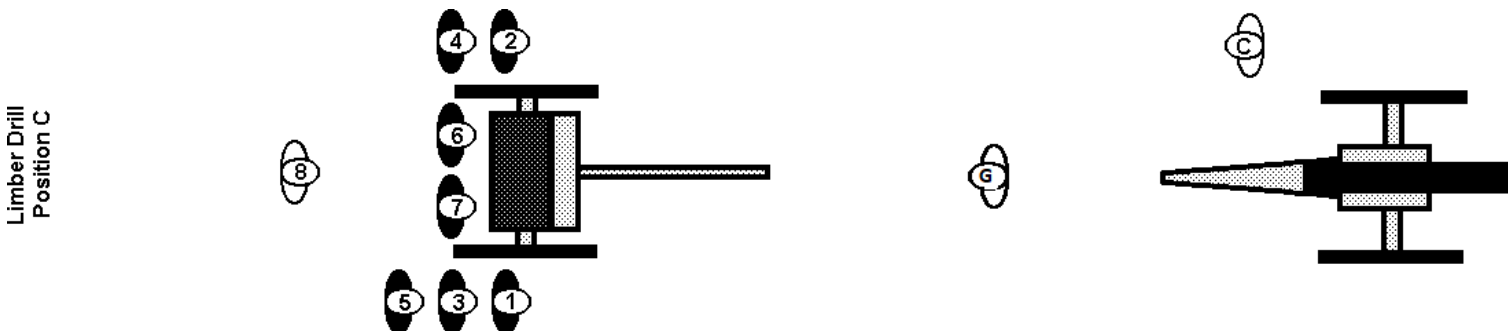
Number 6 takes charge of the gun crew. The Chief-of-the-Piece observes from a convenient position.



Number 6 issues gauntlets to numbers 1 and 2. When the exchange is completed, Number 6 orders the detachment to advance. Number 7 may also aid in the distribution of equipment on his side of the box.

Number 6 orders: DETACHMENT, ONE STEP FORWARD, MARCH
 (Gun detachment advances to Position C)

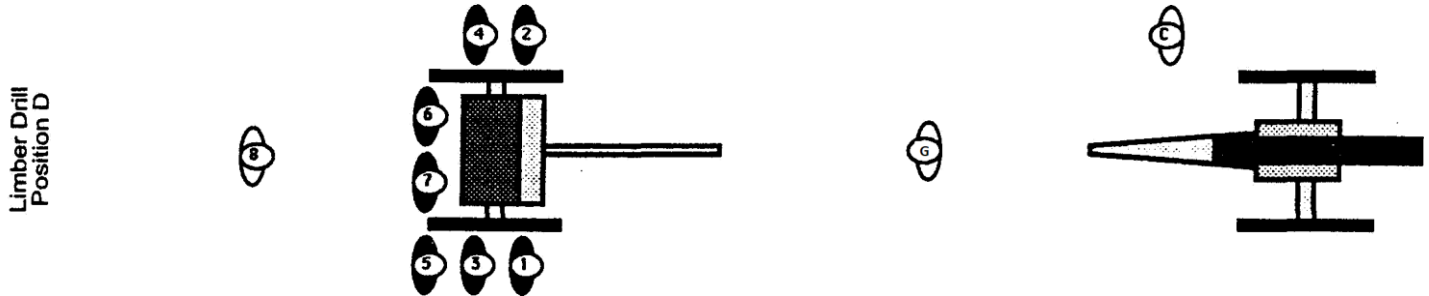
Position C: Numbers 1 through 5 moves forward one step:



Number 6 issues a tube pouch (for the primers) and a lanyard to Number 4, Number 6 issues a second pouch with thumbstall, priming wire (vent prick), gimlet, pliers, and vent brush to Number 3. Numbers 5 and 7 assist Number 3 with the thumbstall and pouch adjustments. When the exchange is completed, Number 6 orders the detachment to advance.

(Gun detachment advances to Position D)

Position D: Numbers 1 through 5 moves forward one step. Number 5 stands next to Number 7.



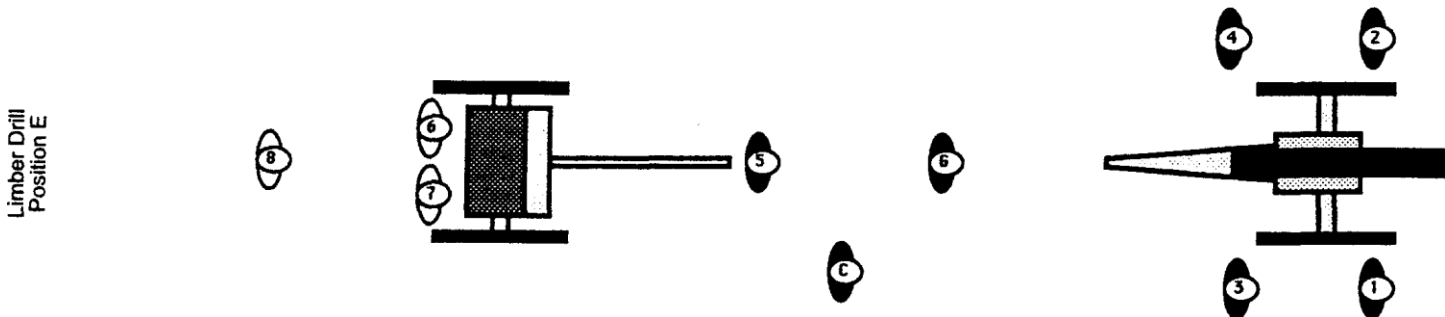
Number 6 issues the cartridge haversack to Number 5. When the exchange is completed, Number 6 orders the chest cover closed. Number 7 closes the cover. Number 6 informs the Gunner that all exchanges have been accomplished.

Number 6 reports: EQUIPMENT HAS BEEN DISTRIBUTED

Satisfied that the crew has been properly outfitted, the Gunner takes command and moves the crew to the gun.

Gunner orders: DETACHMENT, ATTENTION, POST ON THE GUN, MARCH
(Gun detachment advances to Position E)

Position E: Numbers 1 and 3 advance to the right side of the gun, Numbers 2 and 4 to the left side. Numbers 1 and 2 locate themselves outside the gun wheels near the front edge of the wheel. Numbers 3 and 4 locate themselves outside the gun wheel aligned opposite the cascabel. Number 5 locates himself near the front of the Limber pole. Numbers 1 through 4, and 6 and 7 will perform their duties of serving the gun from these positions. The Gunner and Number 5 will move about as necessary between the gun and the limber. Number 8 will move as required to ensure the safety of the ammunition chest and the spectators.



When each of the crew is in position, the Gunner will direct the loading of the piece. The Gunner will order the further preparation of the gun and its service by the crew. The Chief-of-the-Piece monitors the drill from a convenient position, observes the activities of the spectators, and relays the orders of the Section Officer to the Gunner and the cannoneers.

SCHOOL OF THE PIECE **LOADING**

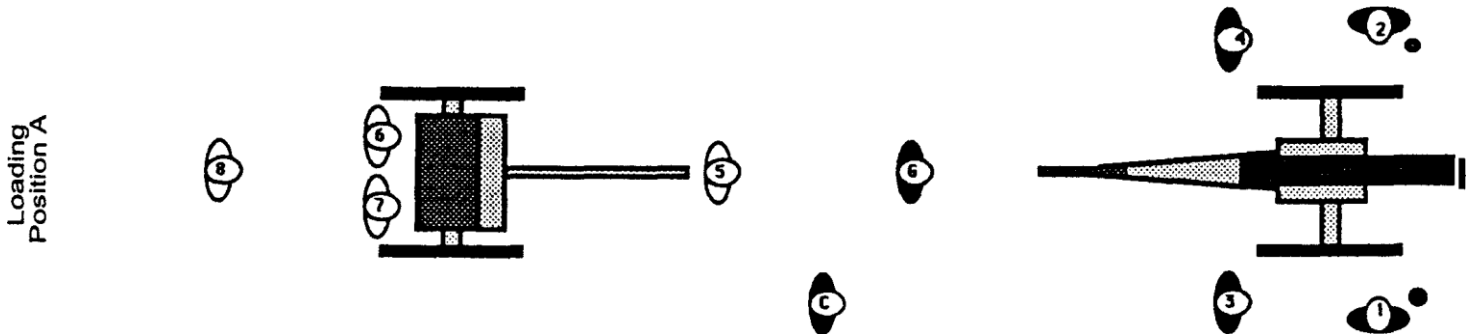
Below are the commands and procedures recommended by the National Civil War Artillery Association in the loading of artillery pieces. All verbal commands and responses are CAPITALIZED while all actions are in normal print. When specific cannoneers are involved in an action, the individuals illustrated are darkened.

This sequence of activities (steps) commences after the detachment has been marched into position and posted as in Position E of the Limber Drill. Any activity may be interrupted by the command "Cease", "Halt" or "Stop" and will stop any and all gun activity. This may be ordered by any cannoneer at any time. The command "Commence Loading," ordered by the Gunner, reinitiates action.

Gunner orders TAKE IMPLEMENTS

(Cannoneers take up their implements and prepare to respond to additional orders.)

Position A: Number 1 detaches the sponge bucket and positions it on the ground. He takes the wet sponge from its hanger, wets it in the bucket, and keeping the wet sponge in hand, returns to his post (facing forward as described in Position E above). Number 2 takes the dry sponge and the worm from their hangers and, keeping the worm in hand, returns to his post (as described in Position E above). Number 3 uncovers the vent and removes the handspike from its hanger, placing it in the pointing rings at the trail of the piece. The Chief-of-the-Piece informs the Gunner of the firing order, the number of the gun, and other information from the Section Officer. When implement acquisition has been completed, Numbers 3 and 4 face front, and the Chief-of-the-Piece returns to a place where he can coordinate the loading and firing sequences.



Satisfied that all implements are in hand, the cannoneers are properly posted, and that the gun has been prepared, the Gunner begins the cleaning steps in the loading sequence.

Gunner orders: ATTENTION DETACHMENT, LOAD BY DETAIL, **LOAD**

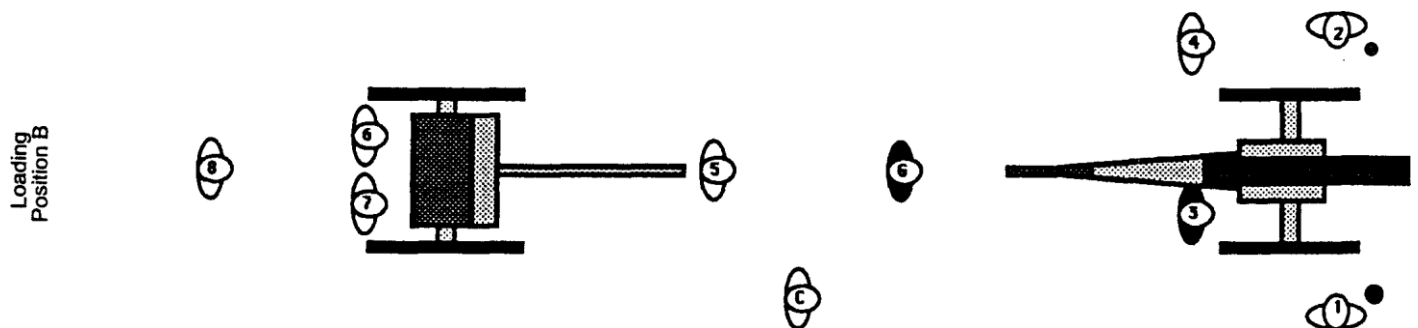
(All cannoneers come to attention for the first step in the loading sequence.) Position A: Numbers 1 & 2, with their implements in hand, turn inward to face each other.

**At Load, Gunner may add: (TYPE OF ROUND), RANGE (xxx) YARDS or, if in a practice situation, LOAD, SIMULATED (or LIVE) CARTRIDGE (This order alerts the cannoneers and specifies the type of cartridge to be prepared and can also add other instructions.)*

Chief of the Box repeats: LOAD (TYPE OF CARTRIDGE) RANGE (xxx) YARDS. The gunner then issues.

Gunner orders: TEND VENT or TEND THE PIECE

(Number 3 steps well inside the wheel establishing Position B)



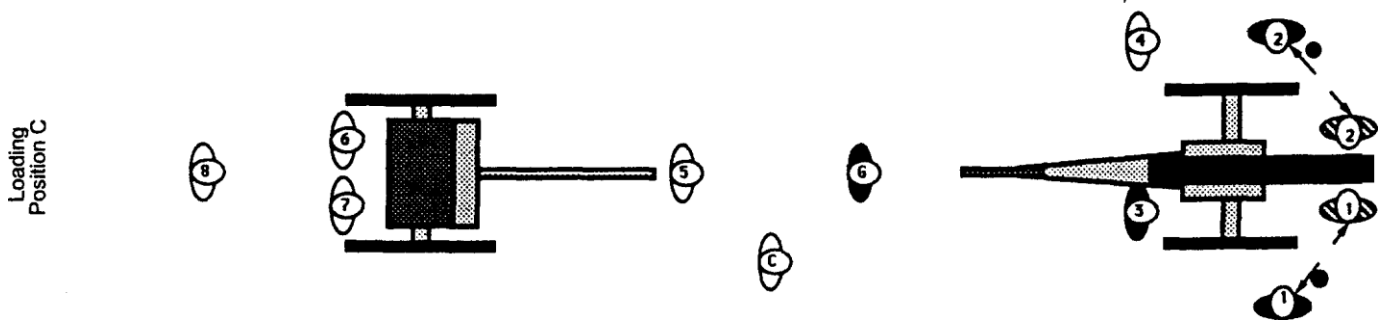
Position B: Number 3 cleans the vent using the vent brush. Then Number 3, with the thumbstall on his left thumb, places the thumbstall over the vent with the fingers to the left side of the gun tube and the elbow elevated to exert downward pressure to shut off the flow of air to the tube. Having accomplished this, Number 3 announces the completion of the step.

Number 3 reports: VENT STOPPED or VENT TENDED

Satisfied that the vent is properly covered and that no air can escape, the Gunner continues the cleaning steps.

Gunner orders: WORM

Position C: Number 2 steps obliquely to the left with the left foot and brings the right foot square therewith and introduces the worm onto the tube. Number 3 keeps the vent stopped. Number 2 runs the worm down the tube seating it at the breach. He turns the worm two or more times, in order to pick up any debris, which may be in the tube. After turning the worm, number 2 withdraws the worm slowly extracting whatever the worm has picked up. He may re-worm if there is any indication that debris is left in the tube. When the task has been completed, Number 2 returns to his post, announces that the step has been accomplished, places the worm either on its stand or with the head upon the axle and the shaft running toward the front of the gun, parallel to the barrel (Note: for those crews choosing to use a separate implement to "dry sponge" Number 2 would now place the worm down and take the dry sponge).



Number 2 reports: WORMED

Gunner orders: SPONGE (or WET and DRY SPONGE if appropriate)

Number 1 steps obliquely to the right with the right foot and brings the left foot square therewith and places the sponge into the tube pushing it all the way to the breach. Number 1 turns the sponge twice and then withdraws it halfway, where he turns it once, then reseats the sponge to the breach and again turns it twice, but in the opposite direction. The sponge is then withdrawn completely and cleared of any debris.

Number 1 reports: WET SPONGED

Number 1 or Number 2 then repeats the entire sponging step, so there will be two distinct sponging steps performed. (Note: a separate dry sponge may be used.) If Number 2 is utilized to complete this process, he steps obliquely to the left with the left foot and brings the right foot square therewith. He runs the sponge down the tube pushing it all the way to the breach. Number 2 turns the sponge twice, and then withdraws it halfway, where he turns it once, then reseats the sponge to the breach and again turns it twice, but in the opposite direction. The sponge is then withdrawn completely and cleared of any debris. Having accomplished the task, Number 2 returns to his post and announces: DRY SPONGED.

Number 1 then spins the sponge around and taps the underside of the barrel twice with the head of the rammer. He places the rammer on the edge of the muzzle, the rammer staff extending horizontally to the right side of the tube. This signals that sponging is complete and the tube and the crew are ready for the round.

(If Number 1 completes both the wet and dry sponging steps, he will report SPONGED)

Satisfied that the gun tube is clean and that the vent is stopped, the Gunner initiates the loading of the cartridge.

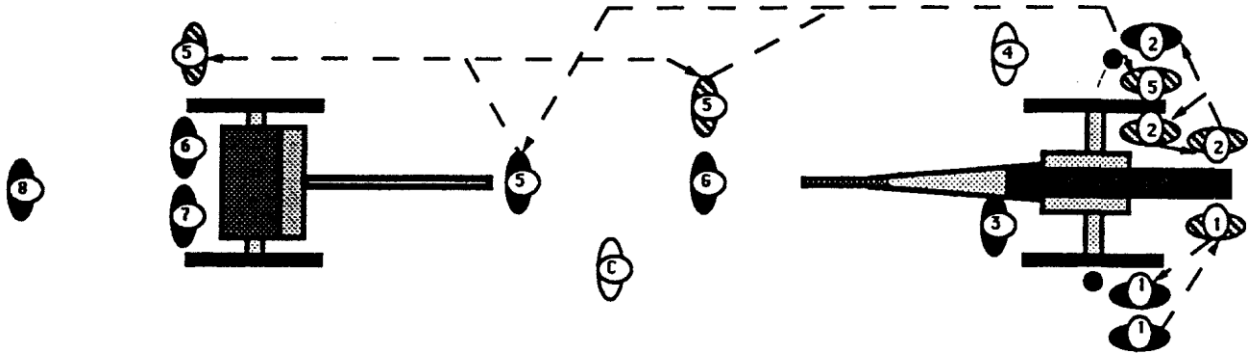
Gunner orders: ADVANCE THE CARTRIDGE *or* ROUND

(This order starts a series of actions at both the gun and the limber.)

Position D: Number 5 walks from his post at the end of the limber pole to the limber chest to receive the cartridge. Number 7 opens the chest and holds the cover. Number 6 selects the cartridge and, assisted by Number 7, removes and stores the packaging. Number 6 places the cartridge in the haversack carried by Number 5. Number 7 closes the chest cover. Number 5 advances the cartridge to the Gunner who inspects the content of the haversack, looking for loose powder or other defects. All being as specified, the Gunner reports PROCEED. Number 5 then advances to Number 2 via a route to the outside of Number 4. When Number 5 obtains the cartridge, Number 2 places his implement in its stand (or upon the axle as previously described) and positions himself inside the wheel with his back to the gun tube. Number 5 stations himself outside the wheel opposite Number 2. Number 5 opens the haversack and lifts it so that Number 2 may reach into it to obtain the cartridge. Taking the cartridge, Number 2 turns to his left, counterclockwise, and inserts the cartridge into the muzzle, ensuring that it is properly placed for the rammer. Number 5 moves to his original post after delivering the cartridge, again traveling on the outside of Number 4. Number 2 now returns to his post near the hub, takes up the worm, and announces that the task has been completed.

(NOTE: *In most cases, number 2 is expected to place his implement on the hub at this time. This will signal that there is a load in the tube and ready to be seated.*)

Loading
Position D



Number 2 reports: CARTRIDGE ADVANCED or *ROUND IN*

Gunner orders: RAM

After confirming the vent is well stopped, Number 1 runs the cartridge down the tube using one hand on the rammer shaft, keeping the thumb uninvolved, with the body behind the muzzle as much as possible. Simultaneously, Number 1 moves toward the axle of the carriage (being careful not to actually contact any part of the gun with his body), releases the rammer with his right hand passing underneath the tube. His left arm extended horizontal, elbow slightly bent, palm down, following the direction of the tube, while staying well clear of the vent, (or with his left arm and hand dropped by his left hip), (Note: After seating the round, Number 1 should wait a few seconds before grasping the ram again. There is always increased danger as the cartridge is pressed against the breech.) Prior to the final seating of the charge, he withdraws the rammer about 1 foot and gives a final light thrust, releasing the rammer as the charge is seated at the breach. After a brief pause, the rammer is then completely removed, one-handed, thumb uninvolved. Number 1 then moves to the right wheel axle hub and places the rammer on top of the hub. He holds the rammer shaft upright in his left hand with the sponge slightly forward. This indicates to all that the gun is loaded. It is also acceptable for number 2 to have the worm on the left hub to signal a Round is in the tube.

Note: This is the most dangerous part of the loading procedure and requires extra care. This procedure may vary from that listed above, due to equipment used, type of cartridge, type and construction of the cannon, and many other factors. The gun owner and safety officer should be aware of the different procedures required and make the final decision as to these actions and the correct procedure. (See addendum) Rounds must be constructed so they cannot leak powder, during the seating process.

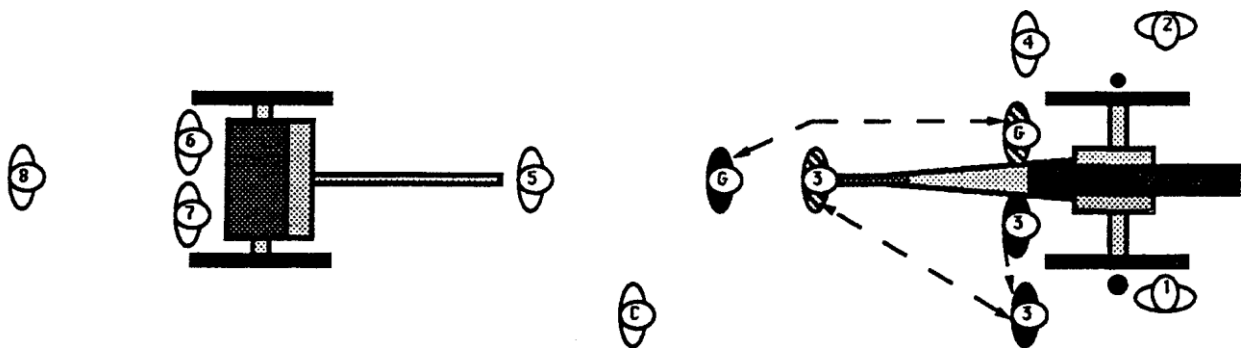
Number 1 reports: RAMMED

Gunner orders: SIGHT THE PIECE

(This action can allow the Gunner and the Chief-of-the-Piece to determine that the field of fire is clear, add extra time to the loading process, the tube is at the proper elevation, and it is safe to proceed. When this option is used, it also adds historic value.)

Position E: The Gunner advances and stations himself along the left side of the trail, left foot forward, right leg extended alongside the trail. He sights along the tube or, if a sight is used, conducts a sighting routine. The Gunner may manipulate the elevating screw. As the Gunner approaches the piece, Number 3 uncovers the vent, steps to his original post, pauses momentarily, and then moves to the handspike. Number 3 may point the gun as indicated by the Gunner who taps on either the left or right side of the trail indicating the desired direction. Being satisfied the field of fire is clear; the Gunner stands, reports "Clear" and returns to his post. Satisfied that the loading is complete and that the area in front of the gun is clear, the gunner initiates the firing sequence.

Loading
Position E



SCHOOL OF THE PIECE

FIRING

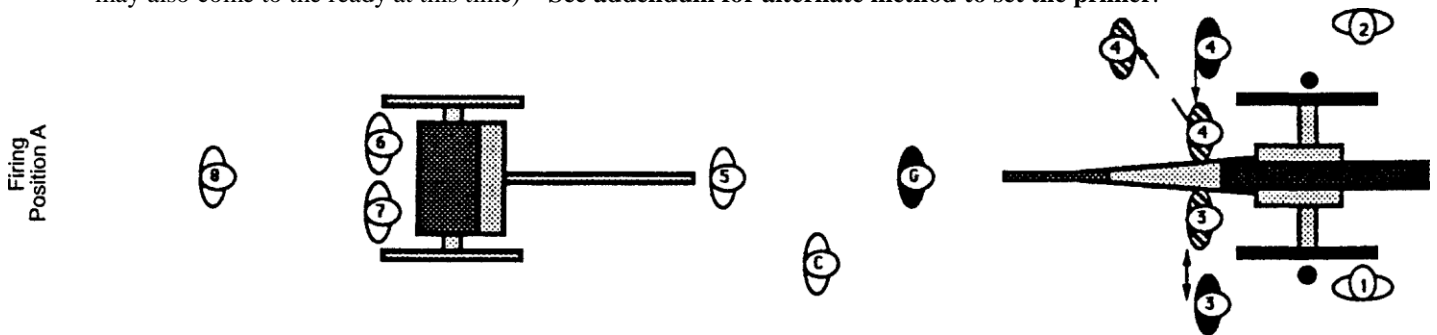
Below are listed the commands and procedures to be followed by the National Civil War Artillery Association in the firing of artillery pieces. All verbal commands and responses are CAPITALIZED while all actions are in normal print. When specific cannoneers are involved in an action, the individuals illustrated are darkened.

This sequence of activities (steps) commences after the cannoneers have completed the loading sequence and are posted as in Position E of the loading sequence. As stated previously, any of the following activities may be interrupted by the command "Cease, Stop or Halt." "Cease, Stop or Halt" may be ordered by any cannoneer at any time. The command "Commence Firing," ordered by the Gunner reinitiates the action.

Gunner orders: **READY THE PIECE** or **READY**

(This command alerts the cannoneers that the firing sequence has begun. Numbers 3 and 4 begin the priming process.)

Position A: Numbers 3 and 4 simultaneously step inside the wheels (if not already in position). Number 3, while keeping his face away from the vent, inserts the priming wire, holding the shaft or the bow of the wire between the fingers of the left hand. Number 3 punctures the powder bag, removes the Priming wire, then announces Powder to confirm the cartridge was punctured. Number 4 then hooks and sets the primer in the vent. Number 3, using the left hand, secures the lanyard with three fingers on the left side of the tube, while keeping the thumb and palm anchored to the breach, and clear of the vent. Number 4 then moves to his position outside the wheel and surveys the crew, making eye contact with each position. Satisfied that all is ready, he nods to signal number 3 to release the lanyard and step back to his position outside the wheel. (Numbers 1 and 2 may also come to the ready at this time) * **See addendum for alternate method to set the primer.**



Number 4 raises his hand and reports: **PIECE IS READY** or **READY**

Satisfied that the gun and the cannoneers are ready to receive the fire order, the Gunner may issue the "PREPARE" command, or if other orders are standing, he may report to the Chief-of-the-Piece or the Section Officer that the piece is **Ready**. **Numbers 1, 2, and 3 come to the PREPARE or READY FIRING POSITION when Number 4 reports the piece ready.** This adds an extra measure of safety if the "Prepare" command is omitted or not used. *(The PREPARE command can be used as a second safety to allow an extra measure of time to assess the readiness of the piece and cannoneers before firing).*

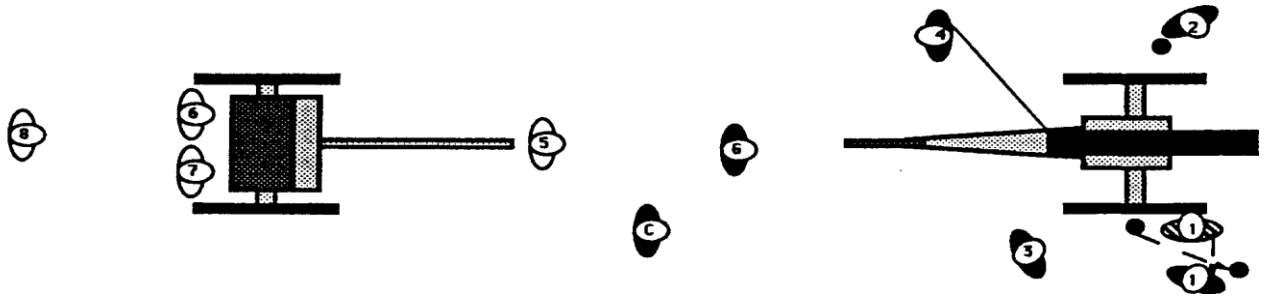
Gunner orders: **PREPARE**, or he may relinquish control of the fire order and reports: **NUMBER (x) GUN IS READY**

(The "Prepare" command is directed to the cannoneers. The "Gun x, Prepare -- ----" report is directed to the Chief-of-the-Piece. When the "Prepare" order is initiated by either the Gunner or, by his proxy, another NCO or Commissioned Officer, the cannoneers respond. *(Note: it is important that the Gunner stay involved, if even as an echo to the officer giving the command. This alleviates confusion that may result in a Number 4 picking up the FIRE command from another crew. It is essential that Number 4 has eye contact with the individual giving the command, and as such, keeping the Gunner involved, no matter what provides that connection.)*

Position B: Number 1 removes the rammer from the hub and steps to his original post where he assumes the position for firing by bending his left knee, placing the head of the rammer onto his right foot, while holding the shaft in his left hand (back of the hand down), and **covering his right ear with his right hand.* His eyes are on the muzzle of the gun and that area of the safety zone that can be seen while looking out over the muzzle. Number 2, on the opposite side of the gun takes a mirror image position to Number 1. His eyes are on the muzzle of the gun. Number 3 assumes a position for firing similar to Number 1. His eyes are on the vent. Number 4 makes eye contact with the cannoneer that will give the fire command. The lanyard is extended and taut. Number 4, holding the handle of the lanyard and keeping it lower than the vent, grips the handle in his right or left hand so that the back of the hand is toward the primer with the lanyard protruding between the second and third fingers close to the knuckles. The command to "Fire" or "Hold", follows immediately after the cannoneers are in the Prepare to Fire Positions.

**If hearing protection is worn in both ears, the right hand will remain on the rammer as well.*

Firing
Position B



Gunner orders: **FIRE**
 (If he has relinquished control, the order to "Fire" originates from the same cannoneer as the "Prepare " command.)

Number 4 pulls the lanyard smartly. The gun discharges.

The loading sequence for the next round may now be started. (Note: The sequence is not complete until the vent is tended, the gun wormed and sponged.) A minimum of two minutes will be allowed to elapse between the command of "Fire", just executed, and the introduction of a load to the bore.
 A minimum of three minutes should be allowed to elapse between the "Fire" commands.

SCHOOL OF THE PIECE
MISFIRE SEQUENCE

If the gun did not discharge or it is perceived that the gun has not fired, any of the cannoneers may call a misfire.

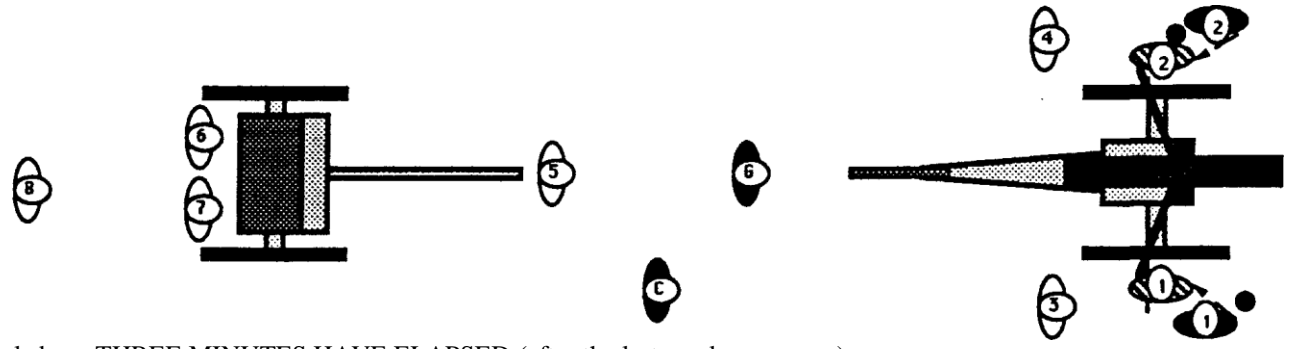
Any cannoneer reports: MISFIRE

Gunner acknowledges: THE PIECE HAS MISFIRED

Gunner orders: DO NOT ADVANCE - THE PRIMER HAS FAILED
 (No further attempt is made to service the gun except Numbers 1 and 2 take the alternate post.)

Position C: Numbers 1 and 2 cross their implements high above the gun at the approximate center of the axle. This display indicates to everyone on the field that a misfire has occurred. All cannoneers will stand clear of the gun for a three-minute interval, starting when the last smoke from the vent is observed. The interval is timed by the Gunner, starts after the last smoke is seen, and should be checked by the Chief-of-the-Piece or a commissioned officer.

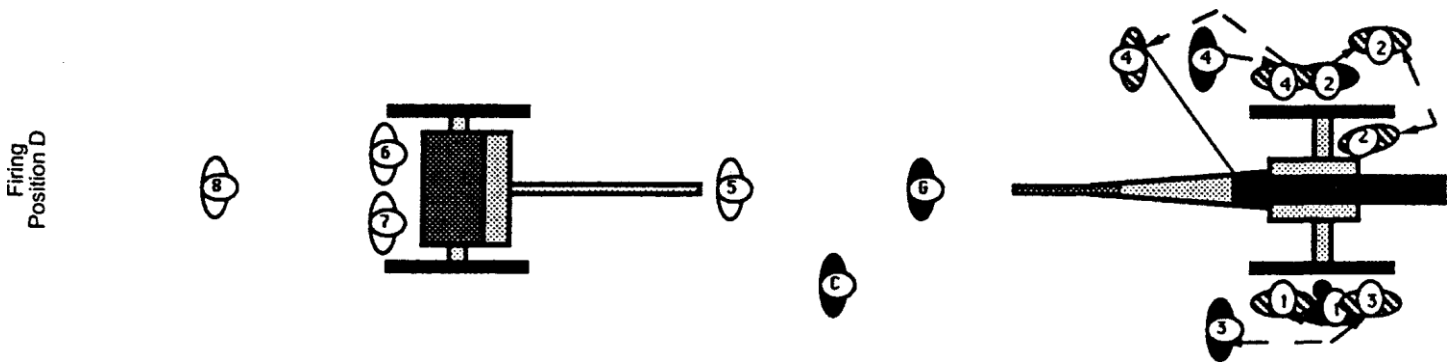
Firing
Position C



Gunner acknowledges: THREE MINUTES HAVE ELAPSED (after the last smoke was seen)

Gunner orders: NUMBER 2, TAKE CHARGE OF THE PIECE or Number 2 Re-pick and Prime.
 (Numbers 1, 2, 3 and 4 begin the procedure to clear the misfire.)

Position D: Number 1 and Number 2 disengage the crossed implements. Number 1 moves into a position near the hub on the outside of the right wheel. Still holding the rammer shaft upright and tilted over the tube as if crossed, Number 1 must make room for Number 3 to advance with the tools (either in front of or behind the position of Number 1) Units should decide for themselves on this option. Number 2 places the worm in the implement stand and steps inside the left wheel by hugging the wheel and keeping his back to the muzzle and the tube. He stations himself facing the rear of the tube in such a manner as to use his left hand to work the vent. Number 3 advances to his misfire station near Number 1 and positions himself outside the right wheel, near the axle hub. Number 3, working above the right wheel, hands the proper tools to Number 2. Number 2 works the vent and extracts the remains of the primer, if any. Number 2 returns the tools to Number 3. (Note: Number 2 and Number 3 should assess the situation and determine if the primer is protruding enough from the vent to utilize pliers or if it is set low and requires a gimlet). Number 2 would normally keep his back to the tube and work the vent with his left hand. Number 3 must position himself so that he or Number 2 does not reach over the vent during the exchange of tools.



Number 2 reports: PRIMER EXTRACTED or THE VENT IS CLEAR

Number 3 hands the priming wire to Number 2, Number 2 inserts the priming wire, holding the shaft or the bow of the wire between the fingers of his left hand. (Never **working across the body** or over the vent) He attempts to puncture the powder bag and removes the wire from the vent.

Number 2 returns the priming wire to Number 3 who moves to his original post.

Number 2 reports: POWDER (Indicates charge is punctured) or THE CHARGE IS NOT SEATED

(If it is determined that the charge is not seated, removal of live charge sequence should be initiated. If the charge has been punctured, the misfire sequence continues.)

Number 4 advances and stations himself outside the left wheel, centered on but clear of the hub. Number 4, working above the left wheel, hands a friction primer to Number 2. (The hook may already be hooked to the primer-unit choice) Number 2 places the primer in the vent. Number 4 then hands the hook end of the lanyard to Number 2 and moves to his position for firing the gun. When in position, Number 4 nods to Number 2 who attaches the lanyard hook to the primer. Number 2 may announce PRIMED. Number 2 steps outside the left wheel and returns to his post, with his implement on the hub.

Number 2 reports: PIECE IS READY "GUNNER TAKE CHARGE OF THE PIECE" may or may not be added

Satisfied that the cannoneers have cleared the misfire and that they and the gun are ready to receive the "Fire" order, the Gunner issues the "Prepare" command.

Gunner orders: PREPARE

(All cannoneers take the positions as described in Position B of the firing sequence, if they did not do so on the report of READY.)

Gunner orders FIRE

Number 4 pulls the lanyard sharply. The gun discharges.

Removing the charge sequence.

These sequences are initiated if, during a misfire, it is determined that the charge is not seated or if a second misfire occurs. When in the charge-not-seated condition, the Chief-of-the-Piece, the Section Officer, the Safety Officer, or the Battery Commander may assume the responsibility for clearing the misfire. Cannoneers will assist as required. Implements at their disposal may include a bronze worm, pressure fire extinguishers, syringes, and other devices to flood the tube. It is always best to exhaust all possibilities to rectify the problem, before attempting to extract the powder charge. Flooding the tube with water to saturate the charge and wash it out might be one option. Pressure applied from a modified fire extinguisher might also be used to remove the charge. Flooding the tube to use the bronze worm may be required, but should be one of the last options. If the gun fails to fire for the second time, "Misfire" is called as before. In this case, the steps in clearing the misfire will be repeated as described in Position D of the misfire sequence up to the primer extracted step whereupon, the Chief-of-the-Piece, or one of the officers will take command as in the charge-not-seated circumstance. (Note: **No charge should ever be reseated after a primer has fired into the chamber**). After 3 attempts to prime and fire, the gun should be shut down and steps to clear the tube should be considered. The Safety Officer should again be notified at this point. If the bore has been flooded and a worm is to be used, no action should be taken, with anyone downrange. Wait as long as possible, after the bore has been flooded, before attempting to remove the charge. This action should be made by order of the safety officer and under supervision.

Securing the piece sequence

Once the "Fire" command has been executed, the Gunner, at the order of the Chief-of-the-Piece or an officer, will terminate serving of the piece.

Gunner orders: CEASE to order CEASE FIRING

(Cannoneers prepare to disengage)

The Gunner uses the cleaning steps as described in the loading sequence, beginning with the "clean- the vent" procedure and continuing through dry sponge to ensure that the gun tube is clean and clear. Dry sponge being completed by Number 2, the Gunner issues the next command.

Gunner orders: SECURE THE PIECE

(Cannoneers begin to stow the implements and secure the gun.)

Numbers 1 through 4 replace the implements, acquired initially as described in Position A of the loading sequence, on their hangers. The sponge bucket, sponges, worm, and handspikes are returned to their proper positions. The vent cover is installed and all debris left from the firing sequence is retrieved. When this has been accomplished, Numbers 1 through 4 return to their posts and come to attention as in Position E of the Limber Drill.

Satisfied the gun and the implements are secure the Gunner continues the sequence.

Position E: The Gunner moves the gun crew to the limber where they will return the issued equipment.

Gunner orders: ABOUT FACE

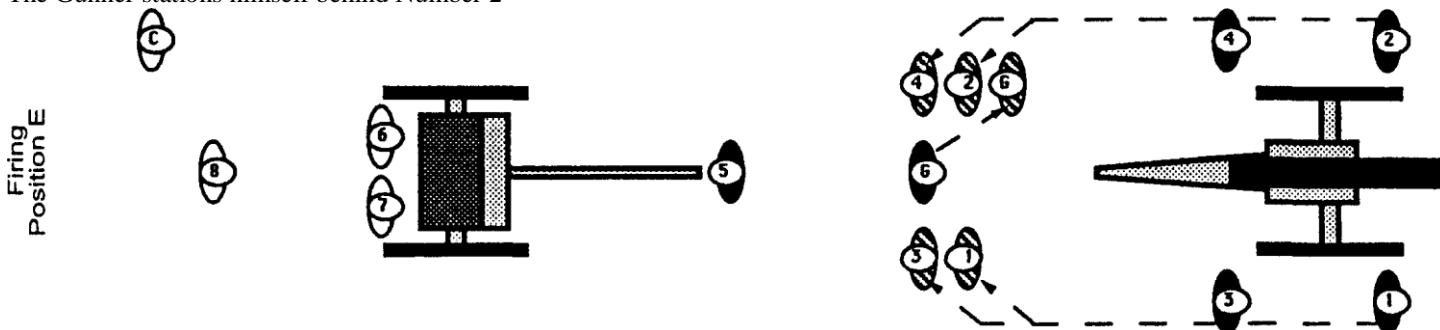
Numbers 1 through 4 turn to face the Gunner, Number 5 faces the limber.

Gunner orders: FORWARD MARCH

Numbers 1 through 4 advances toward the Gunner. The Gunner halts the gun crew at a convenient post. Number 5 does not advance.

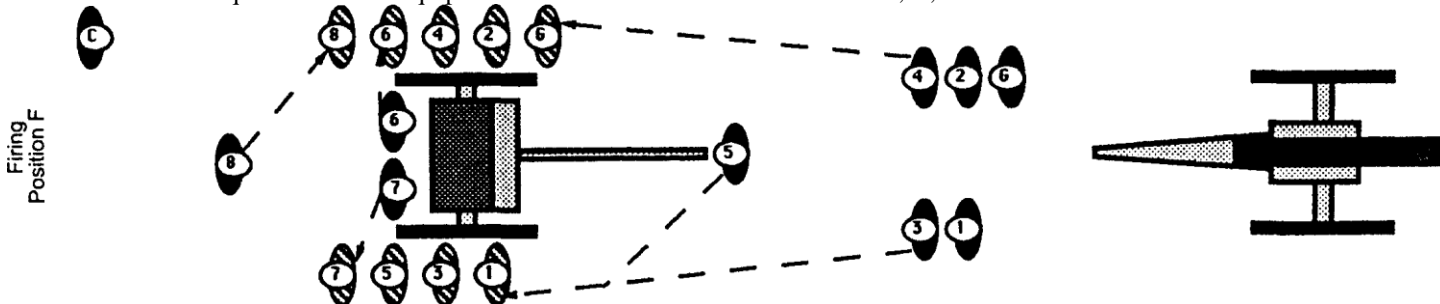
Gunner orders: HALT

The Gunner stations himself behind Number 2



Gunner orders: POST ON THE LIMBER MARCH or other commands to position the gun crew at the limber. Number 5 rejoins the formation in front of number 3.

Position F: In formation, the detachment, moves to the limber and halts in a position as described in Position E of the Limber Drill except, Number 1 through 5 and the Gunner are facing toward Number 8. At this point, Numbers 6 and 8 take charge of the detachment and reacquire the issued equipment in the order described in Position D, C, and B of the Limber Drill.



Chief-of-the-Box or the Chief-of-the-Piece will inspect all equipment and will open and search all tube pouches for unused friction primers and the cartridge haversack for loose powder or other debris. Residue from firing, aluminum foil, will be deposited with Number 8. When the equipment inspection and exchange have been completed, Number 6 orders the chest cover closed and locked. Number 7 closes the cover. Number 6 or 8 informs the Gunner that all implements and equipment have been retrieved.

Number 6 reports: EQUIPMENT HAS BEEN RETURNED

Gunner orders: DETACHMENT, FORM INTO FILES

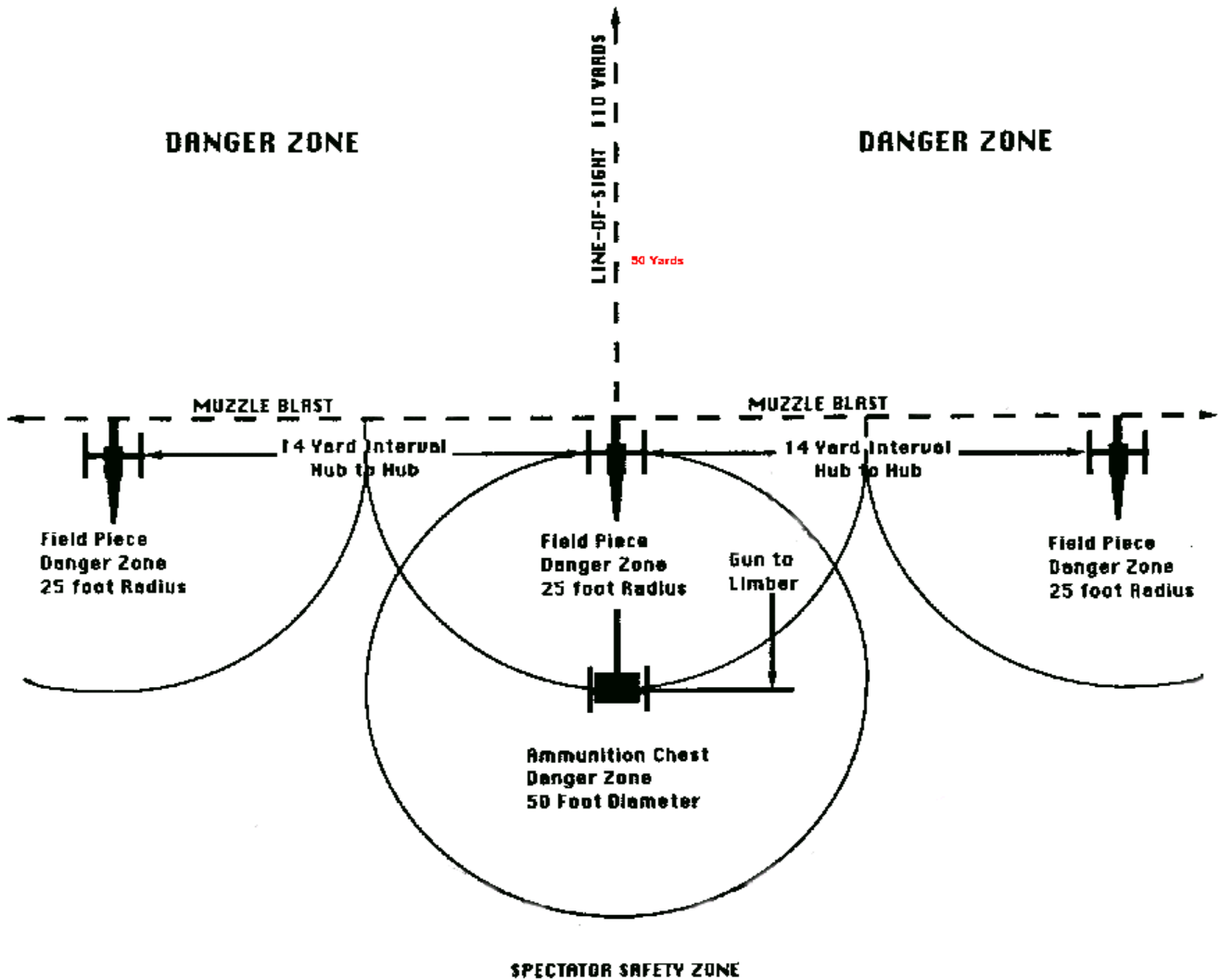
Number 6 steps to the front of Number 4, Number 8 steps to the front of Number 6. Number 7 steps to the front of Number 5. The Gunner may advance the detachment to clear the area of the limber.

This being accomplished, the Chief-of-the-Piece or the Gunner forms the detachment into a proper marching formation. The detachment is marched to their next assignment.

DANGER ZONE

WARNINGS:

The blank cartridge (powder charge), when ignited in the field piece tube, throws a cone of flame 25 feet downrange from the muzzle of the field gun. An accidental discharge with an object such as the rammer, the worm, or a small solid piece of debris in the tube will throw fragments down range an unpredictable distance. The spent primer is launched upward in a column of flame as the field piece is fired. It sometimes comes down outside the danger zone.



50 yards marks the no fire line in the safety zone.

When at all possible, a buffer zone of 25 yards (or more) between the limber danger zone and the spectator line should be maintained. This will also allow room for troop movement and possible emergency vehicles.

PRECAUTIONS:

During firing demonstrations, no one places anything in the Ammunition Chest or takes anything out except Cannoneers Number 6 or Number 7. The Ammunition Chest cover is closed prior to the "Ready" command and is kept closed until the piece has discharged or, in the case of a misfire, until the misfire is cleared. When firing from an artillery line, the chest should also be kept closed while nearby guns are being discharged. No debris of any description is to be stored in the Ammunition Chest. **Do not store Primers or Primer Related Materials in the Limber Chest.**

Powder

Type g or sporting powder -Cannon, Fg & FFg are suitable for blanks. The potential for extremely high pressures is too great with FFFg or FFFFg for blanks or projectiles. The use of Fg &FFg is limited and requires reduced loads.

Type A Blasting Powder -(3FA-1FA) Can be used in most blank rounds. 3FA and 2FA are similar to cannon grade powder and 1FA is much coarser and has been used for projectiles fired in bores larger than 4 inches. Lifting powder and type A powder is often used as cannon grade powder for making blank rounds.

The basic blank load for cannon grade powder is 3.oz (1312.5 gr.) per inch of bore. For most blank rounds, this is a good starting point. With bores less than 2.5” the amount should be adjusted down and for bores larger than 3.75” this *may* be increased to the point that rounds do not butterfly down the bore. **This is for blank rounds only** and many other factors need to be addressed for projectiles.

Pyrodex -*Pyrodex is limited to very few uses and should never be used for blanks. This is not a suitable powder for artillery! Do not experiment!*

Type B Blasting Powder -*Has very unpredictable results when used in Cannon. (Should never be used)*

Note: There are 7000 grains per pound of powder (all types Cannon, Fg, FFg, FFFg, or FFFFg) Granule size does vary, cannon having the largest and FFFFg the smallest, but all have 7000 gr. (weight) per pound.

1 ounce = 437.5 gr.

1 grain = 0.002285714 ounces

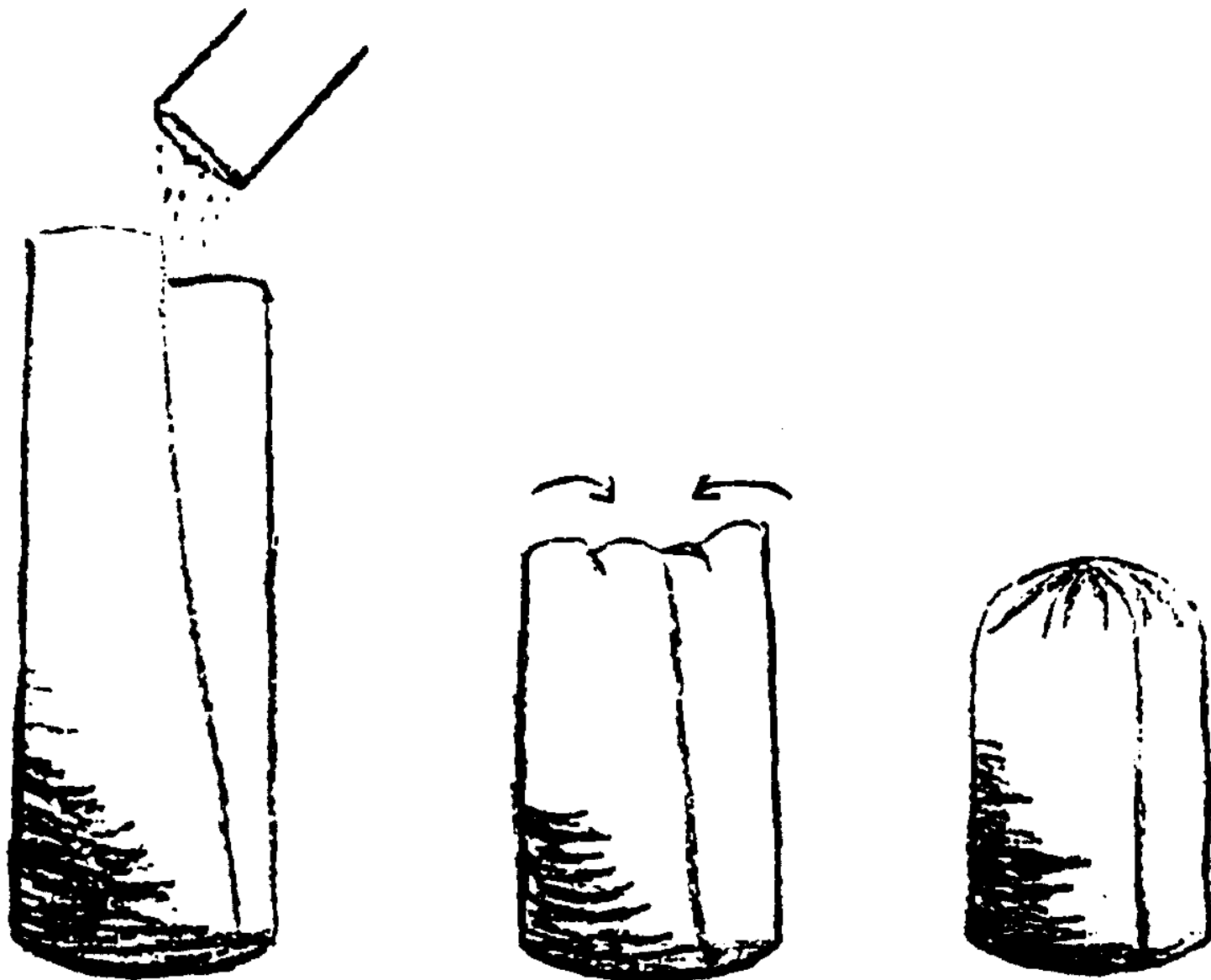
1 pound = 7000 gr.

This is information is for blank rounds only! Many other factors must be addressed for firing projectiles. Do not attempt making blank or live rounds without proper instruction and supervision. **Never store Primers, Powder, or Rounds in the same area.**

Introduction to Blank Rounds

Step 1: Start with a large sheet of heavy-duty aluminum foil. Fold sheet over to make a rectangle large enough to wrap 3 times (6 layers min.) around your cartridge form. (A cartridge form can be made from tubing or a cylinder with an O.D. near the I.D. of the bore)

Step 2: Fold and roll foil around the form. Remember to keep an excess of foil at the bottom of the tube. This will be folded over and tamped to make a thick seal for the bottom end of the blank cartridge.



Step 3: After foil has been tamped and inspected, remove the foil cartridge from the form. The powder charge may now be placed in the cartridge.

Step 4: Fold the foil in on itself to seal the top of the cartridge. The foil should be formed to make an extremely good seal. The end can be color-coded to mark the type and load of the blank cartridge.

This is information is for blank rounds only! Many other factors must be addressed in the construction of blank rounds. Do not attempt making blank or live rounds without proper instruction and supervision. The above information is only an introduction to one method of round construction.

Addendum

* Alternate method to set primer

Number 4 hands the friction primer (**Hooked or Not**) to Number 3 who places it in the vent. Number 4 then hands the hook end of the lanyard to Number 3 (**if not hooked previously**) and steps outside the wheel (**facing forward or back**) setting himself in position so that he can see the cannoneer that will give the fire order. Number 4 nods to Number 3 who attaches the lanyard hook to the primer (**if not already done**). Number 3 may or may not announce: PRIMED. Number 3 then steps outside the right wheel to his original post. *(There is a simpler method, where Number 4 hooks and sets the primer. Number 3 secures the lanyard till Number 4 nods and signals Number 3 to release the lanyard and step back to his position outside the wheel. This method is covered in the main text)*

Best Practices

*Never store Primers and Rounds in the same area. Primers should never be stored or transported in the limber box. Primers should always be store in a sealed container and kept separate from loads and powder.

*It is never a good idea to construct or make rounds at the reenactment or event. All rounds should be well constructed so as not to leak powder and always made in a safe space.

*Never attempt to re- ram a misfired cartridge after fire has been introduced to the chamber.

*Never use more powder in round construction than is necessary to produce an acceptable report.

*Only use acceptable black powder and HD foil in the construction of blank rounds.

*A CO2 fire extinguisher with a long hose and nozzle to fit the vent is a good way to clear misfires. The extinguisher is operated by Number 4. The nozzle is passed over the wheel like all other tools, while Numbers 2 & 4 service a misfire.

*It is a good idea to wear ear protection while firing muzzle loading artillery. If ear protection is worn in the ear facing away from the muzzle, and the other is covered with your hand when in the firing position, both ears are protected while maintaining the ability to hear clearly between firings. **Active ear protection can be worn in both ears, and safe hearing levels can be maintained without the covering of ears.*

*Keep earplugs and period safety glasses available for anyone that needs or requests them.

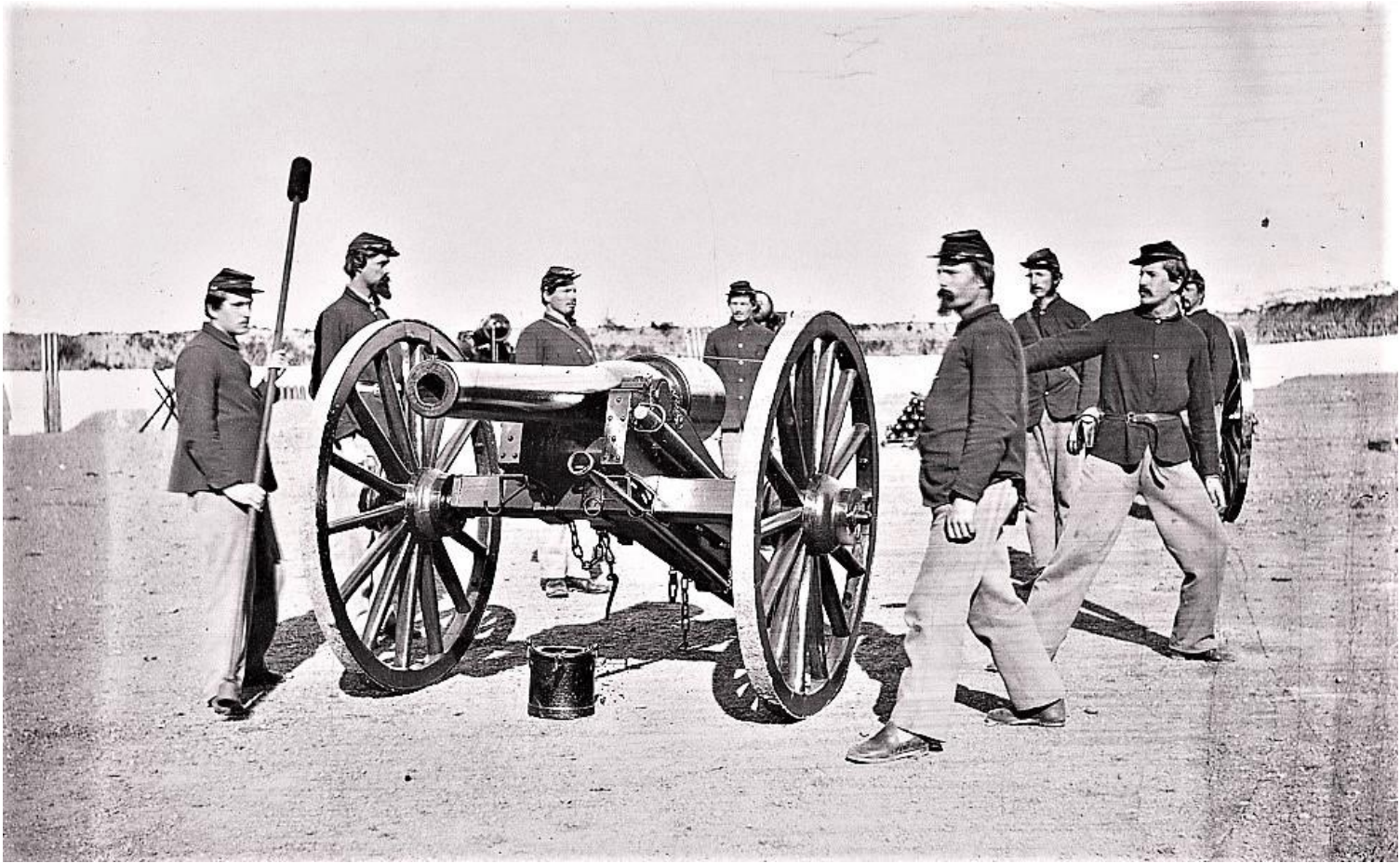
* It is advisable that Number 3 wear optional eye protection, due to his close proximity to the Vent and possible Primer Splatter. It is also advisable that all cannoneers incorporate some type of eye protection into their impression.

*Only necessary equipment and accoutrements should be worn while servicing the piece. Anything that might get caught or hinder movement should be left at the limber or in camp.

* Assign a member to guard the limber and box whenever the piece might be overrun or abandoned during battle.

* Whenever weather conditions allow, protective clothing should be worn while working the front of the gun. A heavy long sleeve uniform jacket might help afford some small degree of protection from an accidental discharge.

* It is a good idea to remind #1 and #2 to watch out over the muzzle and down range, #3 the primer, and #4 of the firing procedure to be used.



Civil War era (1861-65) cannoneers from the 1st Connecticut Heavy Artillery Regiment practice firing with a 20-pounder Parrott rifle.