

# The Artilleryman



*...dedicated to the advancement of safety and skill in the exhibition and competition shooting of muzzle loading cannon and mortar.*

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## Artillery Safety Rules

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## **Artillery Safety Rules**

**A Service of Civil War News:**

# **National Safety Rules and Procedures For Shooting Muzzleloading Artillery**

### **GENERAL INFORMATION**

The following safe shooting procedure presumes the crew is firing blank charges or projectiles with a muzzleloading artillery piece made (or altered) to modern safety standards. (If firing blanks skip Step VII and see Safety Rule 10.) The bore should be lined with seamless steel tubing with a minimum 3/8-inch wall thickness and a yield strength of 85,000 p.s.i. or greater. The breechplug should be threaded and pinned; welded and pinned breechplugs can be equally strong but require expert installation by competent manufacturers. Sand-cored bores are not recommended for shooting. The vent should be drilled in a threaded copper bolt similar to original cannon vent liners of the 1840-1865 period in order to provide an unbroken passage through the casting and the liner, into the bore.

### **SAFETY ZONE**

Establish a 50-foot wide safety zone between the spectators and the gun. No one is to be forward of the muzzle at any time. Only crew members or authorized personnel are to be in this zone.

### **EQUIPMENT REQUIRED**

Two men minimum. Ammunition box with self-closing lid restricted to opening at no greater than 80-degree angle. Vent brush or cleaning device. Vent pick. Thumbstall. Heavy leather welder's gloves. Leather haversack for use as ammunition pass box and another for priming materials. Rammer. Wet sponge. Dry sponge. Worm. Water bucket. Primers. Priming power device (if used). Linstock and slowmatch or lanyard. Stopwatch. Gimlet. Individual safety containers for powder charges, high intensity flashlight.

### **TEN-STEP STANDARD PROCEDURE**

#### **I: Clean The Vent**

Clean the vent as the first step in each cleaning, loading, firing sequence. Use a .22 caliber or appropriately sized bronze cleaning brush on a suitable rod and brush the entire vent twice. If no brush is available, the alternative method is to run the priming pick or gimlet up and down the vent twice, twisting it to make sure the vent is completely free of powder bag remnants.

#### **II: Stop The Vent**

Seal the vent with thumb pressure during the entire cleaning and loading procedure. This means no air should escape the vent from the time the worm enters the muzzle until the rammer is removed after the projectile has been seated. Use a leather thumbstall or heavy leather glove to protect your thumb and make a tight seal.

### **III: Worm The Bore**

Using a tool with two sharp steel points which replicates an original cannon cleaning worm, worm the bore twice. Give two complete turns of the worm at the breech each time to pick up any powder container remnants and to loosen any powder residue. The worm should fit closely so the points will pick up debris easily.

### **IV: Wet Sponge the Bore**

- Sponge with a wet (but not sopping) tight-fitting sponge with a head of lambs wool or wool carpeting over a wooden cylinder affixed to a shaft at least one foot longer than the bore. The end of the sponge head should conform to the shape of the breechplug (hemispherical or flat).
- Seat the sponge against the breech with hand pressure and give two full rotations of the shaft. Withdraw the sponge half-length, twist, then reseal against the breech and give another two full rotations.
- Remove the sponge. If any powder container remnants or unburned powder comes out with the sponge, repeat the entire process, starting with Step III: Worm.

### **V: Dry Sponge The Bore**

After wet sponging, the same procedure is used with the dry sponge. The dry sponge is cleaned and dried off periodically with an absorbent towel-type rag. (The purpose of the dry sponge is to remove excess moisture from the bore; if water is left in the bore it may cause incomplete burning of the next powder charge, leaving dangerously glowing residue.)

### **VI: Load Powder**

- Use a plain wooden pole without a head, or with a smoothly tapered head, so that it might force the hand open should a premature ignition occur. Staffs should be dense hard wood (ash or maple). Painted cardboard tube rammers are safer than wood and can be obtained in heavy-duty long lengths which are durable but will disintegrate into less dangerous pieces.
- Mark the rammer in advance in two places, one to show the amount of shaft which should be left sticking out the muzzle when the charge is fully seated and the other to show when the rammer is fully seated at the breech.
- The ammunition chest should be located 25 feet behind the gun. Powder charges should be prepared in advance as specified in Safety Rules 1 and 2 below, wrapped in heavy-duty aluminum foil. Each charge should be kept in an individual safety container within the chest to prevent them from breaking open during transport or accidental upset of the chest. (Fiberboard military shell cases or fuse cans or similar tightly sealed containers are recommended.)
- Open the chest only long enough to remove one safety container and transfer it to a leather haversack. (Do not open chest following warning that a gun is about to fire until 10 seconds after that gun has been discharged. This is to prevent hot vent debris from falling into chest).

- Carry container within leather haversack to the gun. Do not proceed to load unless 3 minutes has elapsed since the gun was last fired (even though cleaning procedure has been completed). Use a stopwatch.
- Open safety container. Remove foil-wrapped charge and place it in muzzle with one hand while wearing heavy leather welding gloves, hot stove or foundry worker's gloves.
- Wearing the heavy gloves, stand to the side of barrel with as much of your body as possible behind the plane of the muzzle. Grasp rammer **underhand, with one hand, thumb -to-the-side**. Seat the charge lightly with smooth, short strokes. **Do not pound the rammer against the charge.**
- Immediately upon feeling the charge reach the breech, drop your hand away, releasing the rammer. After 10 seconds and after ascertaining the charge is fully home (according to the rammer marks) remove the rammer, one hand, underhand, thumb-to-the-side. This may require grasping and releasing the shaft a few times. At no time should more of the body than absolutely necessary be forward of the muzzle face and never in front of it **Never have two hands on the rammer.**

#### **VII: Load Projectile**

- The projectile loading procedure is the same as that for powder. The rammer is operated with short strokes, **one hand, underhand, thumb to the side**, until the mark shows the projectile has been fully seated.
- As with all muzzleloaders, to avoid bursting the barrel it is essential there is no air gap between powder charge and projectile when the gun is fired.
- When the rammer is removed, after the projectile is seated, the vent may be released.

#### **VIII: Pick The Charge**

- To insure ignition, pick the powder charge wrapper through the vent with a pick or gimlet held by the shaft, between glove protected fingers.
- The pick should not be so long that it reaches the bottom of the bore when fully inserted so as to avoid making pits under the vent

#### **IX: Prime**

Priming the vent depends on the type of ignition to be used. Typical systems are: linstock and priming powder, fuse, priming quills, friction primers, .22 blank, and percussion cap.

#### **X: Fire The Gun**

The man designated to ignite the charge (the No. 4 man in Civil War period drill) calls out "Ready to Fire" in a loud voice to alert other crews on the line that his gun is about to fire and to notify the gun captain that the piece is primed. At this call, any open ammunition chests are immediately closed. The gun captain makes a quick visual

inspection of the range forward of the muzzle to make sure no one (photographers, children, pets, etc.) is in danger and then commands "Fire". The primer is then ignited.

Priming powder, fuse and priming quills are ignited with a linstock which is long enough to allow the cannoneer to stand outside the wheels. The linstock holds the burning slow match made of cotton rope impregnated with potassium nitrate or lead acetate to make it burn.

If a lanyard is used to ignite friction primers, or to activate a lock using percussion caps or blank cartridge, it also should be long enough to allow the cannoneer to stand outside the wheels and out of the way of recoil.

Start your stopwatch to be sure at least 3 minutes elapses before powder is reloaded.

## MISFIRES

If the primer ignites, but the gun fails to fire:

- Command: "Do not advance, the primer has failed." Start stopwatch. Wait 3 minutes.
- When 3 minutes has elapsed, step inside wheel from the front of the axle so you will be out of recoil path should the gun discharge unexpectedly. **Do not get in front of muzzle at any time.** If gun is less than full-size or barrel under 5 ft. this position might put you in danger of muzzle flash so you will have to work behind the axle. Use good judgment. Estimate recoil distance and stand well back from axle.
- Wearing gloves, use a gimlet to clear the vent. Grasp by shaft only. Keep head away from vent. When vent is clear, reprime and fire.
- If three attempts fail to fire the gun, use a CO2 fire extinguisher (with horn removed) to blow down vent and force powder (and projectile) from the barrel. If CO2 is unavailable, flood bore and vent with water and worm after thorough soaking.

## TEN BASIC SAFETY REGULATIONS

**1. Maximum blank powder charges for properly constructed guns of 3-inch bore or larger should not exceed 2 oz. of Fg grade or 3 oz. of Cannon Grade GOEX black powder per inch of bore diameter. Maximum powder charge for bore of more than 2 inches and less than 3 inches should not exceed a total of 3 oz. Fg or 4 oz. Cannon Grade. Use reduced loads with projectiles. (See North-South Skirmish Association regulations for a guide to projectile weights and powder charges.)**

**2. Prepare powder charges in advance using light-weight plastic baggies with end twisted closed. Leave 2 inches of twist; cut off excess plastic. Fold twist to bag. Enclose bag in a triple layer of double-thickness heavy-duty aluminum foil (six layers total). Take care not to break plastic baggie. The bag prevents escape of powder dust and keeps granules from getting trapped under folds of aluminum to help insure complete burning. (Aluminum foil wormed out after firing often yields unburned powder although this may appear impossible to those familiar with smaller caliber guns.)**

3. All crew members should wear ear protection devices.

4. No one should cross in front of the muzzle at any time during the cleaning, loading or firing procedure.

5. The ammunition box shall be located 25 feet behind gun and attended at all times or locked. The interior shall be lined with a non-sparking material and the box itself shall be stoutly constructed of wood or metal.

6. No smoking at any time within the safety zone.
7. No drinking alcoholic beverages for 10 hours prior to serving on a cannon crew. Any crew member showing signs of the effects of alcohol or other drug should be replaced.
8. Projectiles shall be constructed so that they easily pass through a sizing gauge with finger or thumb pressure only. The sizing gauge to be a length at least 1.5 times the length of the projectile and in inner diameter no greater than bore diameter when the barrel was new.
9. Projectiles should not weigh more than one half the weight of projectiles used in original issue guns of same bore diameter.

**10. When blank firing no wadding should be used nor should be necessary for a realistic report.**

#### **EIGHT KEY POINTS FOR SAFE SHOOTING**

- A. Always allow 3 minutes between firing and reloading next powder charge! There is a valid reason for every rule and procedure contained herein. Follow them and make this a safe sport.
- B. Use black powder only. Inspect your gun tube regularly for signs of stress.
- C. Maintain the 50-foot safety zone with a rope or string marker.
- D. Walk. Do no run. Work at a smooth steady pace.
- E. Train your crew. Run through a dry fire evolution at least twice before commencing operations with live charges each day. Be sure each crew member performs his duties smoothly and accurately.
- F. Make sure each crew member has knowledge of procedures and safety rules.
- G. Have the No. 1 man (rammer) repeat the step instructions as they are called out by the gun commander (or No. 3 man tending the vent). This serves as a procedural check so that none of the 10 steps are omitted by error. Memorize this sequence: 1. Clean vent, 2. Stop vent, 3. Worm, 4. Sponge, 5. Dry sponge, 6. Load powder, 7. Load projectile, 8. Pick charge, 9. Prime, 10. Fire.
- H. Use good common sense. If something is done wrong, STOP. Think it through. Then act to correct it. The stop and think approach gives more opportunity to avoid accidents than the press onward-out-of-sequence method.

#### **WARNING:**

**Loading and firing antique or replica muzzleloading cannon is a highly dangerous activity, likely to result in death, dismemberment or serious injury. Structural integrity of the barrel, powder charge preparation, premature discharge as a result of burning embers remaining in the barrel from previous cannon fire, reliance on others to follow proper procedures and other unforeseen and unanticipated conditions may contribute to accidents, serious injury or death. The authors and publishers of these Rules and Procedures specifically recommend you do not engage in this activity unless you are thoroughly trained by competent instructors, and fully aware of the potential for injury or death. DO NOT RELY ON THE INFORMATION CONTAINED HEREIN TO PROTECT YOU FROM THE DANGERS OF ENGAGING IN THE LOADING OR FIRING OF ARTILLERY. This document is ONLY a summary of what the publishers consider the essential safety rules and procedures they themselves follow when engaging in this extremely hazardous activity, and which have been adopted in part by the Commonwealth of Massachusetts Dept. of Public Safety, the North-South Skirmish Association, the American Artillery Association, the Union and Confederate Volunteers, the National Muzzle Loading Rifle Association and other such groups which participate in the loading and shooting of antique artillery for recreational and historic demonstration purposes. You should be forewarned that SEVERAL DISMEMBERMENTS AND FIVE DEATHS HAVE OCCURRED in the United States and Canada since 1975 to persons while loading or shooting antique artillery or replicas. In addition, gun tubes have failed, sending fragments in all directions at high speed and causing damage and injury. If you decide to engage in this activity, use only black powder in Cannon Grade or Fg grade. Just because the color of the powder is black it doesn't mean it is "Black Powder." Know your propellant and get it from a reliable source in labeled containers.**

These rules were compiled by The Artilleryman magazine and reflect a consensus of safety procedures developed from historical records and practical experience of many present shooting organizations. They were written and edited by Matthew C. Switlik, author of The Complete

Cannonner; George McDonald II, late commander Clark's Battery, N-SSA; Bernard Kurdt, commander, 120th N.Y. Volunteers, N-SSA and Safety Officer, Union and Confederate Volunteers; and C. Peter Jorgensen, The Artilleryman editor and publisher.

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**Kay Jorgensen, Editor**  
**Civil War News - The Artilleryman**  
**(800) 777-1862 - [e-mail](#)**  
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