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FROM "click" TO "BANG!

(Improving the reliability of your firelock)

by
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Introduction

How often do we see something like this on the field?

We are at the highlight of a Tactical Demonstration. A dozen or so soldiers make ready, present and fire a volley – of one or two muskets! It happens with embarrassing frequency, often just when the scenario requires a crashing volley.

Sure, misfires happened frequently on the 18th Century battlefield. But not in the massive proportions that we frequently experience. Contemporary commentators estimated that approximately 15% of the muskets in any given volley would misfire.[1] All too often we only get about 15% of our muskets to fire.

This paper looks at a number of things that we can do to increase the reliability of our flintlock musket or rifle – in other words, what we can do to improve the odds that when we pull the trigger, it will go BANG! Instead of click.

Most of the information and techniques that will be discussed I learned from experienced Brigade target shooters, some of whom are no longer with us -- Frank Gallinant, Grant Woodbury, Si Smith, Dave Horn and John Tintle to name but a few. Some of it was gleaned from various publications and articles in shooting magazines. There even may be a few points that I figured out for myself in almost thirty years of competitive shooting with flintlocks, but not many. Most of it is pretty much common sense – things that were probably well known to our forefathers who dealt with flintlock arms all the time – which have been lost over the years and must be relearned by us 21st Century types.

The discussion is organized into five parts:

> Reliability in the Field, or things you can do on the field to improve reliability.
>
> Preparations to Insure Reliability, or things you can do before you leave home to improve reliability.

Modifications to Enhance Reliability, which will discuss things that you can do to "tune" your firelock to improve its performance.

Maintenance in the Field, which will discuss field cleaning and simple maintenance that you can do in the field in an authentic manner.

Maintenance at Home, which will discuss cleaning and maintaining your firelock at home where you presumably have access to modern materials and tools.

Reliability in the Field

Let's look first at what you can do in the field to improve reliability.

Loose Flint

In my experience, the most common source of misfires is a loose flint. Even a little looseness will cushion the blow of the flint on the frizzen and substantially reduce its ability to strike sparks.

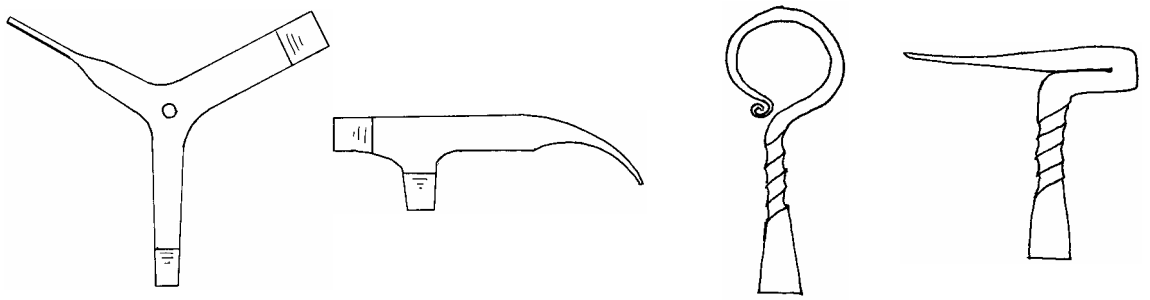
Get in the habit of checking your flint for tightness every time before you take the field. The simplest way is to grasp it between the thumb and forefinger and try to move it from side to side in the jaws of the cock. If you can move it at all, it is too loose and should be tightened.

Tightening a newly installed flint is particularly important. Whether you use leather or lead as a pad, a newly installed flint will tend to loosen after the first few shots as the serrations in the jaws work their way deeper into the pad. So whenever you install a new flint, be more than usually attentive to checking it for tightness. Whenever I install a new flint (or re-install an old one), I snap the lock 2 or 3 times, then tighten down on the cock screw again. I usually can get at least another quarter turn out of it.

Turnkeys

Let me diverge here for just a minute to talk briefly about musket tools, also referred to as "Turnkeys."

Turnkeys



There are three types of turnkey commonly seen on the field, the "Pickering Tool," the "British" musket tool, and several varieties of "home made" turnkeys.

The "Pickering Tool" was recommended by Timothy Pickering as a combination turnkey, vent pick and flint knapping hammer. Many are seen among re-enactors. However, I have never encountered any evidence that "Pickering Tools" were ever made, issued or used. Nor has anyone else I that know of.

I have found the "British" musket tool to be the most useful because it gives a lot of leverage to tighten down on the cock screw. The tighter the better. Don't be afraid to really tighten down hard. It is virtually impossible to break something and if something does break, it was probably defective in the first place.

Flint Pad Material

A major factor affecting one's ability to keep the flint tight is the material used for the flint pad – the piece of leather or lead used to help the jaws grip the flint securely. Eighteenth Century practice, especially for muskets, seems to have been overwhelmingly to use sheet lead rather than leather.

> "The flints should always be screwed in firm, between a thin piece of lead, it having a more certain hold, than leather, or any other contrivance..."[2]

Riflemen may have used leather, but I suspect that when they did it was because leather was more readily available to them than sheet lead. I have tried both, and I have gone to sheet lead for both my muskets and my rifles. I find that it provides a much more secure grip that doesn't loosen nearly as frequently as leather. Further, it is much more convenient and fast when it is necessary to change a flint because the lead pad can be swaged to the flint beforehand, giving you only one piece to handle rather than two. I recommend sheet lead over leather.

Dull Flint

The next most common cause of misfires is a dull flint. With every snap of the hammer against the frizzen, the flint scrapes some steel from the face of the frizzen in the form of sparks. But some material is also lost from the edge of the flint. Eventually the flint becomes dull and will no longer reliably strike a spark. .

To correct this problem the edge of the flint must be chipped or "knapped" to form a new, sharp edge. *Before any attempt is made to put a new edge on a flint in the field the charge should be dumped and the pan blown clear of powder to prevent an accidental discharge.*

We've all seen men frantically chipping the edge of their flints with their musket tool or a knapping hammer to restore the edge, and this is one way to do it. However, it has some disadvantages. It not only requires an extra tool, the edge that it produces is usually serrated, with peaks and valleys. When the lock is snapped, only the peak(s) contact the face of the frizzen. Hence only a small portion of the flint edge can shave metal from the firzzen face to generate a spark. The best shower of sparks is usually obtained when the flint edge is straight and contacts the face of the frizzen along its entire width.

An alternate way to put a new edge on a dull flint is to use the edge of the frizzen. Put the cock fully down in the fired position. Close the frizzen on it. Then, pressing hard on the front of the frizzen so as to close it, simultaneously pull back slowly on the cock. As the edge of the flint passes the edge of the frizzen, the frizzen will flake off small chips from the flint edge, creating a new edge that is straight and properly aligned with the face of the frizzen. It takes a little practice to get it down, but this method of restoring an edge to a dull flint is quick, requires no extra tools and looks a lot better on the field.

From time to time a flint will contain an inclusion which produces a round spot on the edge that slides over the face of the frizzen instead of shaving off small amounts of steel to form sparks. Sometimes such an inclusion can be removed by using the edge of the frizzen. But at other times it will be necessary to resort to a knapping hammer to remove it.

Flint too Short

Sometimes, after a period of use, a flint will become too short to properly throw open the frizzen and create sparks. Ideally, the flint should strike the frizzen approximately 2/3 of the way up from the bottom. That gives it plenty of distance to shave bits of steel form the frizzen face. If it is striking at 1/3 of the way up or less, it probably is not working as well as it should be. The easy and quick fix for this in most cases is to turn the flint over. Most people install the flint with the bevel up. Turning it over and placing the bevel down will raise the point of contact and give you a few more shots.

One can also install a small piece of hard wood between the back of the flint and the cock screw to move the flint forward a bit. Ultimately, however, it will be necessary to install a new, longer flint.

Incidentally, it really makes no difference whether the flint is installed with the bevel up or down. 18th Century instructions say clearly that the flint should be installed whichever way causes the edge to strike the face of the frizzen approximately 2/3 of the way up from the bottom.[3]

Flint No Good

Sometimes you will encounter a broken/shattered flint, or simply one that has been "fixed" so often that it is beyond saving. Here you have no option but to change out the flint. In tactical demonstrations speed is usually not an issue. But in rapid fire target competition, speed is key to getting off those extra aimed shots. If you have a choice, go onto the field with a thick flint in your piece and a thin one, with the lead pad swaged onto it, in you pouch as a spare. If you encounter a catastrophic flint failure, you can then simply loosen the cock screw, sweep out the failed flint and insert the new one without having to open the jaws further. A couple of twists will tighten down the jaws and you're ready to go again. With practice, it is possible to swap out a flint in less than 20 seconds using this technique.

Loss of Prime

Loss of prime is another frequent cause of misfires. If , when you look into the pan after you pull the trigger and nothing happens (as we all should do after every misfire), there is nothing there, and no wisp of smoke is coming from the touch hole, you probably had your prime leak out somewhere in the process. We'll talk about ways to prevent loss of prime later, but if you encounter loss of prime in the field, do not load another round! That can lead to an embarrassing and possibly dangerous overload. Just re-prime, using some powder from another cartridge (if you don't carry a priming horn), and try again. If that doesn't work, dump the charge and blow the pan before trying other "fixes."

Plugged Touch Hole

If the prime flashes but the main charge fails to fire, you may have simply suffered a flash in the pan, you may have a plugged touch hole or you may have lost the main charge. When that happens to me, my first step is to simply re-prime and try again. If that doesn't work, I have recourse to my vent pick, then try again. If that doesn't work, I check to make sure that the weapon is unloaded (and unload it if it isn't), then start over again with a new cartridge.

That about covers what you can do once you've taken the field to improve reliability. Let's look now at some of the things you can do before you take the field to improve reliability

Preparations to Insure Reliability

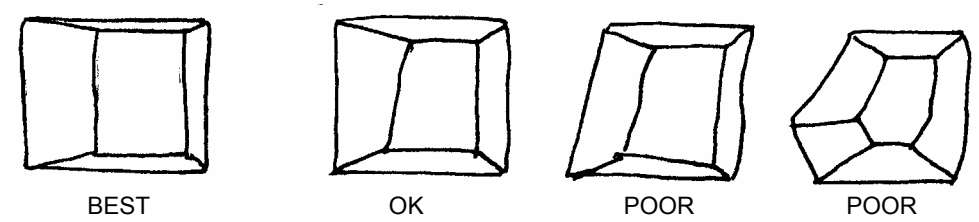
FLINT SELECTION

Selecting good flints is one of the easiest and surest ways to help insure the reliability of your firelock. When you go to a sutler, you will find flints of all sizes and shapes in his bin. You are going to pay just as much for a poor flint as you are going to pay for a good flint, so it pays to be selective.

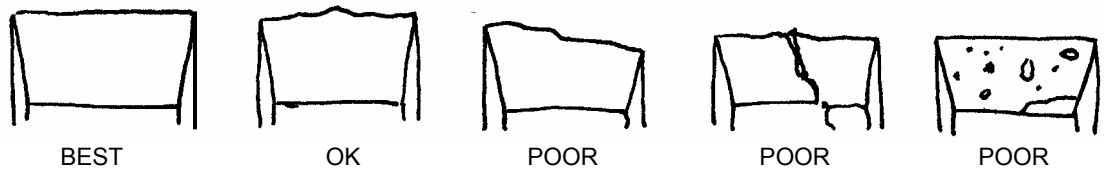
The three things to look for when selecting flints are Shape, Size and Edge.

Side Views

Top Views



Edges



Shape: You want a flint that has parallel faces on top and bottom, that slopes in one plane from the thickest part of the flint to its edge, and which has no lumps, bumps, ridges or other discontinuities along these three facets. Also, when looked at from the top, the flint should be rectangular in shape with no appreciable skew.

The are several reasons for preferring flints of this shape.

First, they are held more securely in the jaws of the cock. Flints with parallel top and bottom faces provide maximum surface area for the cock jaws to bear on, and hence maximum resistance to loosening. Flints with lumps on the upper or lower surface provide less area for the jaws to grip and tend to be difficult to clamp securely. Flints with a ridge like a roof line along the top face provide only a thin line of surface for the cock jaws to bear on. The greater local pressure tends to deform the pad (be it leather or lead) within a few shots, leading to a loose flint. Eventually the ridge may cut through the pad, leaving only the hard edge of the flint for the jaws to grip on.

Flints with lumps, especially near the edge, have a tendency to develop smooth spots that slide over the frizzen rather than cutting into it to produce sparks.

Flints that have a "double slope" on the edge often work quite well, but can wear so that they present a thick edge to the frizzen which will not produce sparks reliably.

Skewed flints are often difficult to position in the jaws in a way that allows the edge to lie parallel to the surface of the frizzen. If the edge is not parallel to the frizzen surface, it will contact only a small portion of the frizzen, reducing the number of sparks produced.

Size:

Look for a flint that is wide enough so that the edge spans the entire width of the frizzen face without hitting the barrel or the flash guard in the fired position. The more striking area you get, the better the shower of sparks should be.

Also, look for flints that are of the proper length to strike the frizzen face about 2/3 of the way up from the base, but short enough so that they will not impinge on the hammer stall (frizzen cover) when the frizzen is closed and the lock is at half cock, which can cause loss of prime. The length parameter can be met by having the flint in either the bevel up or the bevel down position. Don't forget to allow room for the thickness of the material that you use for flint pads. There is some leeway in this if you use lead -- you can shave some lead from the back of the completed flint/lead pad assembly to adjust the overall length of the combination (see below).

Edge

The ideal edge for a flint is straight across the front, translucent with no sign of inclusions (dark or light spots) when held up to the light, and slightly concave on the underside.

Of these parameters, the translucent edge without inclusions is the most important. It is the inclusions that you find in many flints that cause smooth spots as the flint wears away.

An edge that is not quite straight across can be corrected by a little judicious knapping. Often simple knapping with the edge of the frizzen will correct minor imperfections.

The concave underside is only a minor advantage in that it tends to focus the spark shower into the pan rather than scattering it. But flints with flat or slightly convex undersides also work well. Avoid an exaggerated underside of either type.

PRE- INSTALL LEAD PADS

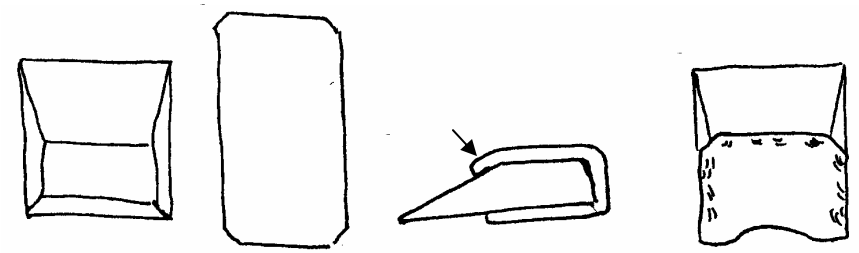
By pre-installing sheet lead pads on your flints, you not only facilitate flint changing in the field when necessary, you can also adjust the length of the combination so that the flint edge strikes the frizzen face at the proper height when the back of the flint is against the cock screw.

Sheet lead can usually be obtained from scrap yards. It was used for many years as a lining for shower stalls. If you cannot find sheet lead, flint pads can be made from flattened musket balls.

Cut strips of sheet lead to the width of your flints, then cut pieces from the strips that are about 50% longer than your flints. Trim the corners to eliminate sharp protrusions [1].

Wrap the lead pad around the flint from the back. With a pair of pliers, swage the lead over the flint securely, making sure that the edge extends slightly over top of the flint [2].

To adjust length, use a file or pen knife to pare away lead from the back of the package until the distance from the edge to the contact point for the cock screw is correct [3].



[1] [2] [3]

HAMMER STALLS

Hammer stalls can be another source of misfires if they are made and installed improperly. If the hammer stall interferes with the barrel, the flash guard or the flint when in position, it can keep the frizzen from closing completely and cause a loss of prime.

If your hammer stall impinges on the barrel or flash guard when installed, pare a little leather off the corners until it no longer does so.

If the leather on the face of your hammer stall is so thick that the edge of a new, properly sized flint touches it when the lock is in the half cock position, you may want to try shaving the face of it until there is no contact. If that is not possible, you may want to make a new hammer stall using thinner leather. Stiff, top grain leather the thickness of a cardboard tablet backer (~1/16 inch thick) is thick enough to prevent sparking in the event of an unintentional fall of the cock.

HARDENING THE FACE OF THE FRIZZEN

A soft frizzen will not spark reliably. The sparks produced by a flintlock are minute pieces of steel scraped from the face of the frizzen by the flint and heated to incandescence by the action of being scraped off.

If the face of the frizzen is too soft, the edge of the flint will tend to dig into the metal rather than slide over it. When this happens, it cannot complete the removal of the minute pieces of steel with enough force to heat them to incandescence. Sometimes the flint will catch on the face of the frizzen and fail to throw it open. Other times it will shatter or chip badly.

Look at the face of your frizzen. If it shows primarily shallow vertical scratches from the action of the flint, it probably is satisfactory. If it shows deep scratches, gouges or horizontal lines, it may be in need of re-hardening.

Re-hardening can be done by most people at home. All you need is a grinding wheel, source of heat that will get the frizzen red hot, some *Kasenit* (available from Dixie Gun Works, Track of the Wolf and other suppliers), gloves, a pair of vice grip pliers and a container of water or quench oil. Automatic Transmission Fluid (ATF) is recommended for quench oil.

Remove the frizzen from the lock and grind the face smooth. (Failure to grind the face smooth will leave hard ridges of steel on the face that will catch the flint and cause misfires and broken flints.)

Apply *Kasenit* liberally to the face of the frizzen and heat it until the *Kasenit* powder melts and boils. Heating can be done with an oxy-acetylene torch, multiple propane torches fueled with MAAP gas (not propane), a forge, a fireplace fire or campfire with a really good bed of coals.

When the *Kasenit* has calmed to the point that it is only "simmering," take the frizzen from the heat. If it is a yellow or orange-red, allow it to cool to a bright cherry red. Then quickly immerse it face down in a container of water or ATF fluid and swish it around keep it there until all hissing stops. (Note: ATF fluid is more forgiving than water.)

This process should convert the first few thousands of an inch of the frizzen's surface to a hard, high carbon steel that will produce a good shower of sparks for several hundred shots.

CLEANING

Cleaning techniques will be covered in more detail later. Suffice it to say here that keeping your firelock "squeaky clean" is one of the best way to prevent misfires. Many re-enactors simply put their firelock in the closet between events without cleaning. This allows for the build up of fouling. Most plugged touch holes in my experience are the result of a piece of fouling from a dirty firelock that became dislodged and blocked the touch hole.

Modifications to Enhance Reliability

FITTING A POORLY ALLIGNED FRIZZEN

Getting a Good Seal

Some frizzens do not fit properly. Check yours. If it impinges on the barrel or flashguard, or if it leaves a gap through which you can see light between the pan and the sole of the frizzen, it should be fitted,

Fitting is done by carefully filing or grinding away metal so that the frizzen fits the pan with no appreciable gaps and does not contact the barrel or flashguard. A bit of work

here will help to insure that the frizzen closes completely each time so as to avert the loss of prime and the misfires associated with it.

Getting the Correct Angle

Some frizzens (notably those on Charleville muskets) have their face almost perpendicular to the surface of the pan. The result is a "basher." The flint tends to strike the frizzen at an almost perpendicular angle, which tends to break flints while producing few sparks. Ideally the angle between the frizzen face and the pan cover should be about 10 degrees. To get the correct angle, carefully grind material from the front of the frizzen foot, being sure to maintain a flat surface that seals well with the pan, until the desired angle is obtained.

IMPROVING JAW ANGLE

Many locks are set up so that the flint points toward the front of the pan in the fired position. Ideally, when fitted with a flint and in the fired position, the flint should point into the center of the pan, almost digging its edge into the prime. This give the edge more time on the face of the frizzen, resulting in more sparks, and helps to direct the sparks into the prime, thereby increasing reliability and reducing lock time. The lock at the top of the illustration below shows the proper jaw angle for greatest reliability and speed. The bottom lock illustrates an insufficient angle for optimum performance.

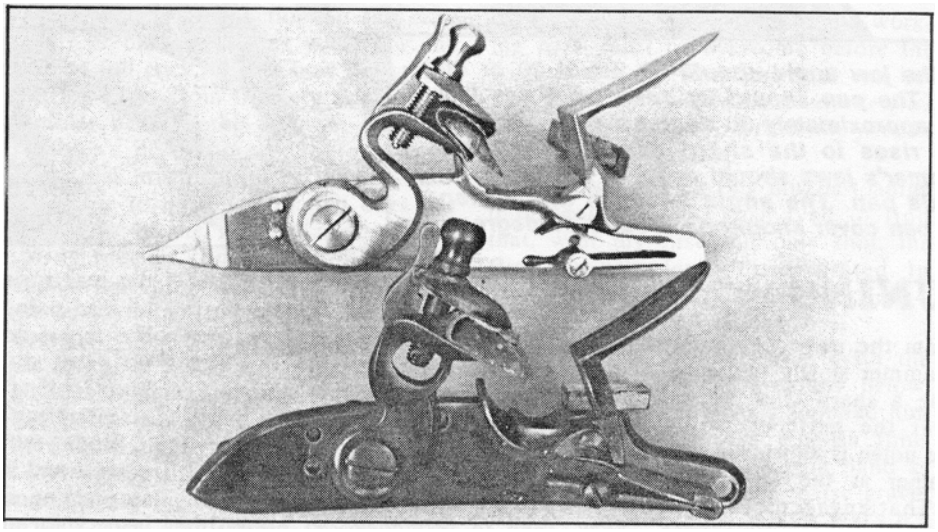


Photo: Buz Fawcett, "Fine Tuning the Flintlock," Blackpowder, April, 1978

To get a better angle, start by filing the shoulder on the inside of the cock that rests on the lockplate in the fired position, so as to allow the cock to swing further forward when fired.

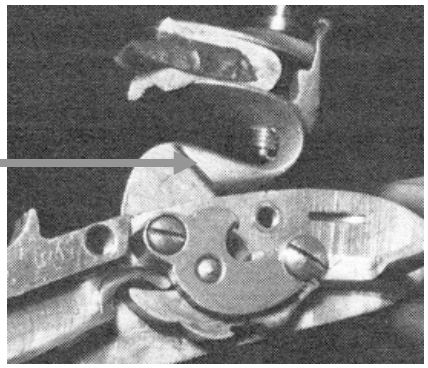


Photo: Buz Fawcett, "Fine Tuning the Flintlock," Blackpowder, April, 1978

BE CAREFUL AND GO SLOWLY – THERE ARE TWO POTENTIAL DANGERS IN DOING THIS!

The first is that the tumbler will be allowed to rotate so far that the nose of the mainspring will slip off the end of the tumbler nose. This could allow the mainspring to break through the bottom of the lock mortise and will certainly render the lock inoperable until it is corrected. The easiest fix for this situation is to bend the nose of the mainspring out a bit.

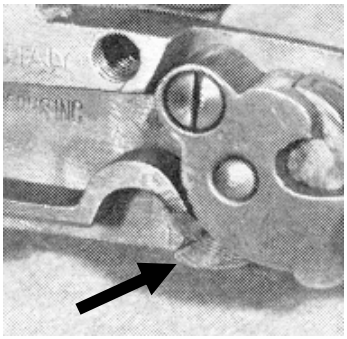


Photo: Buz Fawcett, "Fine Tuning the Flintlock," Blackpowder, April, 1978

The second is that the top of the tumbler may come up against the bridle before the cock has completed its travel. This will put great stress on the internal parts of the lock, leading to premature failure. This situation can be corrected by filing the bridle slightly to allow the tumbler to ride forward and the cock to come to rest on the top of the lockplate.

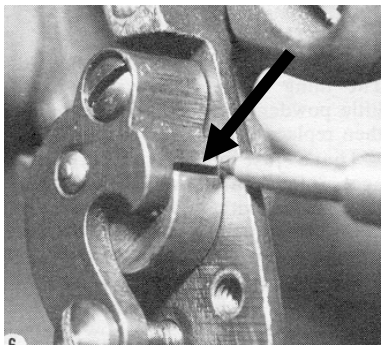


Photo: Buz Fawcett, "Fine Tuning the Flintlock," Blackpowder, April, 1978

BALANCE SPRINGS

Unless your springs are very much out of balance, this is a fix that most people are better advised to forget about. The main problems encountered with spring tension are:

Mainspring too strong. The shooter has to exert excessive force to cock the piece. When it is fired, it tends to smash up flints. To correct this problem, remove the mainspring and draw file the long arm with a fine cut file until the strength is reduced to an acceptable level. Be very careful to always draw the file along the length of the spring arm, never across it. Scratches across the spring arm act as stress raisers that can lead to breakage of the spring.

Mainspring too weak. The piece cocks very easily but the cock falls slowly when fired and sometimes lacks the force to throw the frizzen fully open. To correct this problem, remove the main spring, heat it at the bend to a red heat, and open it slightly (about ¼ inch at the nose end) with a screw driver or similar tool. Then heat the entire spring to a uniform red heat and quench in Automatic Transmission Fluid. (Caution: do not attempt to quench springs in water unless you are experienced. A good temper can be obtained with a water quench, but it requires a touch and experience that are beyond that of many people.)

Frizzen Spring too strong. It is difficult to open and close the frizzen. Flint breakage and wear is excessive. First check to be sure that the frizzen is not binding on something and that the bearing surfaces are polished. If there is no binding, proceed to reduce the strength of the frizzen spring by draw filing with a fine cut file as in the mainspring example above

Frizzen Spring too weak. Frizzen wobbles around. Frizzen spring will not hold frizzen closed causing loss of prime. To fix, follow the directions for a weak mainspring above.

OPTIMIZING THE TOUCH HOLE

Two touch hole factors affect reliability – size and location.

Size

Many muskets come with a small touch hole as they are delivered from the factory. This can cause misfires, especially when using FFg powder, by restricting the ability of the flash to transmit itself from the pan to the barrel.

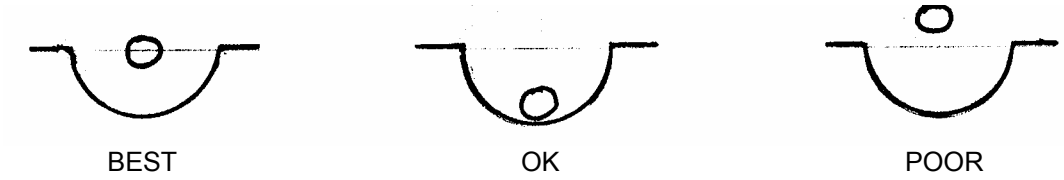
The fix is obvious – enlarge the touch hole. If you plan to enlarge your touch hole, KEEP IN MIND that Brigade safety regulations require that the touch holes of muskets shall be smaller than 0.1040" (#37 drill) and that the touch holes of rifles shall be smaller than 0.0810" (#46 drill). To be on the safe side, use at least the next smaller drill size -- #38 for muskets, #47 for Rifles.

Location

Ideally the touch hole should be positioned so that its center lies on a line defining the top of the pan. This position gives the most rapid and certain ignition.

Many commercially made reproduction muskets have the touch hole located toward the bottom of the pan. This position gives sure ignition, but ignition may be slow because the fire must burn through the bulk of the priming powder to enter the touch hole rather than flashing across the top of it.

Sometimes muskets are encountered with the touch hole located significantly above the top of the pan. This location, while uncommon, is often the cause of misfires because the flash sometimes cannot reach the touch hole.



Relocating a touch hole is difficult. Unless one's touch hole is so high that it causes an unacceptable number of misfires, or if one is intent on getting the very fastest ignition possible from their firelock, prudence suggests that it is probably best to leave well enough alone.

If you decide to relocate your touch hole, there are two ways to do it.

1. Fill the old touch hole with weld metal, taking care that it completely fills the hole and that there are no voids or protrusions on the inside of the barrel. Refinish the exterior of the barrel. Re drill the touch hole.

2. Drill out the old touch hole and tap it to a convenient size. Grind the end of a suitable bolt to a flat surface. Screw the bolt into the threaded hole until the flat end comes flush with the inside of the bore. Silver solder the bolt in place being sure to heat the metal sufficiently so that the silver solder flows completely through to the bore. Cut off the excess of the bolt. Re finish the barrel surface. Re drill the touch hole in the desired location.

Field Maintenance

Other than changing flints, field maintenance consists primarily of cleaning your firelock in an authentic 18th Century manner. Cleaning your firelock in the field in the authentic 18th Century manner is a good demonstration for the public, as well as a good way to keep your firelock in top condition

Materials needed:

Tow

Worm to fit your ramrod
Oil
Cloth oil patch
"brick dust" (optional) with piece of polishing cloth or leather
Hot water

Process

Set a pot of water to heat on the fire.

While the water is heating remove the lock. Do not disassemble the lock. Small pieces can be devilishly tough to find if dropped in the grass.

Immediately put the lock screws into their proper holes in the lock to avoid losing them. If your sideplate is at all loose, remove it and either pocket it or use the lock screws to attach it to the lock. (I once dropped a sideplate in the grass and spent half an hour looking for it even though I knew within a three foot square where it had to be.)

Put the lock(s) in the water and let it boil while you are cleaning the barrel.

Do not remove the barrel from the stock (risk of lost small pieces). To clean the barrel, first plug the touch hole with a small plug of wood to keep black crud from staining the stock.

Using a wad of tow on the worm at the end of the ramrod, repeatedly scrub the barrel with hot water until the water and tow comes out clean. Use only one piece of tow. When the barrel is clean, it will be clean also.

Remove touch hole plug and swab the inside of the barrel while it is still hot with dry tow to get it as dry as dry as possible. Set it aside to cool and finish drying.

Retrieve the lock. It may be quite clean from the action of boiling water. (Don't worry, boiling water is not nearly hot enough to damage the temper of springs, etc.) If necessary, scrub the lock with tow and swish vigorously in hot water to remove fouling. Dry the lock with a cloth or tow as well as possible while it is still hot, then set it aside to cool and complete drying.

When cool enough, place a drop of oil on all friction points of the lock. Place a lightly oiled scrap of cloth on the end of the ramrod and run it up and down the barrel several times to deposit a light coat of oil. Wipe the exterior of all metal parts with the same scrap of oily cloth to lightly oil the barrel, lock and barrel bands (if any).

Reassemble the piece and insert a tompion in the muzzle.

If desired, bright work can be polished using a piece of soft leather and a paste of "brick dust." If you don't want to go to the trouble of crushing a brick and sifting the dust to get

a uniformly fine powder, duPont No. 7 rubbing compound (not polishing compound) makes a reasonable substitute. It is a medium red brown in color, and if left open to the air dries to a cake that can be reconstituted with a damp piece of leather.

A word about Tompions
Everyone should have a tompion to keep the rain and small objects out of the barrel.

Never insert your tompion into a fouled barrel. Particles of fouling will get imbedded into the wood, where they will attract moisture and forever after be a source of corrosion inside your barrel.

Have a secondary tompion, which need be no more than a cloth stopper, perhaps with a small stone inside, for those times you can not clean your weapon thoroughly in the field, or don't desire to do so.

It is not always necessary to clean your weapon before going home. On dry days it may be better to put a provisional tompion in the muzzle and wait until you get home for a thorough cleaning rather than do a quick job in the field and risk leaving water or damp fouling somewhere, and perhaps neglecting to clean it thoroughly when you get home.

Home Maintenance

After each event

I always thoroughly clean my weapons ASAP when I get home form an event where they have been fired – even if they were fired only once. It's safer, promotes greater reliability and longer firelock life.

Equipment and supplies:

- Cleaning rod
- Cleaning patches (cut up old flannel pajamas)
- Small vice grip pliers
- Assorted screw drivers
- Pin punch
- Old toothbrush
- Soap
- Hot water
- Paint thinner
- Denatured alcohol
- 10W40 motor oil
- WD-40
- Petroleum Jelly (Used by the armorers of her Majesty's Tower of London to protect medieval armor from the damp of the Thames.)
- Noxon or Brasso

Process

Remove and partially disassemble the lock by removing the top jaw, flint, frizzen spring, frizzen and flash guard from lock. Do not disassemble internal parts of the lock.

Remove barrel from stock. (If you have a pinned barrel, don't worry about pins coming loose. I've been taking the pins out of mine 15 to 20 times a year for 30 years and they are still secure.)

Thoroughly scrub all removed lock parts and screws with soap and hot water, placing them in a small container of denatured alcohol as each is finished. When finished cleaning all the pieces, place them on a paper towel to dry. The denatured alcohol displaces any water and evaporates quickly and completely to leave the parts thoroughly dry.

Scrub the remainder of the lock with soap and hot water. Then pour the denatured alcohol in which the small parts soaked over the lock in two or three batches, paying special attention to the internal parts of the lock and shaking off the excess between pourings to get off as much water as possible. Then set it aside to dry with the other lock parts while cleaning the barrel.

Swab the bore repeatedly with soap and hot water to remove fouling until the water and the patches comes out clean. Then swab with a dry patch. Swab several times with patches soaked in paint thinner to remove fouled oil from inside of barrel. Swab with a dry patch, then with a patch soaked in denatured alcohol, then with a dry patch. If any patches come out dirty, repeat the previous steps until the patches come out clean. Then swab the bore with a patch soaked in 10W40 motor oil.

Re assemble the lock. Oil all bearing surfaces with 10W40 motor oil. Spray the inside of the lock with WD-40. Wipe down the outer lock surfaces with oily patch from barrel.

Apply a thin coating of petroleum jelly to the outside of the barrel and to the barrel bands (if present) then re assemble the firelock and insert the tompion.

Off Season Maintenance

During the off season, I conduct a complete overhaul of all of my firelocks in preparation for the next campaign.

- Completely disassemble the firelock
  - ❖ Completely disassemble the lock, including internal parts
  - ❖ Remove all brass furniture such as thimbles, nose cap, butt plate, etc.
- Resurface and re harden all frizzens that were used during the year.
- Make any needed repairs or adjustments
- Thoroughly clean, polish, oil and grease all metal parts.
- Repair small cracks and dents if necessary.

- Clean and re oil all wood parts (I use Tung oil. Boiled linseed oil may also be used)
- Reassemble the firelock.

CONCLUSION

All this may sound like a lot of work, and if you do it all, it can be. Only the most dedicated competitive shooters will probably want to do it all. But if each of us will just do some of the simple things that that can be done without major effort and expense, our firelocks will go "BANG!" rather than "click" much more frequently.

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[1] See ROGERS, Col. H. C. B. Weapons of the British Soldier. London, Seely Service & Co., 1960. Pg. 95. "….a lengthy test carried out in 1834 …. worked out at 1 [misfire] in 6 ½."

[2] CUTHBERTSON, Bennett, Esq. System for the Compleat Interior Management and Œconomy of a Battalion of Infantry. Dublin, Boulter Grierson, 1768. Chapt XIII, Sect. X, Pg. 92.

[3] *Rules and Regulations for the Field Exercise and Manoeuvres of Infantry* (New York, 4th. Edition, 1820), Pg. 404. Reprinted in Military Collector and Historian, Vol. XLVI, No. 1 (Spring, 1993.) Pg 32

> MEMORANDUM RESPECTING THE FIXING OF A FLINT
>
> There are so many militia men in the cities and towns rising up in our country, who are not so skilled in the use of the Rifle or Musket, as the inhabitants of the interior, that the following instructions relating to an essential part of fire-arms is considered important.
>
> The cause of a piece missing fire, is generally ascribed to the badness of the Flint, the softness of the Hammer, or the weakness of the Main or Feather spring; but the real cause will generally be found to have been a want of correctness in fixing the flint.
>
> Instances have been, of prescribing directions that flints should be fixed according to some approved pattern: an attempt at uniformity, which though so excellent in many other things, is founded in error in this.
>
> No uniform mode must be attempted: the flat side placed either upward or downward, according to the shape and size of the flint, and also according to the proportion which the Cock bears to the Hammer, which varies in different pieces. Ascertain this, by letting the Cock gently down, so that the flint may strike the Hammer, -- and fix it to do so, at a distance of about one-third from the top of the Hammer.
>
> Let every part of the edge of the Flint come in contact with the Hammer so as to strike fire from the whole surface. -- Be careful of this, as the surface of the Hammer in some locks does not stand square, but a little aslant to the Cock.
>
> Let the Cock down and observe that the Flint pass clear of the Barrel.
>
> It is perhaps unnecessary to mention, but it is most important to do well, that whatever may be the position of the Flint, it should be screwed in firmly.
>
> Whenever the piece has been fired, take the first opportunity of examining whether the Flint remains good, and fixed as it ought to be.