Percussion Caps and Nipples – by “Mako”

Cap sizing and the fit to the cones remains the most misunderstood part of percussion firearms usage. Most shooters of single shot muzzleloading rifles and pistols do not agonize over the cap to cone fit the way that percussion revolver shooters do.

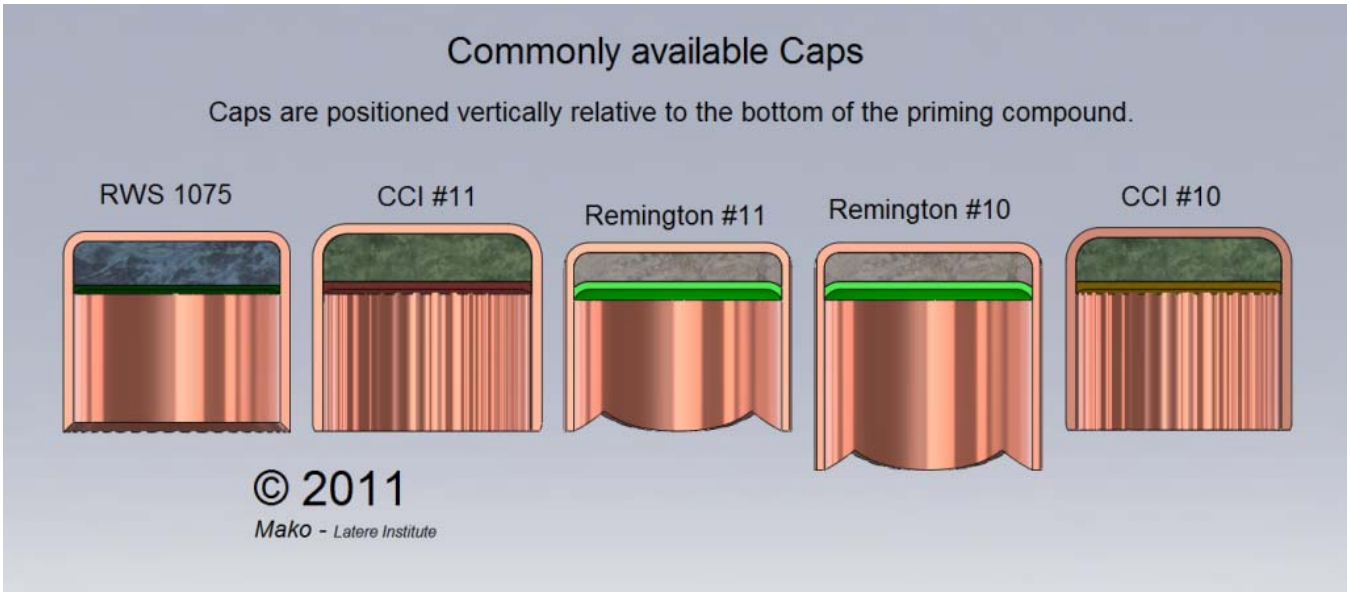
There are 5 caps in the #10 and #11 ranges commonly available today. The RWS 1075 seems to be impossible to find these days and appears to have been "replaced" by the RWS 1075 Plus in availability. The "Plus" cap is actually a "magnum" cap but will work for our purposes. In addition to the five is an entry supplied by Hellgate for an RWS #55 cap, these are also called RWS 1055 caps and I will add to the data sets when I locate a package of them I squirreled away somewhere.

Cap Dimensions as Compiled 28 July 2011 ©2011 Mako						
CAP	I.D.	Height	Cap Face above Cone	Internal Height	Number of Caps	Number of Lots
Rem 10	0.166	0.181	0.037	0.144	120	4
Rem 11	0.166	0.152	0.037	0.115	120	5
CCI 10	0.161	0.163	0.051	0.112	120	3
CCI 11	0.166	0.165	0.052	0.113	120	3
RWS 1075	0.165	0.160	0.046	0.114	87	1
RWS 1075 Plus	0.165	0.163	0.051	0.112	79	1
RWS #55 (1055)	0.158	0.200	0.045	0.155	?	1
RWS #55 Cap Dimensions provided by Hellgate						

I have now measured:

- 120 Remington #10 Caps from four distinct manufacturing lots, 20 caps from each package (two lots provided 2 packages).
- 120 Remington #11 Caps from five distinct manufacturing lots, 20 caps from each package (two lots provided 2 packages).
- 120 CCI #10 Caps from Three distinct manufacturing lots, 20 caps from each package (3 packages from one lot, 2 from another and 1 from a final lot).
- 120 CCI #11 Caps from five distinct manufacturing lots, 20 caps from each package (2 packages from 2 lots, and 1 from two other lots).
- 87 RWS 1075 Caps from one lot.
- 79 RWS 1075Plus Caps from one lot.

This is an image from models of the five caps in question, note how all of the caps are arranged to set the height as it would be relative to sitting on the cone face, this will give you some idea of the differences in priming compound thickness between the caps.



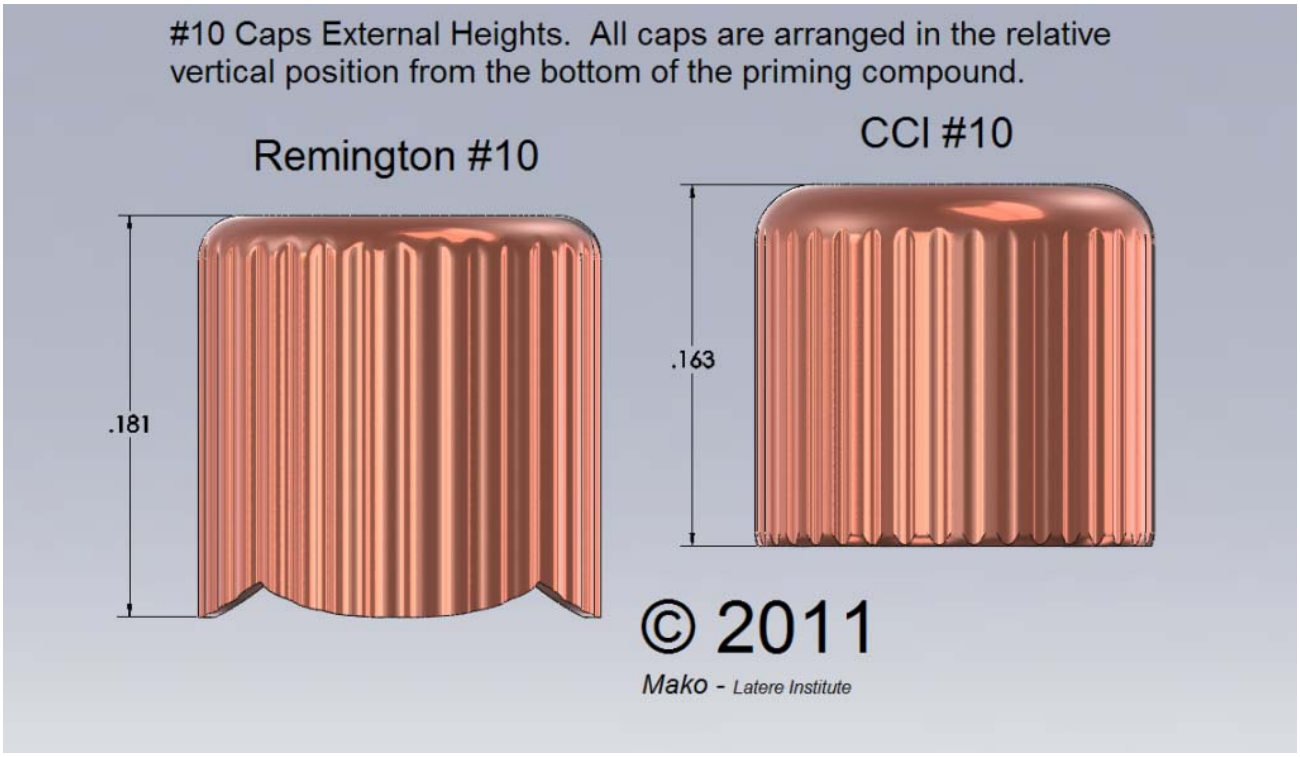
These side by side comparisons of the cross sectioned models will help you understand why some caps appear to be "larger" than others on the exterior, but are in fact nearly the same size internally or actually a bit smaller than another cap that might have an overall shorter outer height.

Construction differences are readily apparent between the three manufacturers. The corrugated features show up as ribs on the inside of the CCI caps, a ghost image of the corrugation shows through on the Remington caps, but are not measurable. The Remington caps have the four "petals" left on them which is part of the forming process. Actually all three styles of caps have these petals at a point in their forming process. CCI and RWS trim the bottom of the skirt and finish them differently. RWS applies an internal chamfer to the skirt to facilitate loading and CCI breaks the outer edge slightly. Only Remington leaves the skirt as formed, this "as formed" condition often manifests itself with petals of slightly different length on the same cap (look at the photo of the Remington #10 cap as an example of this).

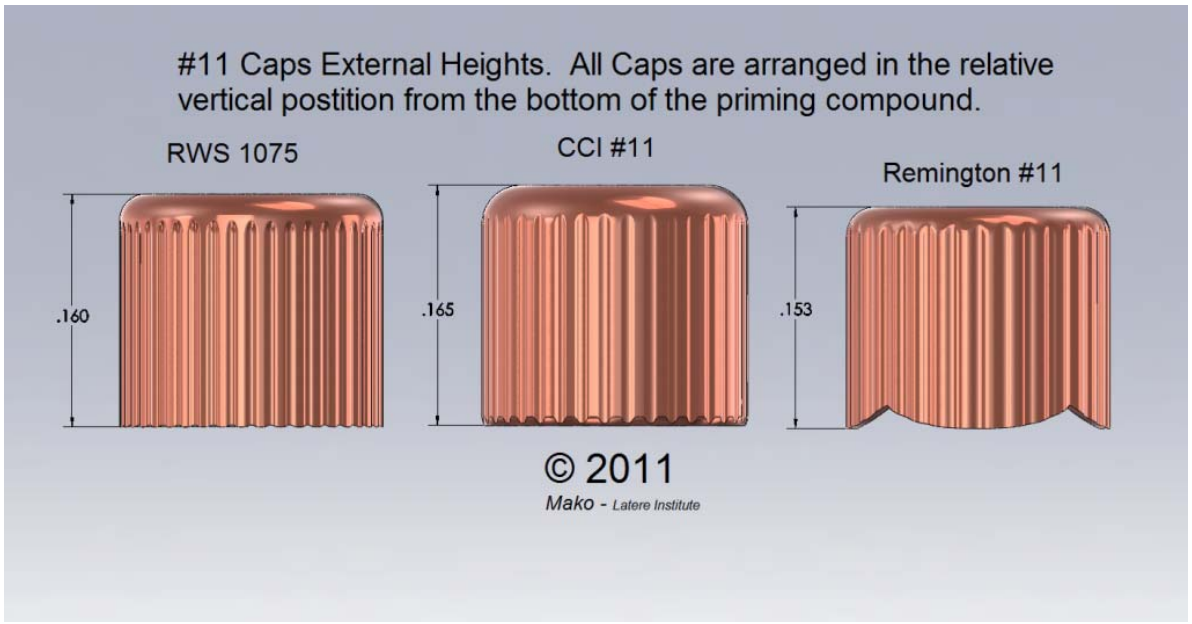
Photos in subsequent posts will show the internal features and differences described above.

The external heights are as follows:

The #10 Caps

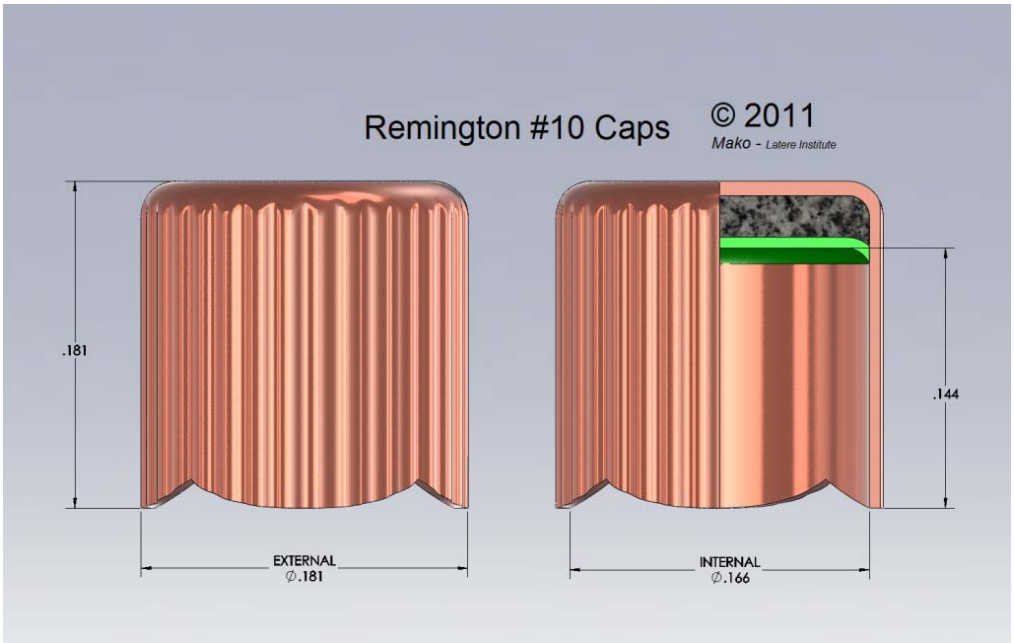


The #11 Caps (note the RWS 1075s are categorized as #11 caps because they fit the same cones as caps marked as #11)



The **Remington #10** Cap is the longest cap of the bunch. This confuses people because it appears to be the "largest cap," when in fact it is the smallest or tightest fitting cap. The tightness

is due to the length of the skirt hitting the taper of the cone further down the body where the diameter is larger.



The two "important" dimensions are the Internal Diameter and the Internal Height. These two dimensions will determine the fit on a cone.

Note the fold seam ("split") that appears at crotch of the petal which is an artifact from the forming operation. You can see also the superficial marking made by the roll tool that made the corrugations; it shows through as a "ghost" image to the interior but is not measurable. The Shiny material on the interior is the sealing compound used over the green paper bursting disk covering the priming compound.

The **CCI #10 Cap** fits the same cones as the much longer Remington cap. The internal diameter is the smallest of the five caps and hits the tapered cone at roughly the same height as all of the other caps except for the Remington #10. The smaller diameter makes the tighter fit on this cap.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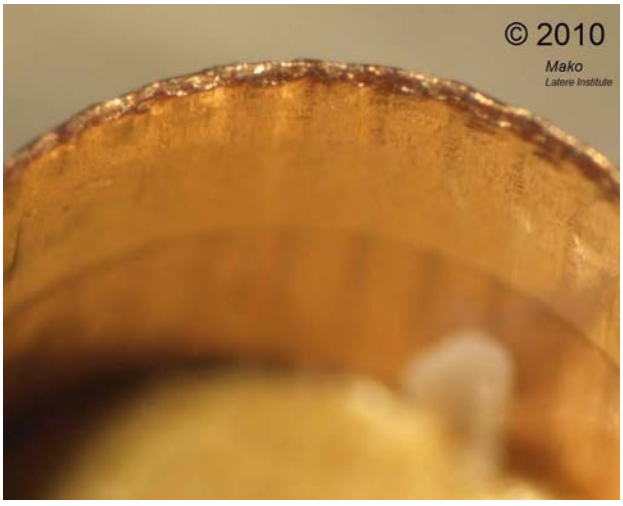
© 2010
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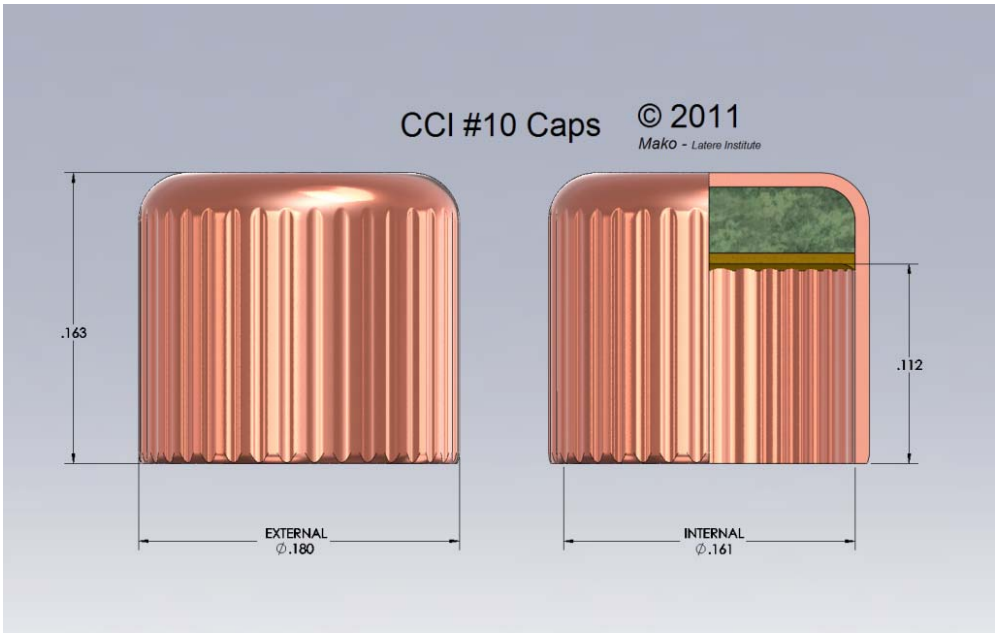
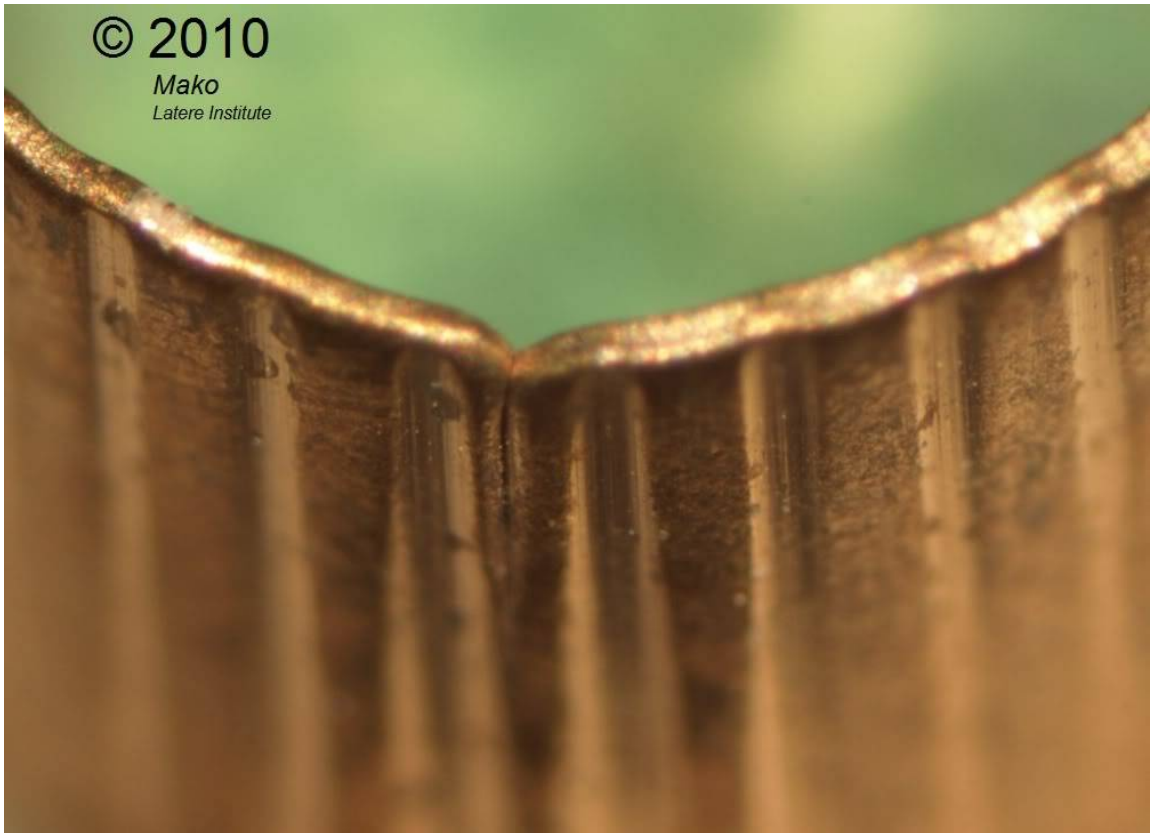

CCI #10 Caps
© 2011
Mako - Latere Institute
.163
.112
EXTERNAL
∅.180
INTERNAL
∅.161

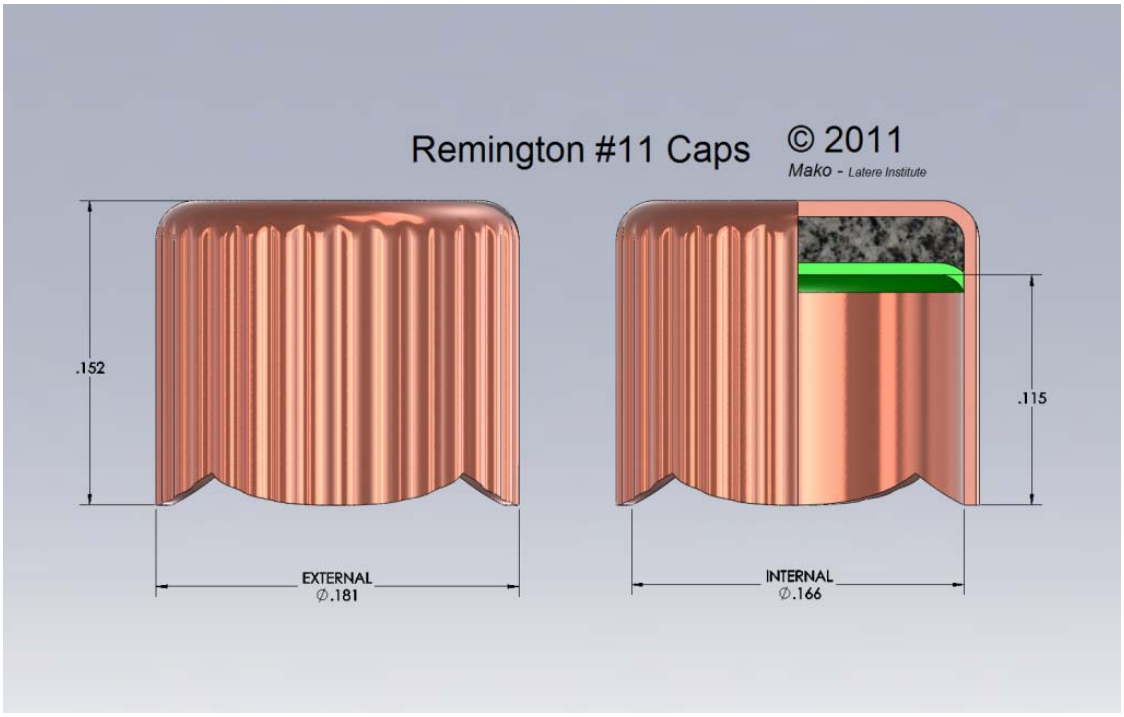
The two "important" dimensions are the Internal Diameter and the Internal Height. These two dimensions will determine the fit on a cone.

The ribbing actually shows through on the interior walls. There is sealant from the bursting disk shows on the walls with a distinct line from the process. The yellow colored Bursting Disk covering the priming compound appears to be a fiber and binder mixture instead of a paper disk.

The #11 Cap

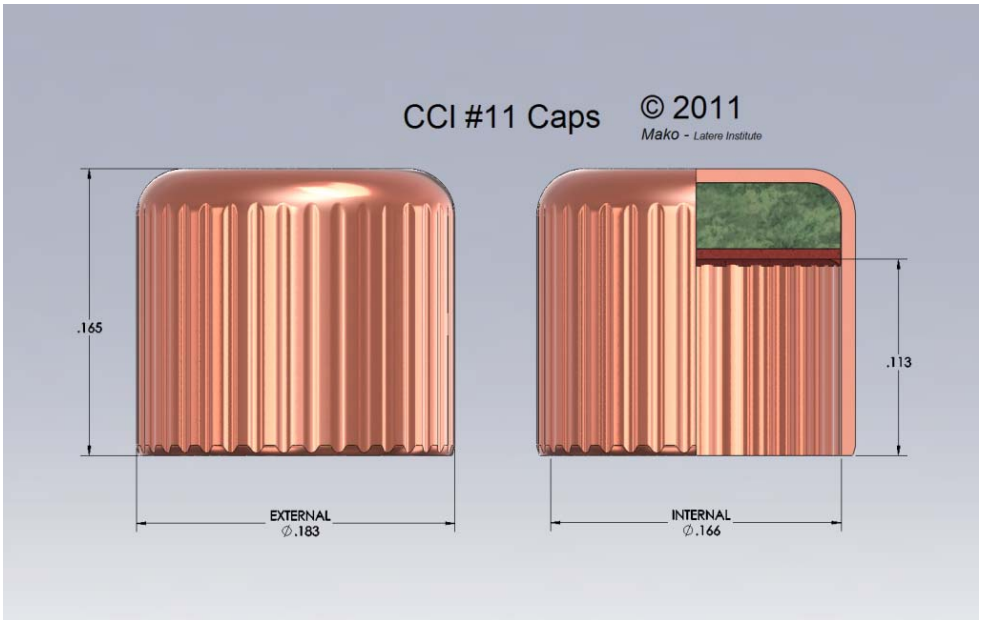
The **Remington #11 Cap** has the same internal I.D.s as the Remington #10. The difference is in the skirt length (Internal Height). The shorter skirt doesn't extend as far down the taper of the cone and will fit on a larger diameter cone. Compare the internal height and the I.D. between the three #11 style caps and they are very similar. The Remington appears to be "smaller" than the other two #11 caps because it has a shorter exterior height; the difference is in the priming compound thickness.





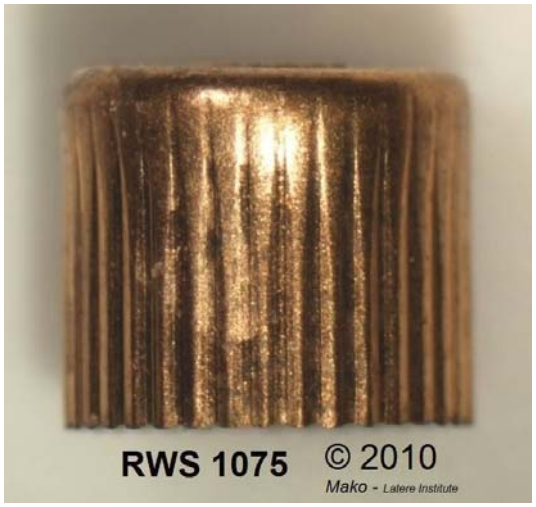
The Remington #11 cap shares the same green paper Bursting Disk with the #10 version. It also shows residual sealant on the inside. The close up photo shows the cracks at the petal crotch that often pass entirely through from the exterior to the interior.

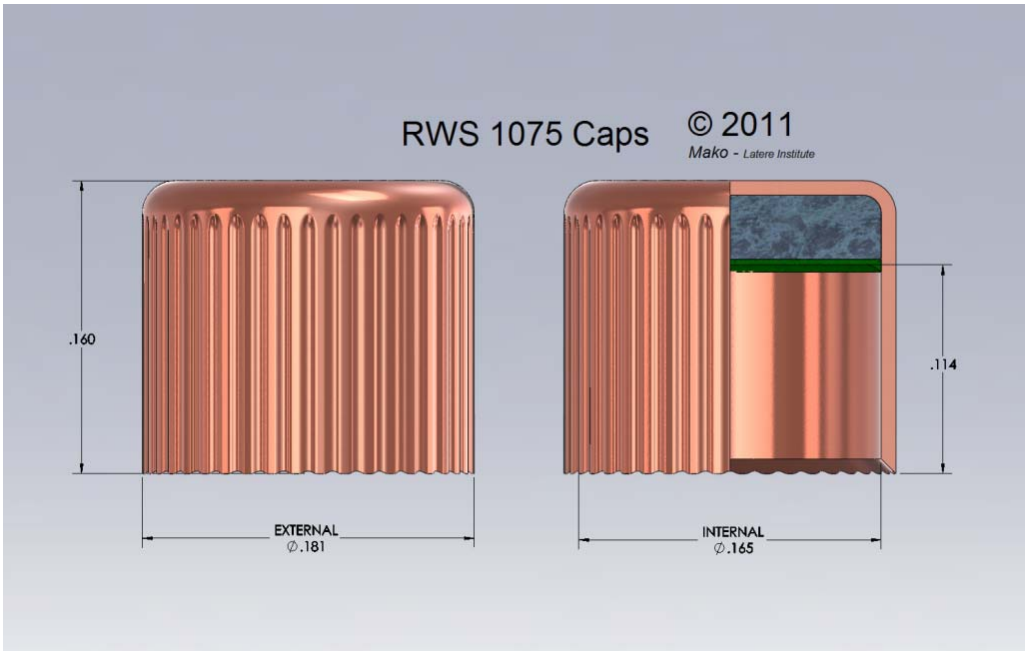
The **CCI #11 Caps** are very similar to the CCI #10 caps with the exception of the Internal Diameter. The I.D.s and internal height are very similar between all three manufacturers.



The ribbing shows through on the interior walls. There is sealant from the bursting disk shows on the walls with a distinct line from the process. The reddish brown colored Bursting Disk covering the priming compound appears to be a fiber and binder mixture instead of a paper disk.

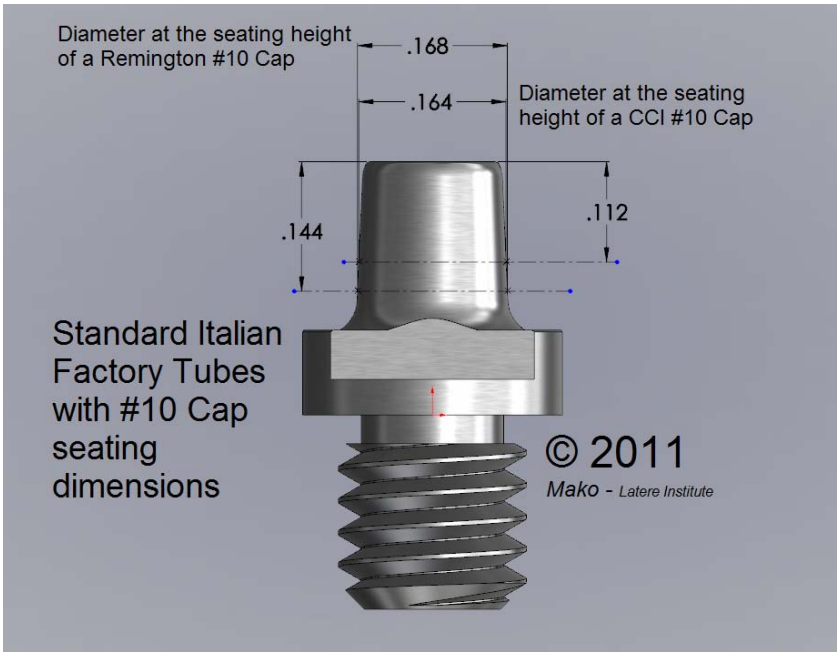
The **RWS 1075 Cap** is actually a #11 size cap (which means it will fit on cones that caps labeled as #11 will also fit).

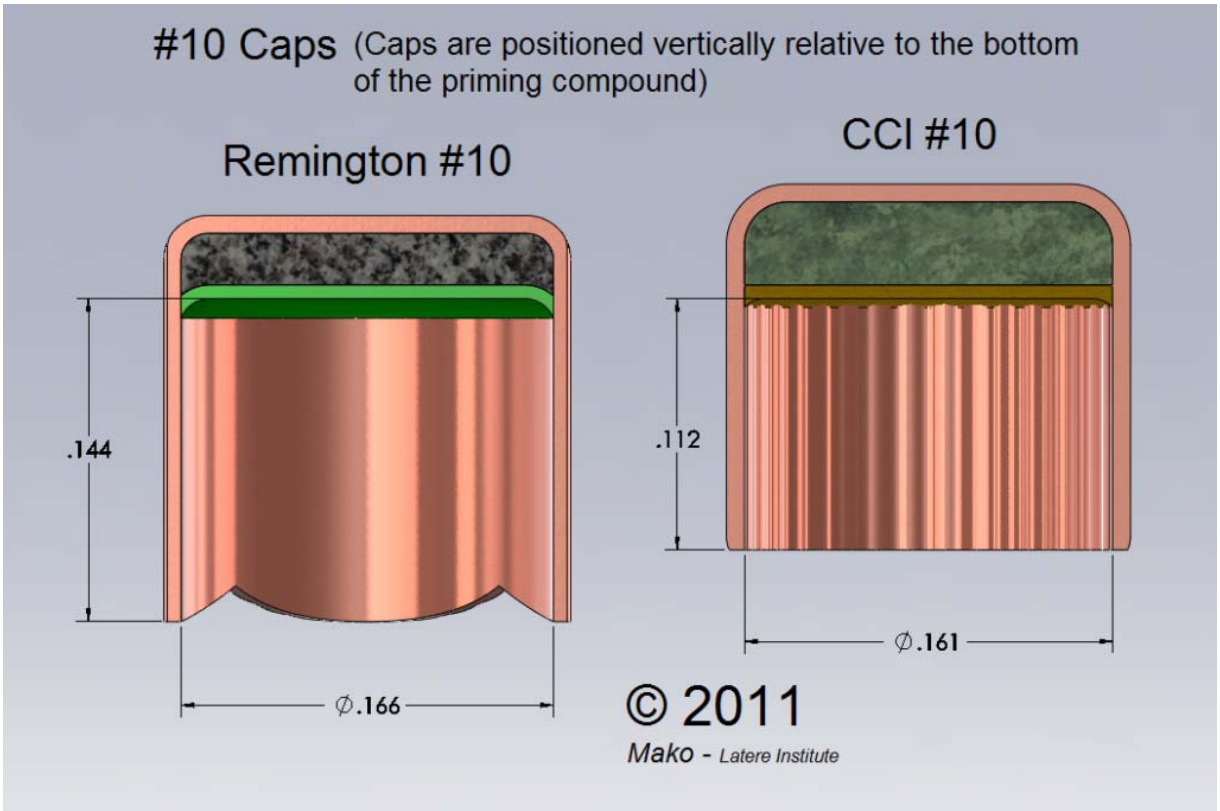




The cap has a tan fibrous bursting disk and it sealed with a clear green sealer. The interior edge of the bottom of the skirt has been chamfered and this creates a "saw tooth" pattern along the bottom edge.

Some of the Factory tubes have cones that are smaller in diameter and #10 caps fit snuggly on them while #11 caps will fall off (unless pinched). I do not recommend pinching except in extreme circumstances, pinching can create its own set of problems.




#10 Caps (Caps are positioned vertically relative to the bottom of the priming compound)
Remington #10
CCI #10
.144
.112
Ø.166
Ø.161
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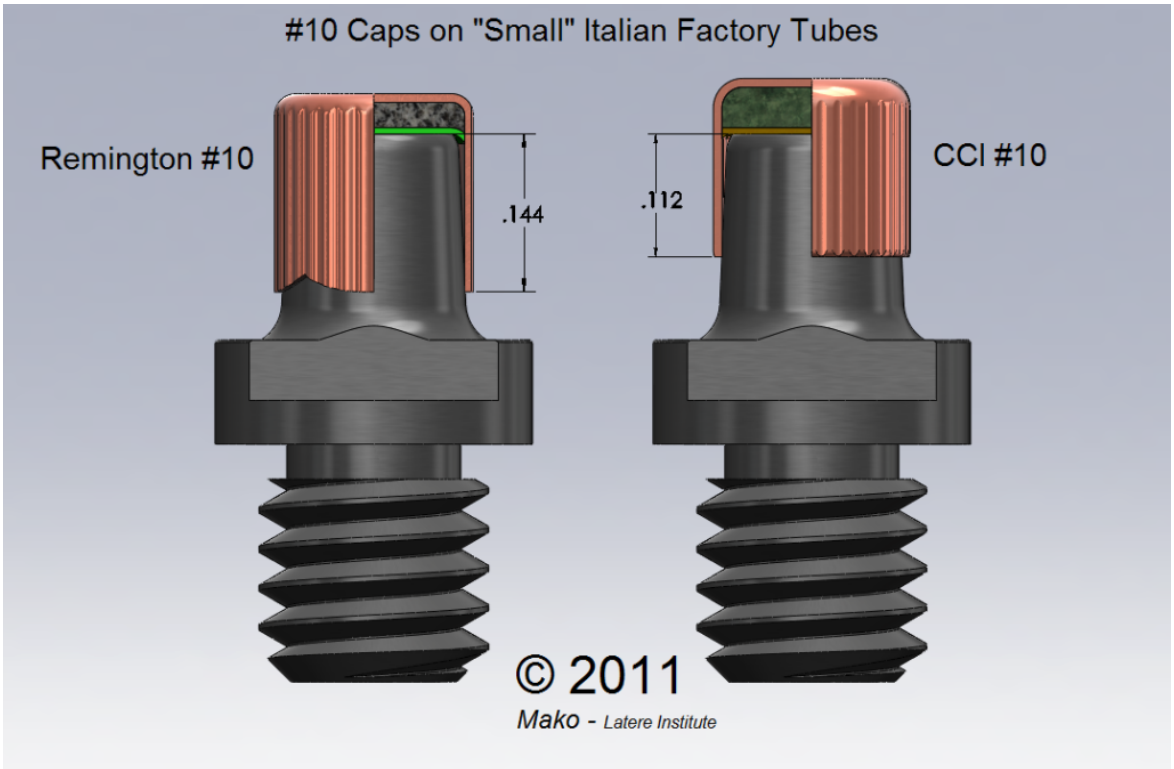
#10 Caps on "Small" Italian Factory Tubes
Remington #10
CCI #10
.144
.112
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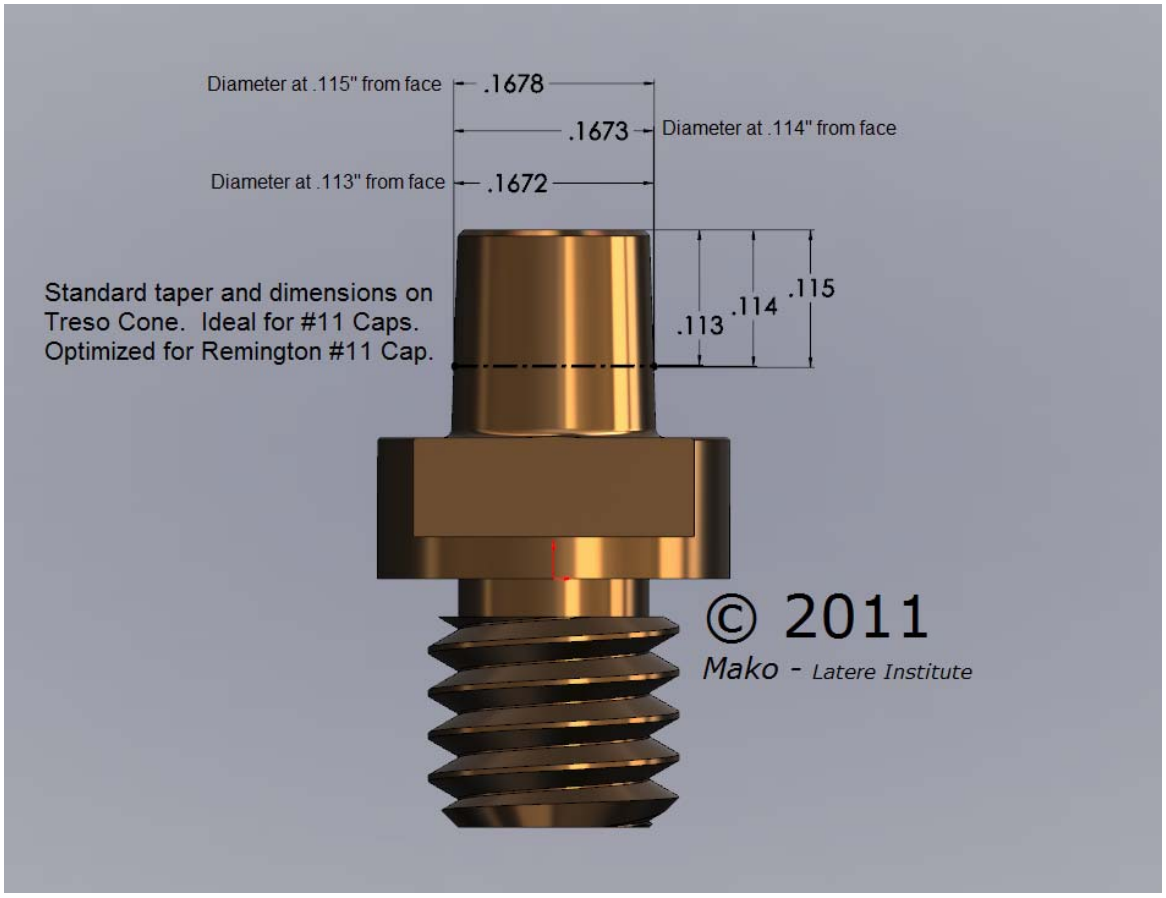
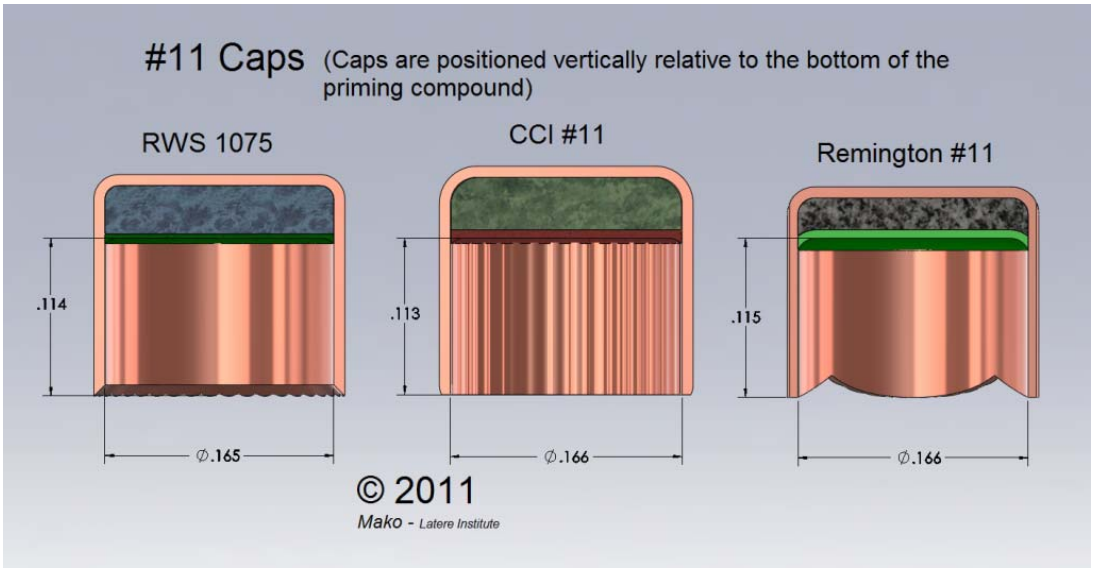
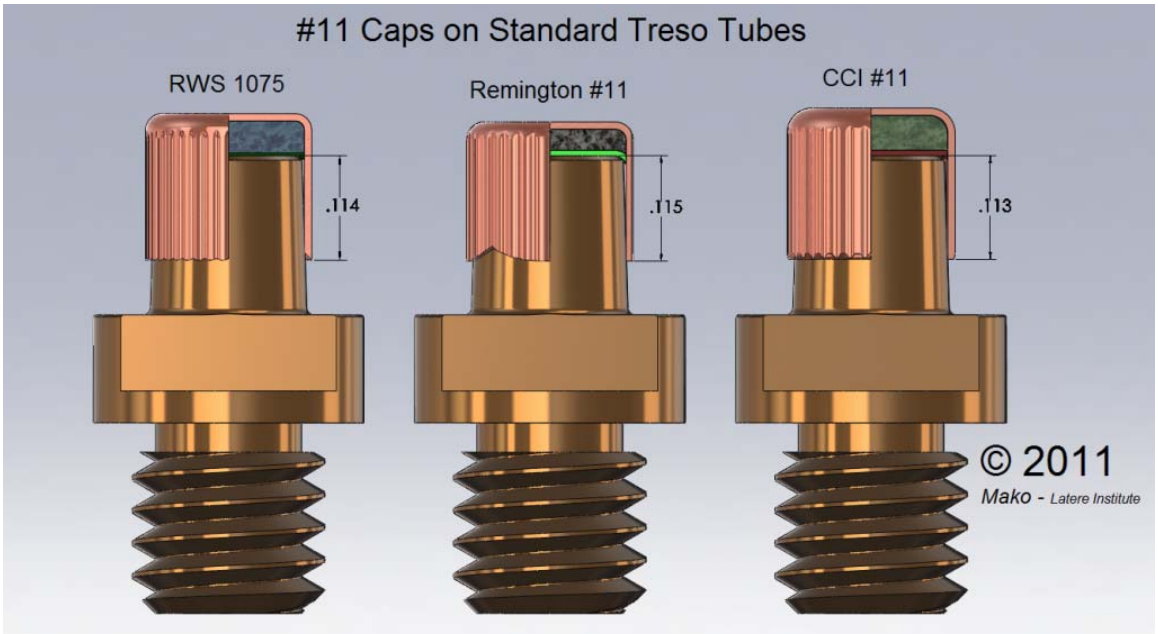
This illustration depicts the two contact points for the two different #10 caps when they are fully seated on the cone.

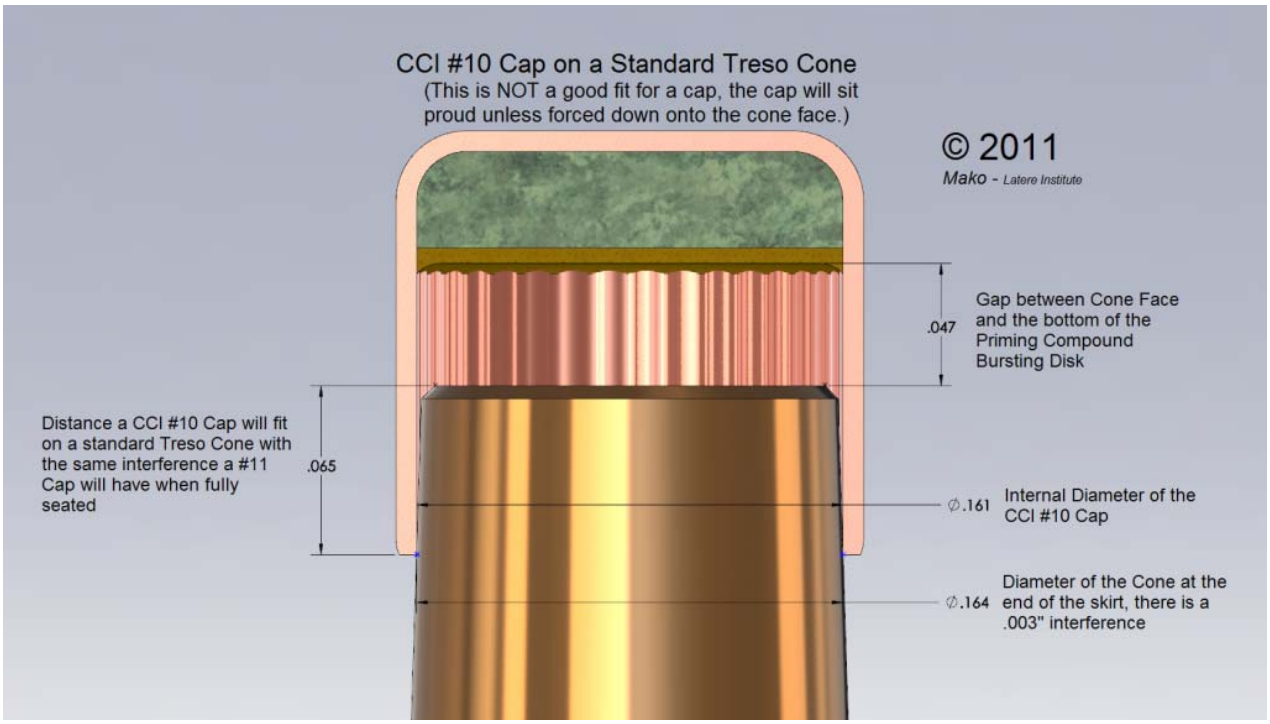
Treso Cones are designed for #11 caps; the model is derived from measurements taken from 4 sets of factory fresh tubes (24 tubes).





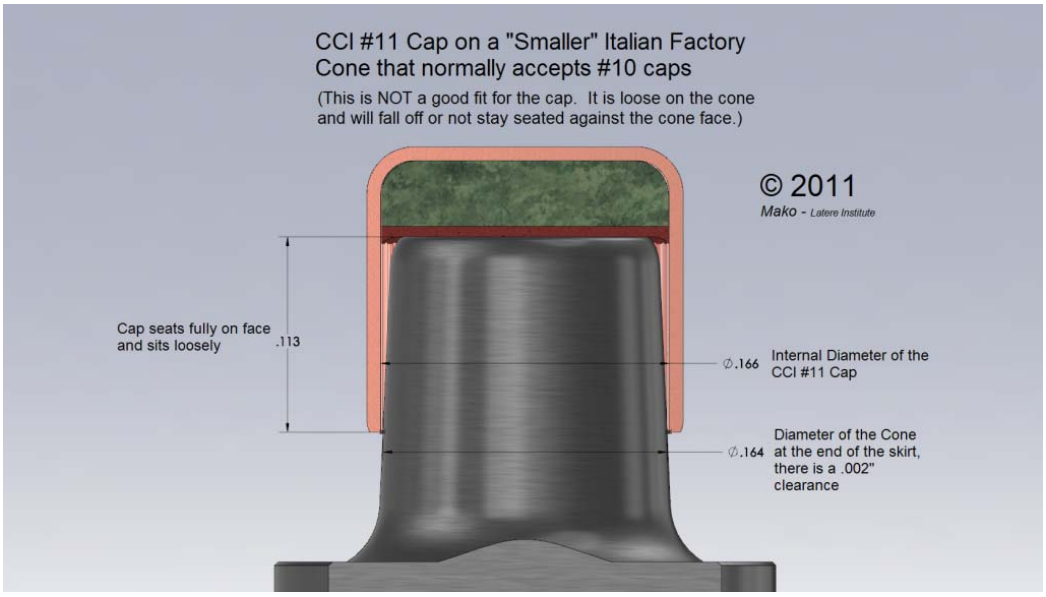


Poor Cap fit: There are three kinds of poor cap fit. The kind that causes the most grief are caps fitting too tightly on the cones. This causes high caps and inconsistent ignition. This is an example of such a condition, in this case a CCI #10 cap has been placed on the cone and pressed down until it has exactly the same amount of interference a #11 Cap would have on the cone (roughly .003"). As you can see the cap sights proud and there is .047" of clearance between the priming compound and the cone face.

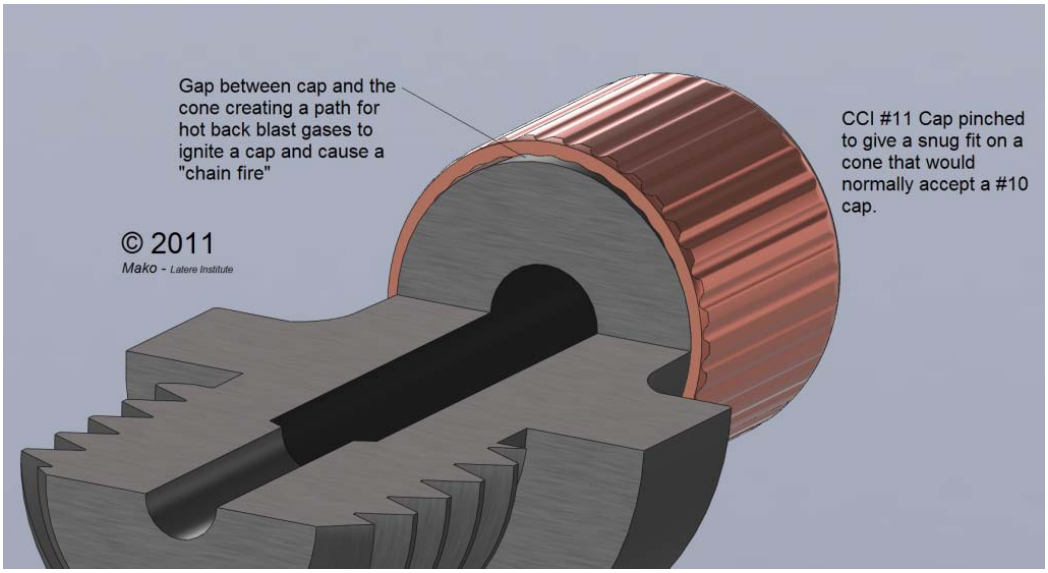


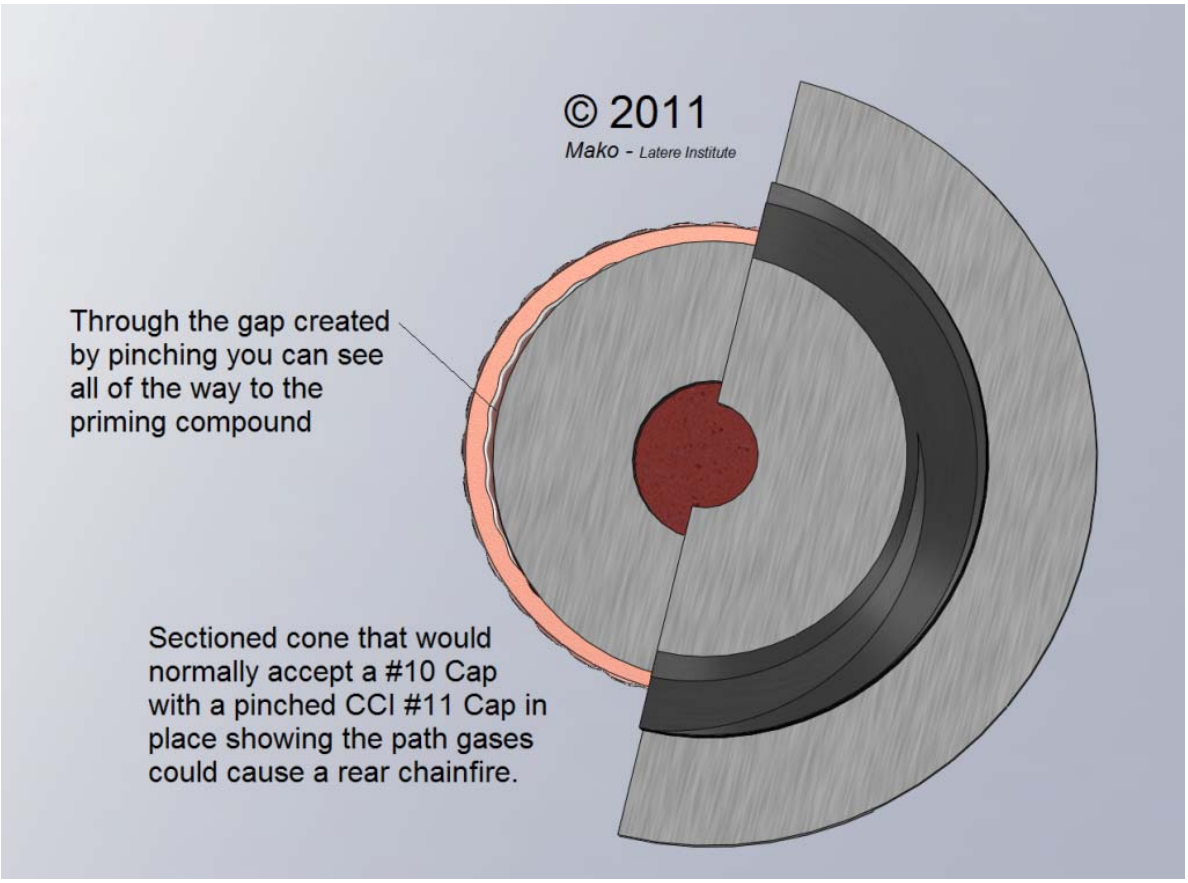
Some shooters will maintain they have no problems with "undersize" caps; they use a pushing stick and force a tight fitting cap down. This is commonly done, but it often results in caps that are split before firing and they may even become loose at that point. If the cap is not fully seated it often will not fire on the first hammer strike because the force of the hammer blow is used to seat the cap further onto the cone instead of crushing the priming compound between the hammer (top of the cap) and the face of the cone.

The second condition is a large cap on a small cone. Some factory cones are better suited to #10 caps; if you "seat" a #11 cap on those cones you will not get a fit that will keep the cap in place. Often the cap will fall free or back off under recoil from the previous chamber and by the time it reaches alignment for firing it is not seated. Once again you may get a "soft" hit as the hammer attempts to drive it home.



The third condition is created by shooters using the technique of "pinching" caps to create a friction fit between the oversize cap and the cone.



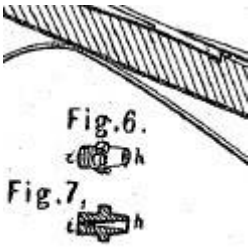


Pinching caps creates a path for hot gases coming back through the flash hole on the chamber being fired to find a path directly to the priming compound. When Samuel Colt was selling his pistols he was advertizing them as being "water proof." We all know they weren't "water proof" but they were intended to be sealed at the rear. He struggled with chain fires and rear

A reader sent me a message and asked if the castellations on the rear of the cylinders wouldn't prevent chain fires from the rear if a cap was in place. They didn't understand how the hot gases could negotiate the tortuous path and make it through a small opening created by a pinched cap.

What many people don't know is that Colt's earliest designs suffered from chain reactions due to a closed breech design Colt originally touted as a safety feature and a protection to the caps from the elements. Colt found his enclosed standing breech and on some designs enclosed blast shields on the front of the cylinders except the one aligned to the barrel, not only allowed chain fires, but exacerbated the problem. His later designs deepened the castellations and dropped the top of the cones below the surface of the rear of the cylinder. Even with these improvements the cloud of burning gas that actually comes back through a flash hole and envelops the entire rear breech area is much more than we imagine.

On August 29, 1839 Samuel Colt was issued a new patent for Improvement in Fire-Arms and in the Apparatus Used Therewith, included in his claims was a feature we now take for granted. That feature was the reduced opening at the chamber end of a percussion tube.



receives the wedge and checks it. By turning this screw the force of the wedge may be tempered. In Fig. 5, *g* is a spring-latch on the under side of the key, which catches upon D when the key is forced in and prevents its accidental removal.

Fig. 6 represents a percussion tube or nipple, through which the fire from the percussion-cap is to be conducted to the chamber. Fig. 7 represents the same in section. The outer end, *h*, of the tube has the opening made as large as convenience will allow, and it goes tapering or conical until at the inner end, *i*, it is as small as a proper entrance of the flame from the percussion-powder will warrant. By giving the conical or funnel-formed opening to the tube the effect of the percussion-powder is greatly increased.

E, Figs. 1 and 8, is a bolt for locking the

Prior to his design, tube through holes were either straight through or tapered in the opposite direction like a rocket engine nozzle as defined by the Robert Adams (Englishman) patent. With single shot weapons the back blast wasn

Questions to Author:

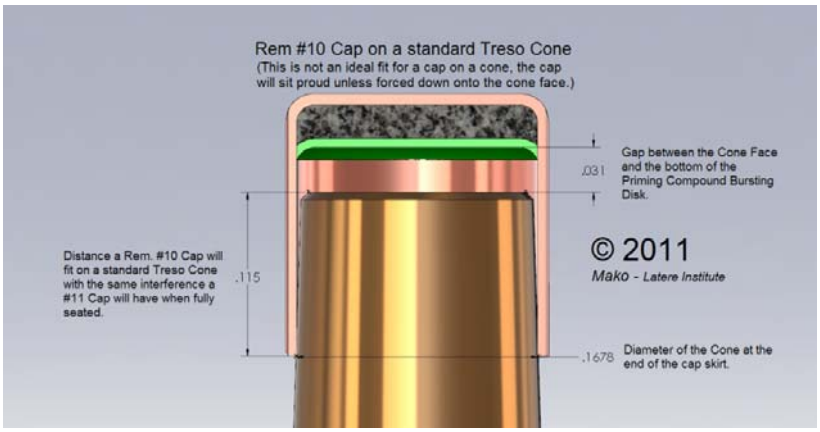
Q:
Do you have a cross section of the Remington #10 on a Treso. That seems to be the most popular combo and I have over 20,000 Remington 10s. Based on your diagrams, the 11s should fit better, but it will be a while before I buy more caps.

A:

Yep, I have them on unmodified and on modified Treso tubes. The Tresos are unique in their geometry (as far as I have found), they have a very shallow taper which will accommodate a Remington #10 cap. I find the CCI #10s to be too tight for my liking they (they don't have the self relieving split skirts). I actually find the Rem. #10s to be tighter than I like. I went back and forth for years because a lot of people think tight is better and I would read they used #10s. I finally wrote the guys in Colorado and asked what the cones were designed to accept. They told me #11s, they wouldn't come out and say Remington #11s, but when I called them on the phone and pressed them I got an "uh huh" when I said it appeared they were designed for Remington #11 caps. He was quick to add, "But CCI #11s fit too," which they in fact do. I am always reminded of

the havoc that can ensue while loading a cap on a loaded cylinder when I think about the picture of Jon Davis' thumb.

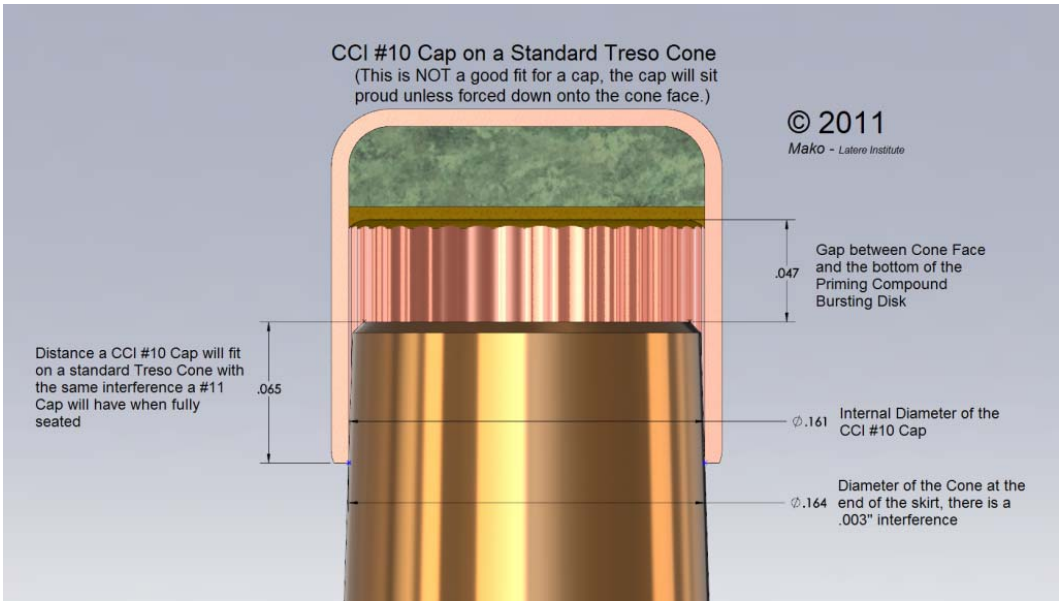
With a snug fit the #11 caps stay in place and bottom out easily. I have used Rem. #10s on unmodified Treso tubes, but for a while a couple of years ago I could only find Remington #10s so I modified two sets of Tubes threaded for Uberti cylinders. I'll show those dimensions as well.



Several things to remember:

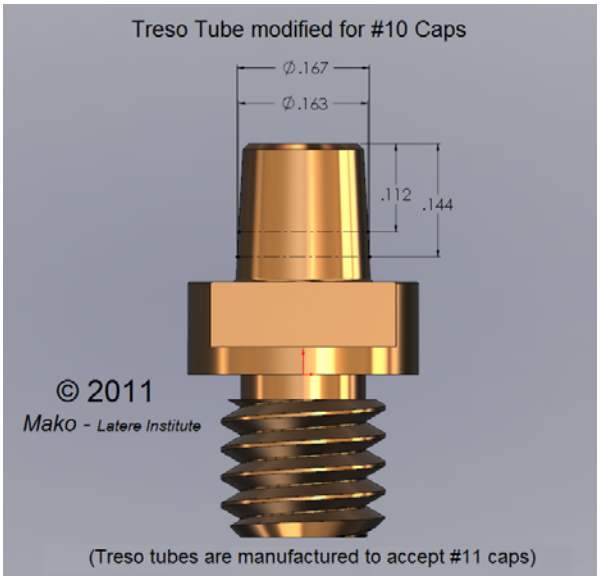
- The internal diameters are the "same" on Remington #10 and #11 caps
- The taper is small so the cap can be forced down to seat. This is especially true for the Remington #10 cap because of the self relieving "notches" in the skirt.
- The CCI caps are smaller in diameter as shown below, so they sit higher on the cone and take much more force to seat. Plus the skirt does not have the petals which allow the cup to relieve itself.

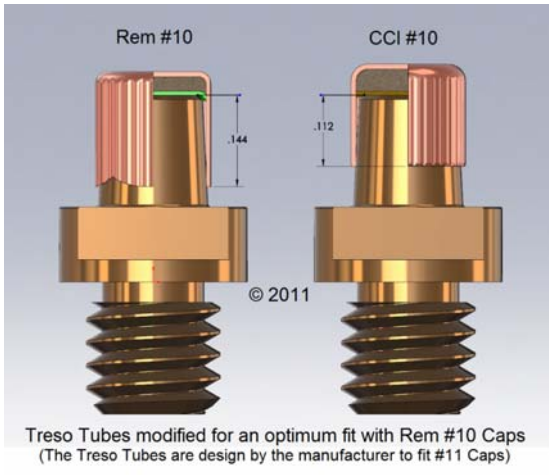
This is the CCI #10 on a standard Treso as shown in the Primer thread:



You need very little interference. More is simply MORE, it is not "better" and requires the caps distort or split to allow them to fit. Like many mechanical fits a slight interference is actually better and stronger than a forced fit which compromises the strength of one or more of the components. In this case the weaker copper cup gives way but you lose some of the hoop strength and spring back of the copper cup to grab onto the cone.

I used Rem. #10s when I couldn't get #11s and I modified two sets of tubes to the dimensions shown below.

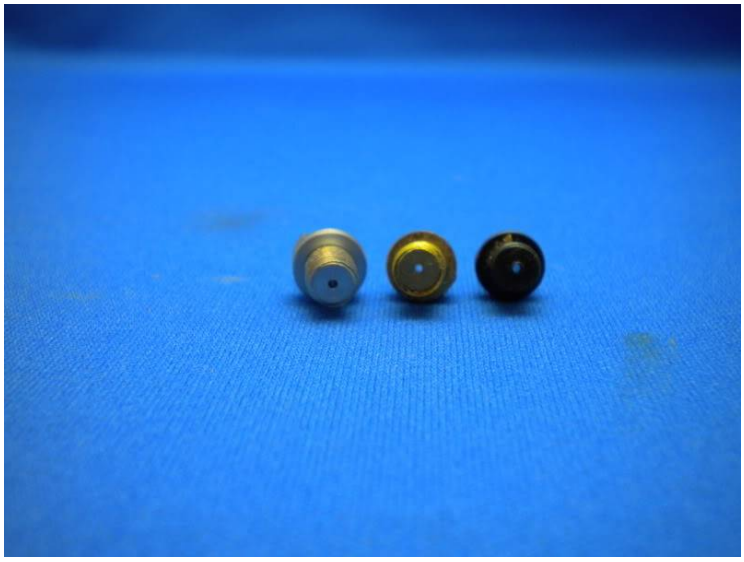




A Reader Response:

Read on a couple other forums where there was a new C&B revolver nipple on the market for Uberti, Pietta and ROA revolvers that worked better than Tresos. This new nipple is stainless steel (??) and has an improved orifice as well as two cross drilled hole like the old Hotshot nipples had. They're available right now from Desperado Bullets for $36.00 for a set of 6. I ordered a set for the Uberti and a set for the Pietta revolvers on last Monday & they came in Thursday's mail. Plan was to try them out this past weekend in a SASS match, but the rain kept that from happening.

Here are a few pictures of the new nipples. The new nipple is on the left, with a Treso in the middle and a stock factory Uberti on the right.



I measured the Uberti and Pietta nipples and compared them to stock. The Uberti SlixShot measured about .032 longer than the stock Ubertis. The Pietta SlixShot only measured about .006 longer.

I haven't tried the Uberti with the SlixShot nipples yet - ran out of time at the range. I did run about 72 rounds through a Pietta 1860 Army. I fired three cylinders full with Remington #10, Remington #11, CCI #11, and RWS 1075 caps. One cylinder with each size cap was capped with a TDC revolver capper, one with a TDC dual spring straight line capper, and one capped by hand. I did not use a "seating stick" or anything other than the capper or my thumb to seat the caps. All of the caps went on without any trouble and felt like they were a snug fit. I slow fired the first cylinder full with each size cap and didn't see any evidence of unfired caps backing off the nipple.

The load I used was 30 gr. fffg Goex thrown from a flask with a 30 gr. spout (which weighs out to 30.3 gr.); Ox Yoke Wonder Wad, and a .454 round ball cast by BPstuff llc. Every chamber fired first time. All of the Remington and RWS fired caps looked like a plus sign. Four evenly sized

wings coming off the center. Most of the CCIs did the same; but some of them disintegrated or didn't split up completely. The only two instances of a cap falling into the frame/action, was with the CCIs that didn't split up completely on firing; but, they didn't jam up the gun. The hammer just flattened them to the frame. In every instance, the only cap still left on a nipple was the one under the hammer from the last shot. All of caps fell off, and none got between my hand and the grip.

The 1860 I used was 1994 vintage that has been worked over some using Pettifoggers procedures. It has coil spring & plunger hand spring and the hammer notch is filled with JB Weld.

I'm going to try to get back out to the range later this week & run the same process on my Uberti 1861 Navy. Hopefully the extra length won't be a problem. My 1861's have been worked over like the 1860s, so I'm going to take one of my .36 cal Piettas that is still bone stock unmodified & see how the nipples work on it. I'm also going to try a couple Wolf reduced power hammer springs & see how they act. This time I'll take my camera too.

So far, I'm really liking these nipples.