

The Viro Cylindrical Padlock

By BosnianBill

I am incredibly lucky because my work requires worldwide travel and I get a chance to look at a wide variety of high security products. My passion though, is padlocks and I often buy the interesting ones that look as though they might present a picking challenge. At first, I pretty much bought whatever I found in the hardware stores or locksmith shelves, but quickly found myself in possession of the world's largest collection of crappy Chinese-made junk that literally falls open at the sight of a pick. (If you're looking for a good laugh at near-instant openings and various exploits of Chinese locks, I've put a large collection of them YouTube under the user name "BosnianBill"). It wasn't long before I realized you could spend a LOT of money on these less-than-secure locks so I began to get a little more selective in my purchases. One of my techniques to identify potential purchases was to observe what the local stores use to secure their metal roll-down (called rolladens) security doors. My logic was that the store owners have a vested interest in good security and not likely to buy locks that are easily picked or exploited.

Over the years I've found that this logic doesn't always yield the most security locks. Store owners, like John Q. Public, usually know nothing about locking devices, how they work, or how criminals compromise them. They simply buy the same lock as the business next to them, hoping that *someone else* knows best.

Once in a while I find a really good, high quality lock. Less frequently, I find one of these with some special feature that earns it "extra points" in the pick resistance category of my evaluations. The Viro Cylindrical padlock (Figures 1, 2 and 3) is one such lock. While working in Quito, Ecuador I noticed that most of the stores used this lock, as well as many motorcycle owners. During my work I also found the military and police forces often use this lock to secure various sensitive items. With testimonials like that I figured it must be pretty high quality, so I went hunting for one. I didn't have to look very long because almost every store I looked in carried the Viro line of locks and they were all pretty expensive. Oddly, most of the stores carried two distinct categories of locks: the Viros, at around \$40, and Chinese locks at around \$5. There was no middle ground.



Figure 1: Front of 70mm Padlock



Figure 2: Side View



Figure 3: Rear Markings

I snagged a few of the locks because they come in two different sizes (60mm and 75mm) and I figured they probably had two different locking mechanisms. When I looked at the key later I discovered this

assumption was wrong and both locks contain identical **4-pin** cores. I was angry at myself for investing so much money in 4-pin locks, figuring I'd pick them in a few seconds, as we all can with 4-pin Master locks. I thought, "what the hell" and threw in a tension wrench and started picking with a Peterson hook. Nothing. The feel of the pins was springy, with no binding pin. I kept picking, becoming more and more frustrated with the lock and my apparent lack of skill. This went on until my blood pressure spiked at around 9000/1200, so I threw it down and went to dinner.

The next morning I woke up around 0400 thinking about that stupid lock. I couldn't sleep so I picked up one of the other locks and began working on it. Then I tried the third one. Three hours later my partner called from the lobby asking if I was coming to work today. Damn, all that time had slipped by and I *still* hadn't managed a single opening from any of the locks.

During the day I couldn't focus on anything but my failure to open the locks. As we passed a store I pointed out a Viro securing a nearby store and made a comment to the driver. He said they were very good locks and could not be picked. Caca. I knew that *all* locks can be picked and began obsessing about it again. Before long, my engineer brain kicked in and I started thinking about what could possibly be frustrating my picking attempts. Heck, I couldn't even get the pins to set, more or less find a binding pin. In a flash, it came to me. Something was blocking the core rotation. I couldn't wait to get back to check out my theory.

Back in my room I grabbed the first lock and shined an LED flashlight into the keyway and FINALLY began to understand why the lock is "unpickable". It IS unpickable, to anyone that doesn't know its secret – and I had just found it: The Viro is no ordinary 4-pin lock! It has a secret.

With my flashlight I was barely able to make out a pin nestled in the *bottom* of the keyway that prevents the core from rotating (Figure 4). What an elegant security measure (and one other manufacturer of high quality locks have used as well). I quickly picked the 5th pin, which allowed the core to rotate slightly, and was finally able to find a binding pin. I tried picking it, only to discover it was a security pin – probably a spool or mushroom, but with an unusual feel. As the core counter-rotated, the pin in the bottom popped back up, again preventing the core from turning. With the core blocked, I couldn't pick the security pin. Damn, stuck again. This went on until bed time... No openings.

Again, I woke up early thinking about the lock. I figured the bottom pin needed to be neutralized somehow and pushed a thin tension wrench handle into the bottom of the keyway, hoping to depress the pin. This sounds good in theory, but doesn't work so well in practice. The detent is spring loaded and my tension wrench couldn't reliably hold it below the shear line while I picked the pins at the top. I struggled and finally, by some fluke managed to get my first opening of this "simple 4-pin" lock. I couldn't repeat the opening with the other locks because my makeshift tension wrench wouldn't reliably hold down the detent. I needed a special tool.

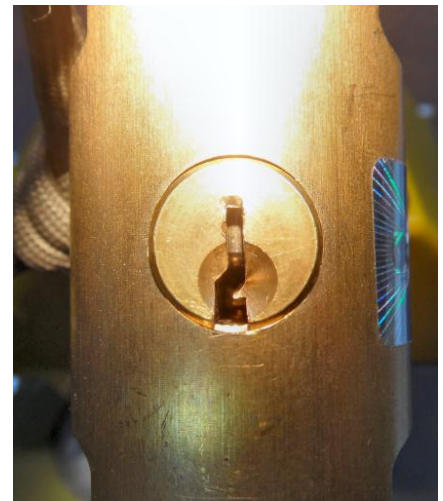


Figure 4: Viro's "Secret"



Figure 5: Beating Viro's Secret

During lunch I went to a hardware store and bought a file. I was DETERMINED to whip this simple little lock! Back in my hotel room that night I took the file to one of the four keys that came with the Viro and, just for giggles, made a bump key. I won't go into details about this frustrating experiment, suffice to say it didn't work or even come close. Ok, I moved on to phase 2, which required a lot more filing on the bump key.

I filed down the bump key until only the bottom part of the key remained, which I intended to fit into the bottom of the keyway (Figure

5). I've positioned one of the Viro keys above the tool in the photo so you can see how much I had to file away. I later drilled a small hole in the remaining part of the bow so I could fit in a piece of piano wire to act as a tension wrench. Once this tool is inserted into the bottom of the keyway it pushes the "secret" detent into its proper position while still leaving plenty of room in the keyway into which you can fit your pick tools. You can see a little more clearly how this looks in figure 6.

Now, finally, I was able to begin picking the Viro without having to worry about the detent locking up the plug. I jumped in with a Euro Wave, thinking I'd quickly rake this 4-pinner open and close this chapter on Viro padlocks. To my amazement, it STILL refused to yield! Instead, it gave me a pretty significant false set, signaling the presence of a security pin. The lock was still fighting back. "OK, no problem" I thought as I replaced the rake with a hook. I set the first security pin only to find another, and another, and another! Not only were they some kind of security pin, but they just felt *weird*. I was still able to set them, but the false sets seemed to vary from small to huge and the spring tension varied from pin to pin. This little lock still had plenty of fight left. Finally, once I adjusted to the variable tension springs and the weird-feeling security pins I figured out they were probably either mushrooms or spools *in every single chamber*.

Well, at least I could open the Viro padlocks and I briefly found comfort in that. They were *not* "unpickable" as my driver had suggested and I was confident I knew the secret.

Yet, it bothered me. What was that "weird" feeling? How was the detent positioned? Why did the lock resist bumping so well, despite several hundred attempts? Did it still hold more secrets within? I had to know.

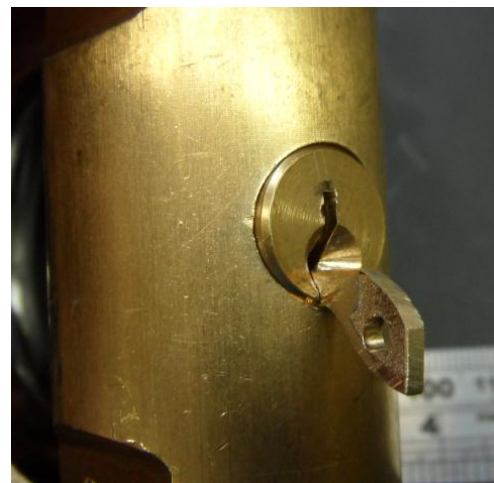


Figure 6: The tool fitted into the Viro Keyway



Figure 7: Viro cutaway showing the detent.

Once I returned home I took the locks into my machine shop and clamped one into the milling machine and began cutting. My objective was to remove the core, examine the detent, and get a good look at the chambers and security pins. After carefully milling away a good portion of the solid, hardened brass body, the secrets began to emerge. Once the core was out I discovered there was absolutely nothing special about it. It looks like any American or Master core – solid with no security features whatsoever. The body of the lock contained the answers to all our questions (Figure 7 and Figure 8).

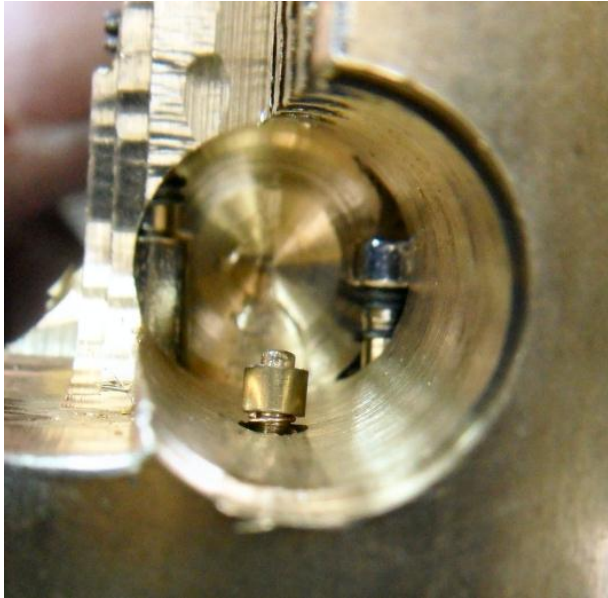


Figure 8: View down the plug chamber

Looking down the plug chamber in figure 8 you can clearly see the detent in its fully extended position. The small dimple on top, which is pretty hard to see when the plug is in place, is what protrudes into the bottom of the keyway and prevents the plug from rotating. In Figure 9 you can see it is a very simple design but is a supremely effective anti-picking mechanism. (In the rear of the chamber you can see the hardened steel locking bars, which we'll take a look at later).

In Figure 9 you can see a close up of the detent. The edges are slightly deformed, probably because I was a little over enthusiastic (read: frustrated) in applying tension before I realized something was preventing the core from rotating.



Figure 9: Close up of Viro's Secret



Figure 10: The pin layout

Figure 10 shows a couple of interesting things. First, you'll notice that all four drivers are spools – very LONG spools, which probably explained the “weird” feedback I was getting. (They got a little scraped up during the disassembly process). Unlike spool pins of “normal” length, these were pretty difficult to set and the false sets were much different, depending on the number you could get set. The springs in the photo are not the originals – I just put them there for photo purposes. The original springs were of varying lengths, explaining the variation in pressure on the pins – all designed to confuse and discourage a picker.

The detent sits deep inside at the bottom of the keyway, and this is no accident. If you recall, my initial solution was to make a bump key and force my way into the lock, but I was 100% unsuccessful. The placement of the detent explains why. Since it is near the back of the keyway, slightly beyond the last pin, only the tip of the key pushes it into the proper

position to rotate the core. Most bumpers use the “one click out” technique, meaning the detent is fully extended at the beginning of the bump. By the time the tip of the key reaches the detent to push it down to allow the core to rotate, the bumped pins have already settled back into their original position, which blocks the core and renders bumping completely useless. To prove this I tried bumping both of my surviving locks *hundreds* of times with no luck whatsoever. I even experimented with grinding off the key shoulder and installing a rubber donut, which allows the bump key to sit against the pins, effectively reducing their “flight time”, and hoping the detent would depress before the springs pushed the pins back down. Again, after hundreds of attempts I enjoyed not one single bumped opening. As a bump proofing, this detent is highly effective.

Well, I’ve gone on and on about this not-so-simple 4-pin lock. Hopefully, as these make their way to the U.S. in increasing numbers you’ll recognize them, circumvent their “secret”, and avoid the learning curve that I suffered through.

Good luck and happy picking!

BosnianBill



