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The Key to Escaping Groundhog Day

When a customer has the same problem repeatedly, it's time for a new solution.

By Rick Karas, RL, CFDI, AFDI

Albert Einstein is often given credit for the quote, "Insanity is doing the same thing over and over again and expecting different results." "Over and over again" are the words a property manager kept using as he explained a problem with the locks in his building.

"We keep replacing them repeatedly. They just don't seem to last. We are hoping that they will, but they never do." He went on to explain to me that the company that installed the access control system in his building was no longer in business and were the ones that he had been calling to replace the locks. He also told me that the locks were not cheap. He made a point of telling me that, and I read his message loud and clear. He contacted me because I had previously done work at his building.

We entered the parking garage and walked over to one of the many parking garage stairwell doors. There was a proximity reader on the wall and an electrified cylindrical lockset on the door. The door was supposed to unlock and grant access to the stairwell door when an authorized credential was presented to the proximity reader. This was the same setup on all levels of the parking garage doors. He held his credential (a key fob) up to the proximity reader, and nothing happened.

He explained to me that he thought that the lock was bad because the access control company that previously did his service work had always replaced the lockset to fix the problem. He also told me that the building had been subjected to lightning strikes, had power issues and often has power spikes, especially during inclement weather. I asked him for a key fob so I could try to dig further into his issue.

First Things First

There were a few things that quickly came to my mind as to what the problem could be: bad reader, bad lock, power issue or simply the programming in the access control system. I decided that my first step toward diagnosing the problem would be to check if there was power to the door lock.

Lucky for me — so I thought at the time — there was a 4" electrical box on the wall right next to the door with a door cord attached to it and to the door. My thought was that the door cord was a power transfer cable, and inside of the electrical box I would find the wires that provided the lock with power. I removed the cover of the electrical box anticipating finding the power wires spliced where I could check for power. Nope, not that lucky this time: The electrical workbox was just used as a pass-through for the power wire *(see Figure 1)*. My next move was to check the power at the lock, so I put the electrical box cover back on and removed the lock from the door.

Once I removed the lockset, I noticed that the power wires were attached to the lock with twist-on wire nuts *(Figure 2)*. Let me just shift gears here for a second. Using twist-on wire nuts is a bad idea in this situation because the vibration from the door closing could cause the wire nuts to become loose over time and fall off, as happened to the red wires shown in the photo.

With the lock removed, I was able to attach my multimeter to the incoming wires. The reading I got was a voltage of 25.84 VDC, just a little bit more than the 24 VDC I was expecting *(Figure 3)*. The voltage was constant, and when I presented the fob to the reader, the voltage momentarily went away for a few seconds; this confirmed my theory that the lock was fail safe. The lockset was bad and needed to be replaced; this validated what the property manager had said about the lock going bad and needing to be replaced.

Figure 1. The electrical workbox was just used as a pass-through for the power wire.

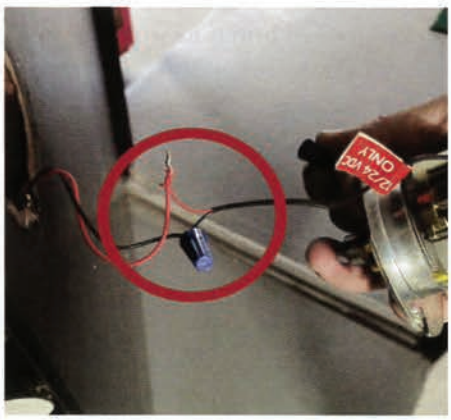


Figure 2. The power wires were attached to the lock with twist-on wire nuts.

Figure 3. The multimeter had a reading of 25.84 VDC.

Figure 4

Figure 5


Figure 5a

Figures 4-5a. The author chose the SDC Z7250GQ Electra Pro because the power regulator (*Figure 5a*) is included with the lock.

My finding was unsatisfying. Yes, I had found the problem. But if I just replaced the lock like they'd done in the past, would I truly be solving my client's problem or just buying him some time until it needed to be replaced again? I felt it was the latter, and I really did not want to step into the shoes of the previous company by just replacing the lock and moving on. Experience and intuition told me that I needed to do something to correct his problem once and for all.

A Chat With My Client

I spoke with my client, explained my finding and said I wanted to do something different than what had been done previously. I explained that the voltage coming down to the lock to be a little high at 25.8 VDC, and it should be 24 VDC. I also made clear that I was concerned about the power surges and electrical problems that the building experiences. He told me again that the building experiences power issues quite often. I asked him if he had ever seen the movie *Groundhog Day* with the actor Bill Murray. He said he had seen it and looked a little confused. I asked him if he felt like his situation with replacing the locks was similar. He laughed and said, "Yes, exactly, but I was told there was nothing that could be done except to replace the locks." I asked him if he would be open to trying something different to hopefully alleviate his problem with his locks once and for all.

I explained to him that I wanted to install a different brand of lock that would have the same physical look to it (same handle style and finish) as the lock that was currently on his stairwell door, except this lock would have a power regulator installed with it. I explained that the power regulator would help to limit power consumption, reduce heat and suppress any inductive kickback that may occur — and that one of those was most likely the culprit for his problem. I am not sure that he totally understood, but he gave me the green light.

Prep Work For the Job

I chose the SDC Z7250GQ Electra Pro, which is one of the solenoid-controlled cylindrical locks in SDC's 7200 Series *(Figure 4)*. The part number that was on the box is shown in *Figure 5*. The SDC Z7250GQ is an ANSI Grade 1 fail-safe electrified cylindrical lockset with a clutched lever. The lockset is designed with dual voltage of 12/24 VDC and has a SPDT rex output.

The reason that I chose the lock is because the PR-7200 power regulator *(Figure 5a)* is included with the lock. This is the component that would hopefully solve my client's problems. Additionally, this meant that there would be no

additional cost to my client because it's included. Remember, my client had specifically told me more than once that the locks were not cheap. His loud-and-clear message kept reverberating in my head as something to be mindful of.

I do as much prep work as I can in my shop before going to a job site. This helps to not only cut down on time once I'm on the job but also to address problems ahead of time — no one likes surprises on-site.

I decided to install the included power regulator on the lock in my shop so that I could make sure that all my connections were good. This also gave me the opportunity to bench test the lock before I went to the job site.

Dressing the Wires

For me, it's important to be organized. Being organized allows me to stay focused on what I'm doing. I also like to have only the equipment or parts that I'm currently working with on my workbench. This helps to ensure there are no leftover parts or questions about parts remaining on my bench that may have come from a similar lock (or something else).

The Z7250GQ has two cables *(Figure 6)* coming out of the chassis of the lock body. One cable has four wires (white, black, blue and red, as shown in *Figure 7*) that will connect to the incoming power. The way in which they are connected determines the voltage — either 12 VDC or 24 VDC — that the lock will be set to accept. *Figures 8* and *9* show the wiring diagram that can be found on the body of the lock for both 12 VDC and 24 VDC. For this application, I was going to set the lock up to 24 VDC. The other cable has three wires: yellow/red (normally open), white/red (common), orange/red (normally closed) *(Figure 10)*. These are optional monitoring wires used to monitor the latch status. I did not use these wires on this project.

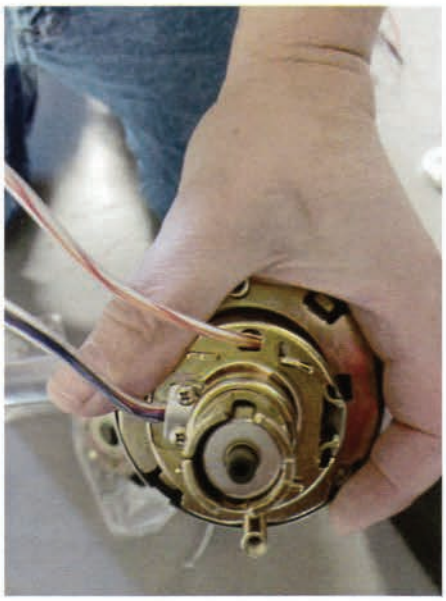


Figure 6. There are two cables coming out of the chassis of the lock body.

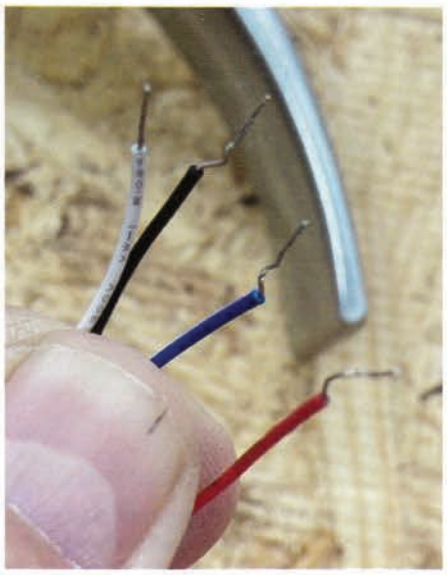


Figure 7. There are four wires (white, black, blue and red) that will connect to the incoming power.

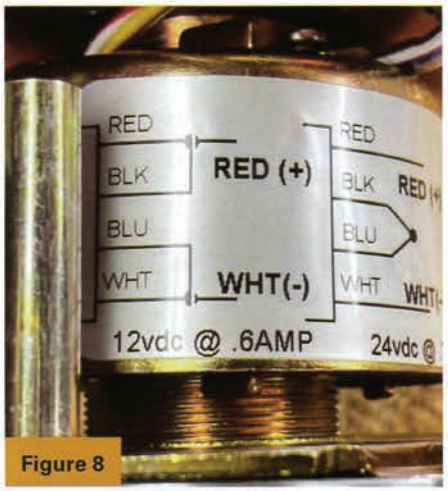


Figure 8

Figure 9

Figures 8 and 9. Here's the wiring diagram that can be found on the body of the lock for both 12 VDC and 24 VDC.

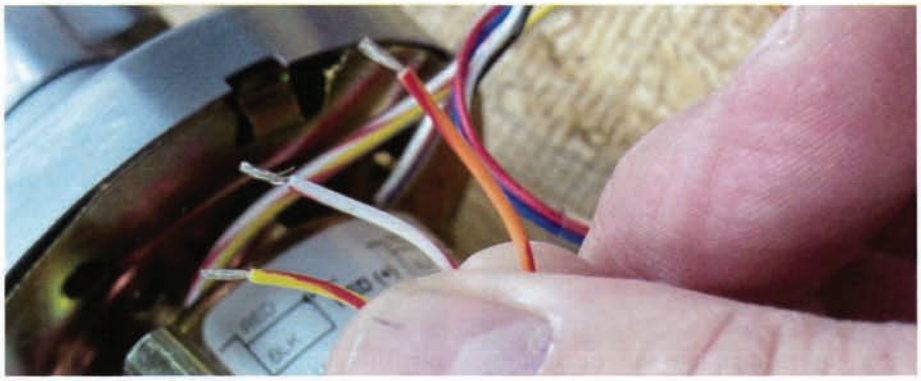


Figure 10. This other cable has three wires: yellow/red (normally open), white/red (common), orange/red (normally closed).

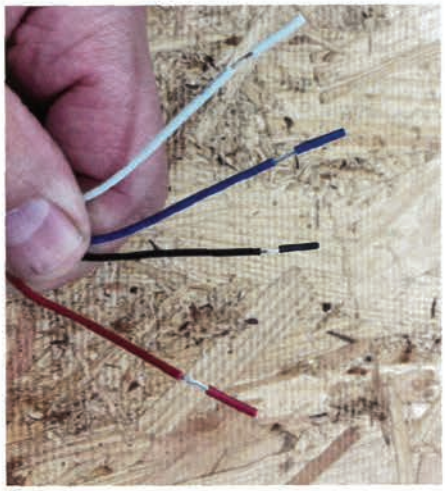
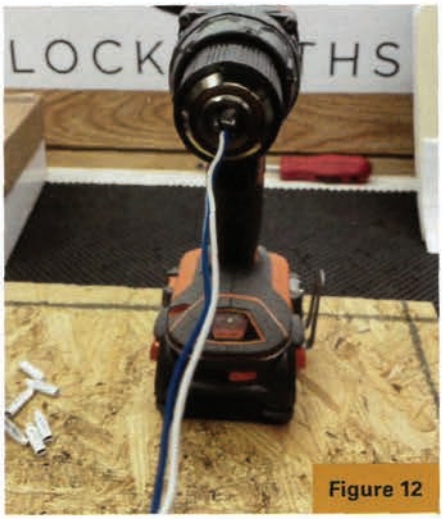
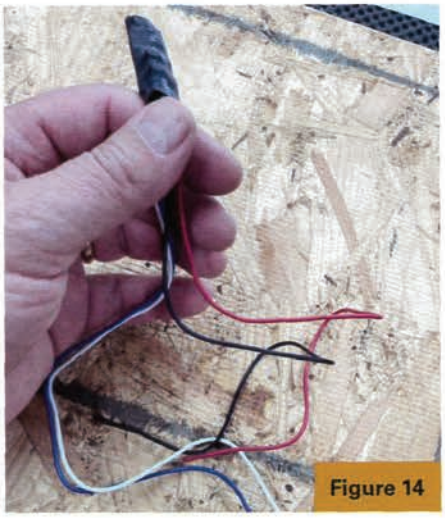
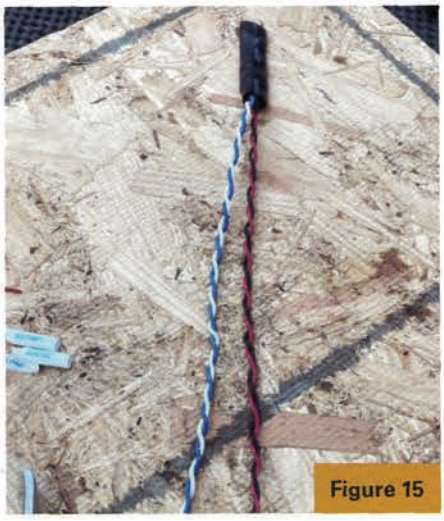


Figure 11. The PR-7200 regulator has four wires: white, blue, black and red.



Figures 12 and 13. The author uses a drill to wind the wires together.





Figures 14 and 15. Here are the before and after versions of the wires.

Figure 16. You can see the final connections.

The Power Regulator's Wires

The PR-7200 regulator has four wires: white, blue, black and red *(Figure 11)*. The blue and white will be connected to the lock, and the red and black will be connected to the power supply. The regulator has two wires in and two wires out. To keep the wires neat and orderly, I like to dress the wires and make all possible wire connections prior to installing the lock. One little trick is to use a drill. I take the wires, insert them into the chuck of my drill *(Figure 12)*, pull slightly taut on the other end of the wires and pull the trigger on my drill. The drill will neatly wind the wires together *(Figure 13)*. Note: Don't overtighten the wires. Stop when they are finished twisting themselves together.

Figures 14 and *15* show the before and after versions of the wires, respectively, on the PR-7200 power regulator. You can see how nicely and neatly the wires are arranged in the "after" photo *(Figure 15)*. The blue and white wires will be connected to the lock, and the red and black wires will be connected to the power supply. This simplifies things and keeps the connections from getting confusing. This is an example of one of my favorite acronyms that I like to follow and apply: KISS. "Keep it simple, stupid!"

Next, I made the connections from the lockset to the PR-7200 power regulator using the supplied B-connectors. The final connections are shown in *Figure 16*.

Here are the connections for the 24 VDC (the connections for 12 VDC are different):

1. The black and blue wires together from the lock.
2. The blue wire from the PR-7200 power regulator to the red wire on the lock.
3. The white wire from the PR-7200 power regulator to the white wire on the lock.

"There were a few things that quickly came to my mind as to what the problem could be: bad reader, bad lock, power issue or simply the programming in the access control system."

Once all connections were made, I installed a piece of heat shrink tubing to keep everything neatly in place *(Figure 17)*. Using my electric heat gun, I applied heat to the heat shrink tubing. *(Figure 18)*. *Figure 19* shows the final neatly arranged and organized wires. The lock is ready for installation.

At the Site

The installation was straightforward. First, I installed the latch into the door *(Figure 20)*. The manufacturer's label on the lock clearly indicates that the latch provided with the lock must be used. *Figure 21* shows the label.

Then I connected the red and black wires from the lock to the power wires that were in the door *(Figure 22)*. The connectors in the photo are blue because I used Dolphin Super B wire connectors with sealant.

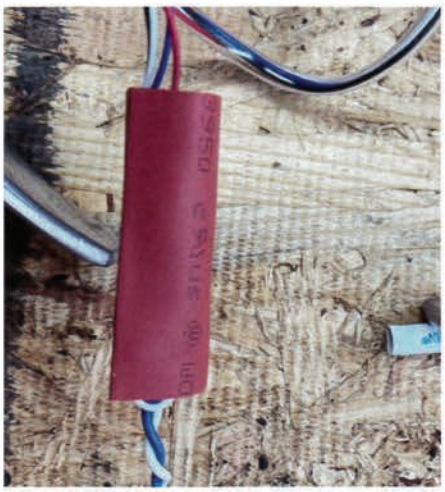


Figure 17. A piece of heat shrink tubing keeps everything neatly in place.

Figure 18. The author applied heat to the heat shrink tubing.

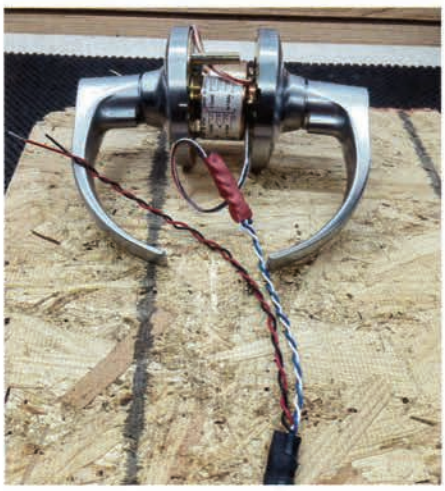


Figure 19. Everything is in place and organized.

Figure 20. The latch is installed.

Figure 21. The manufacturer's label indicates that the latch provided with the lock must be used.

Figure 22. The author is connecting the red and black wires from the lock to the power wires in the door.

Figure 23. The author is installing the lock.

Figure 24. These are the connectors before use.

Figure 25. This is what a good crimp looks like.

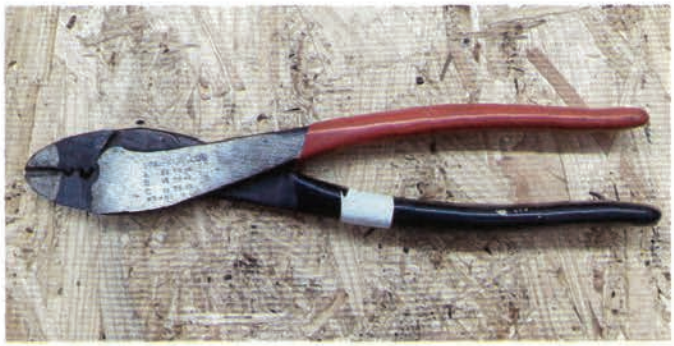


Figure 26. The author likes using these Sta-Kon (Thomas & Betts) crimping pliers.

Finally, I easily tucked all the lock's wires into the door and installed the lock *(Figure 23)*.

Since I installed the lock, my client has not experienced any more problems. The Groundhog Day insanity of constantly replacing the lock has finally stopped. Only time will tell, but I feel confident that his lock problem has been resolved once and for all. I think my client is happy to go through Groundhog Day just once a year now: in February, waiting to see if Punxsutawney Phil sees his shadow.

Bonus Tip

About wire connectors and crimping tools: It is important to use good quality connectors and a quality crimping tool when fastening wires together. The SDC Z7250GQ came with Dolphin B connectors, also commonly known as "Beanies," that I used to connect the PR-7200 power regulator to the lock. *Figure 24* shows the connectors before I used them. *Figure 25* show what a good crimp looks like. I have used these Sta-Kon (Thomas & Betts) crimping pliers for a long time, and they have always worked well. *(Figure 26)*. There are other brands that make excellent crimping tools; I am just showing you what works for me. Use whatever you are comfortable with and what works. I went through many pairs until I found ones that really worked well for me. One of the nice features of the ones I use is that they have the terminal and wire gauge sizes stamped on the side head of the tool *(Figure 27)*.

"The regulator has two wires in and two wires out."

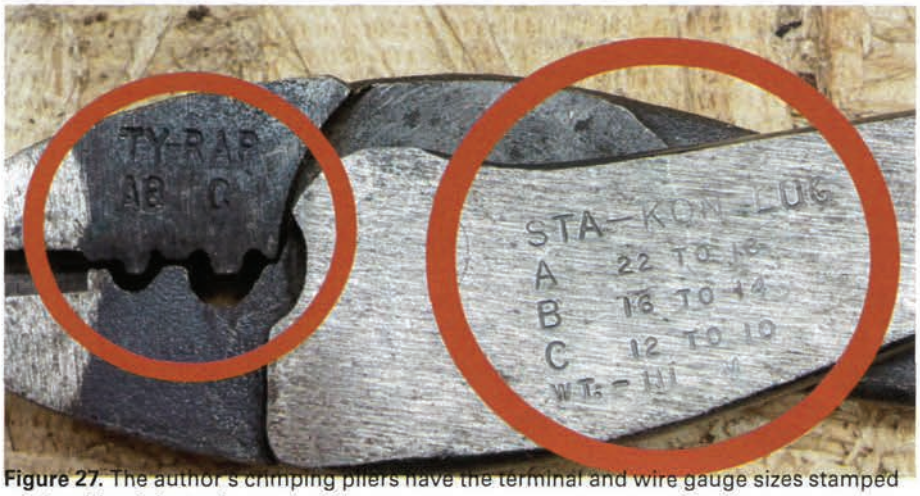


Figure 27. The author's crimping pliers have the terminal and wire gauge sizes stamped on the side of the tool.

Here are a few helpful general tips.

- Make sure that the connector has been properly crimped. A firm pull on the wire without the wire coming out of the B Connector is always a good test.
- Crimp the connector properly. It is crucial not to break the connector or squeeze so hard that the metal conductor under the insulation is revealed. A connector that has been damaged can possibly lead to a short circuit or a point of an electrical failure.
- Use the correct crimping tool for the connector. Using the incorrect tool will result in a bad or faulty connection.
- Make sure that the connector is rated for the gauge wire that you are using.
- Properly insert wire(s) into connector. There should be no bare wire exposed.

Rick Karas, RL, CFDI, AFDI, started in the locksmith industry in 1983. A licensed locksmith, he has experience with many physical security disciplines, including access control systems, intrusion detection systems and video monitoring systems. He works in both commercial and institutional settings. Rick owns Phil-Rich Lock, which serves the Washington, D.C., metropolitan area.