

KEYNOTES

SECURING YOUR SUCCESS



THE **SAFE & VAULT** ISSUE

Making a Tool for Broken Spindles

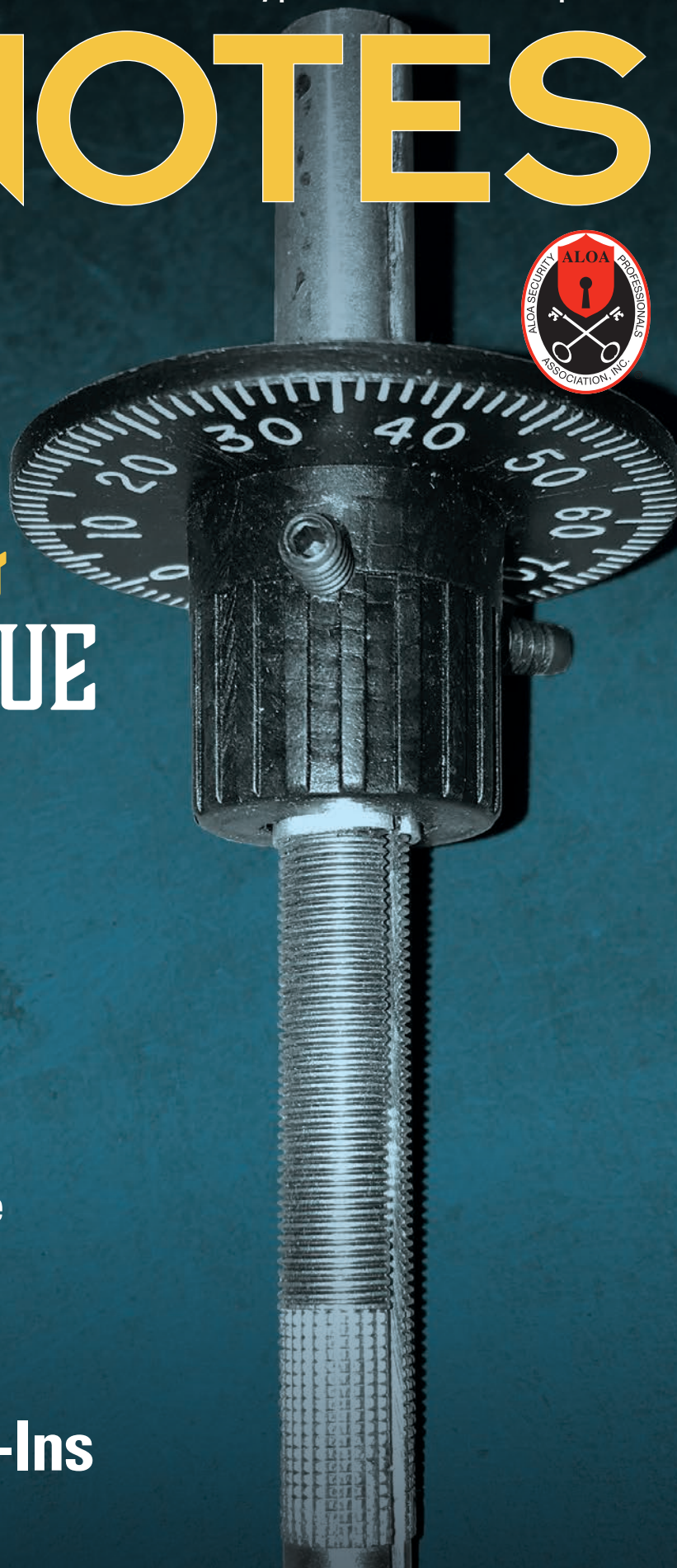
How to create this useful tool in your workshop

Rock and Roll

Learn this safe-moving technique

PLUS

Dangerous RV Locks That Can Cause Lock-Ins





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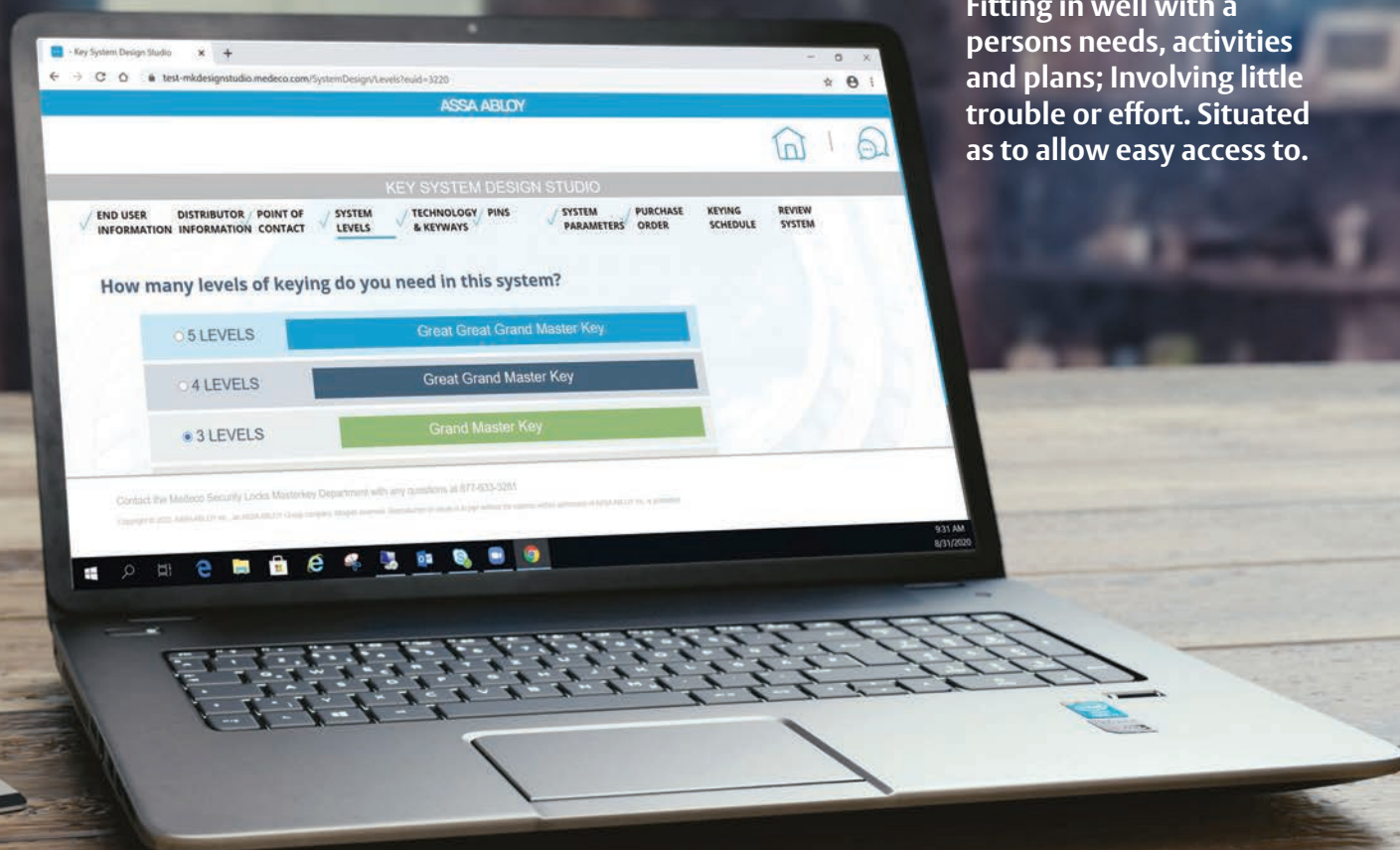
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34

Features

- 34 All the Right Moves: Rock and Roll**
Gene Gyure, CRL, GSAI, CAI, explains one of his favorite safe-moving techniques.
- 38 Working With AMSEC Wall Safes**
Matthew Holley, CML, provides technical information on this simple safe.
- 42 "It's Just a Padlock"**
How hard can it be?
- 46 Making a Tool for Broken Spindles**
Learn how to create this useful tool in your workshop.



14

Spotlights

- 11 Investigative**
Keep your certification active.
- 14 Automotive**
Badly designed RV locks can cause potential lock-ins.
- 24 Business**
Learn how to decode income statements.

What's New

- 8** ALOA/Industry News
- 11** Applicants
- 11** Calendar

Departments

- 5** Presidential Perspective
- 6** Executive Perspective
- 12** Main Event
- 41** Products & Services Guide
- 53** Back to Basics
- 57** Associate Members
- 59** Marketplace
- 60** Ad Index



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ALOA SPAI STAFF

Executive Director

Mary May
mary@aloea.org

Comptroller

Kathy Romo
kathy@aloea.org

Finance Coordinator

Phyllis Jones
phyllis@aloea.org

Convention Coordinator

Bernadette Smith
bernadette@aloea.org

Convention Consultant

Kelly Parker
kparker@aloea.org

Education Manager

Jim Hancock, CML, CMST
jim@aloea.org

Assistant Education Manager

Joe Peach, CML, CAI
joe@aloea.org

Membership Manager

Kevin Wesley
kevin@aloea.org

Administrative Assistant

Judy Risinger
judy@aloea.org

Legislative & Legal Counsel

Barry Roberts
barry@aloea.org

Education, Marketing & Creative Design Coordinator

Dawne Chandler
dawne@aloea.org

Director of ALOA SPAI Chapters

Robert Mock, RL
(856) 863-0710
chapters@aloea.org

EDITORIAL ADVISORY BOARD

J. Casey Camper, CML, CPS
Tom Resciniti Demont, AHC, CAI, CFDI, CFL, CIFDI, CMIL, CML, CMST, ARL
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(615) 773-6115
president@aloea.org

Secretary

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(540) 380-1654

Director, Northeast

Tony E. Wiersielis, PM, CPL, CFDI
(201) 965-7156
acw59@juno.com

Director, Southeast

Tyler J. Thomas, CJIL, CMKA, CRL
(770) 455-6244
sedirector@aloea.org

Director, North Central

Guy Spinello, RL
(815) 222-1486
nedirector@aloea.org

Northwest Region Director

Adrian V. Holley, CRL, LSFDI
HSCBozeman@gmail.com
(406) 570-9782

Director, South Central

Mark E. Dawson, RL
scdirector@aloea.org

Director, Southwest

Guy T. Robinson, CPL, PSP
swdirector@aloea.org

Director, International - Asia

Beta Tam, BA (Hons), FCSFS, RL
btam@alumni.cuhk.net

Director, International - Europe

Hans Mejlshede, CML
intdirector@aloea.org

Director, Associate Region

Noel Flynn, RL
(800) 532-2562
nflynn@aloea.org

Director, ALOA Latino Division

Humberto Villegas, RL
+52-33-3121 7878
americaembajador@aloea.org

Director, Non-Voting

Robert E. Mock, RL
rmock@aloea.org
(856) 863-0710

Director, Non-Voting

Robert R. Cullum, CPL
(800) 225-1595
bcullum@aloea.org

Trustees

Tom Foxwell, RL, CFDI, CAI
(410) 206-5772
trustees@aloea.org

Tom Resciniti Demont, AHC, CAI, CFDI, CFL, CIFDI, CMIL, CML, CMST, ARL
(724) 969-2595
trustees@aloea.org

Director, AIL Division

John Truempy, CRL, CMIL, IFDI, AIL

Director, IAIL Division

Tom Resciniti Demont, AHC, CAI, CFDI, CFL, CIFDI, CMIL, CML, CMST, ARL
(724) 969-2595
trustees@aloea.org

Director, SAVTA Division

Michael Potter, CPS, CAI
president@savta.org
(330) 323-4198

Additional contact information for the ALOA SPAI Board is available on the ALOA SPAI website at www.aloea.org or by contacting the ALOA office at 3500 Easy Street, Dallas, Texas 75247. Phone: (214) 819-9733 Fax: (214) 838-9299 E-mail: aloea@aloea.org

PAST PRESIDENTS

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1956-1960

Ernest Johannesen*

*deceased

KEYNOTES STAFF

Publisher

madsen/miles media

Editorial Director

Kimberly Turner

Editor

Wendy Angel
editor@aloea.org

Ad Sales

Adam Weiss
madsen/miles media
(817) 908-7827
adsales@aloea.org

Art Director

Ben Carpenter
benc@madsenmiles media.com

Graphic Designer

Phil Lor

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Staying Hopeful for ALOA 2021

WE ARE NOW A FULL quarter through 2021, and we are finally starting to see some improvements in this never-ending pandemic. I hope all of you who want to get vaccinated are having luck getting appointments, and I hope we are going to see a return to “normal” later this year.

That includes a return to our annual conventions and other educational events. I’m personally really excited about the opportunity to attend the 2021 ALOA Convention & Security Expo in Orlando in July. We have all been anxiously awaiting good news this year that would point toward being able to hold this convention. I think we are now on a path that’s going to allow that to happen.

This is an event that’s not just a favorite for attendees, but it’s also important to ALOA’s bottom line. ALOA SPAI is a membership organization, and — as most of you know — we have a heavy focus on education. From hands-on classes to certification, a lot of what we do focuses on helping our members learn new skills and get credentials to help position themselves with clients. We’ve put in a lot of effort over the past year to develop more online education opportunities, which is really exciting, and those webinars have been highly popular. But we know many of you have sorely missed our hands-on classes.

We are doing everything we can to keep ALOA 2021 on track to be held. We are keeping up to date with local restrictions in Florida and keeping an eye on the latest recommendations and people’s collective level of comfort. As of now, we feel we will be able to continue moving forward with this convention.

So keep July 25-31 on your calendar, and start registering for classes. Take a look at the registration brochure included with this hard copy of *Keynotes* (it will also be posted online) and plan your schedule for the week. And definitely stay for the Security Expo. It will be nice to be able to actually test out products in person!

Sale of ALOA Headquarters

We are pleased to announce that ALOA’s Dallas headquarters properties on Easy Street were sold at the end of March, and the net proceeds deposited in ALOA’s bank account. We have executed a short-term lease for a 5,000-square-foot building that is about one mile from Love Field, for about the same monthly operating cost as Easy Street.

We now have time to carefully consider our alternatives as we assess ALOA’s post-pandemic and longer-term office and warehouse space requirements.

More information will be made available shortly, but we wanted to include this information in this issue of *Keynotes*.



ALOA Elections

Next month, we will include elections materials for all of the ALOA SPAI board candidates. This is an important time for the association. You’re choosing not just your board members, but the direction you want ALOA to take. You’re choosing what you want your membership to look like in the future. Review your choices carefully, and really take the time to think about who you want your leaders to be. And then vote!

I have thoroughly enjoyed my time as president, and it’s bittersweet to be wrapping up my last term as president. It’s been both a challenge and an honor, and I respect anyone who steps up to run for the board. It’s a big time commitment, but it’s also rewarding. Thank you to all of those who are running for positions this year. No matter who gets elected, I’ll be rooting for your success — and for ALOA’s.

Jim Wiedman, CML
President
ALOA Security Professionals
Association, Inc.
president@aloa.org

Register for ALOA 2021

SPRING IS HERE, THE SUN IS shining and the world seems to be getting to a better place. COVID-19 infection rates are going down in many areas, and vaccination rates are climbing higher. And this news on the pandemic front means good news for the ALOA Convention.

We have been full speed ahead in planning this year's convention. While the pandemic situation has been — and will likely continue to be — in flux, all signs are pointing to being able to hold ALOA 2021 in Orlando. Restrictions have been loosening, and many are becoming more comfortable with travel as they get vaccinated. ALOA is working to make the convention as safe as possible, from employing hand-sanitizing stations and adhering to social distancing in classes to encouraging mask wearing.

With that in mind, I hope you are getting excited about attending. I am sure many of you are looking forward to catching up with old friends, networking and learning some new skills. The staff and board are looking forward to seeing you all as well. We know that the ALOA Convention & Security Expo is an important event to the industry, the association and its members. We are thrilled to be able to plan for this premier event.

If you receive the hard copy of the magazine, you will see that the full registration brochure is included with this issue

“We know that the ALOA Convention & Security Expo is an important event to the industry, the association and its members.”

of *Keynotes*, and it will also be posted online in the Convention section of ALOA.org. We have more than 60 classes for you to choose from, including some new business classes to help you increase sales. Our instructors are some of the best in the industry, and we hope you will take advantage of their expertise.

Security Expo

While education is important, don't forget about the Security Expo as well. You will have two full days to browse the show floor to see the latest products. Getting to see products in action with live demonstrations and being able to talk to distributors one-on-one is so valuable. We have a good number of exhibitors signed up already and more signing up all the time. Be sure to plan your trip so you will be able to take advantage of the full show floor.



Changes at ALOA Headquarters

We have made a few changes for the association lately. We have finalized the sale of the ALOA headquarters building, which has been our home for many decades. It's a bittersweet moment to say goodbye to years of history and memories, but we know it's the right financial move for the association and members.

While staff members continue to work remotely, we will be on the hunt for a new facility in the Dallas-Fort Worth area. In the meantime, we have a new temporary mailing address. You can send any needed correspondence to: 1408 N. Riverfront Blvd #303, Dallas, TX 75207. You can also call us at 214-819-9733 or email us at membership@aloa.org. Please let us know if you have any questions.

I hope you all continue to stay safe and well. See you in Orlando!

Mary A. May

Mary A. May
Executive Director
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ALOA 2021 Registration Is Now Available!



THE MOMENT WE HAVE ALL BEEN WAITING FOR IS here: registration is now available for the 2021 ALOA Convention & Security Expo! Join us July 25-31 at the Caribe Royale in Orlando, FL, for five

days of classes and two full days of the Security Expo. See page 12 for more information, and take a look at the registration brochure included with the hard copy of this issue of the magazine for full class and event details. See you there!



Security Lock Is Now Seclock

DISTRIBUTOR SECURITY LOCK IS NOW SECLOCK. The company has used the seclock.com web address for years, and the new name is a natural transition from that. The company retains the same ownership and management.

With the new name comes a new logo, with a visual element the company calls “The Path,” which the company says “represents all the ways Seclock is connected to its valued customers and gets them to the right solutions efficiently.”

For questions, contact info@seclock.com.

ALOA Has a New Mailing Address

WITH THE IMPENDING SALE OF THE BUILDING, please note that ALOA Headquarters has a new temporary mailing address. If mailing or shipping anything to ALOA staff, such as inquiries, membership forms, convention registrations or anything else, please use the following address: 1408 N. Riverfront Blvd. #303, Dallas, TX 75207

For questions, please contact membership@aloea.org or call 214-819-9733, ext. 2101. Thank you!



NEWS BRIEF

» The **Security Industry Association (SIA)** named Matt Feenan as the 2021 recipient of the SIA Committee Chair of the Year Award, which recognizes individuals for excellence in leading SIA committees and advancing member objectives. SIA presented Feenan with the award at The Advance, SIA's annual membership meeting, which was held virtually March 23. Feenan, who serves as marketing specialist, product and solutions marketing at Axis Communications, is the immediate past chair of the SIA RISE Committee.

IN MEMORIAM



» **Shubert A. Matzkanin, CRL**, of Dashu Enterprises in Yuma, AZ, has passed away. He had been a member since 1987.

» **Richard C. Hebenstreit, RL**, of Rick's Lock Shop in Bethel, OH, passed away last year at age 73. He had been a member since 1996.

PRODUCT BRIEFS

» **Lucky Line Products** has introduced several new items. Key Bands are color-coded key identifiers made from colored heat-shrink plastic with a writable surface. They come in two sizes and four colors. Another new product, Designer Key Skins, are peel-and-stick key identifiers made to fit Kwikset and Schlage keys. They are made from high-quality vinyl label paper and come four design sets: Animal Prints, Tropical, Rainbow and Patterns.

The third new product, Antimicrobial Brass Quick Release, helps slow the spread of germs when leaving keys with family, valets or mechanics. This is an antimicrobial upgrade to one of Lucky Line's best sellers. It includes two key rings and is 3" long.



» **PACLOCK's UCS-80S-250 Trailer Hitch Lock** has a high-security 6-pin cylinder and is compatible with UCS Series locks. The 5/8" pin is designed for 2", 2½" and 3" trailer hitch receivers. Made in the USA.

ALASKA

Fairbanks

- **Rochelle A. Larson**
Larson's Locksmith & Security, Inc.
Sponsor: Charity A. Craft

Kodiak

- **Jonathan Sholl**
Sholl's Locksmithing Services
Sponsor: Glen I. Davies, CPL, AFDI

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- **Matthew D. Churchill, CPS**
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We Need Your Help

Attention, ALOA Members: Help us eliminate the industry scammer problem by screening these applicants, who are scheduled for clearance as ALOA members, to ensure they meet the standards of ALOA's Code of Ethics. Protests, if any, must be made within 30 days of this *Keynotes* issue date, addressed to the ALOA membership department, signed and submitted via e-mail to membership@aloea.org or via fax to 469-543-5241. For questions, contact Kevin Wesley, membership manager, at Kevin@aloea.org or (214) 819-9733, ext. 219.

**CALENDAR**

For a complete calendar of events, visit www.aloea.org.

APRIL

April 10

**Security Pro Supply 2021
Virtual Trade Show**
[www.virtualprosupply.com/
tradeshow](http://www.virtualprosupply.com/tradeshow)

MAY

May 15 and May 22

**ALOA SPAI Board of Directors
Meeting**
A link will be sent to members via email

JUNE

June 16-18

IML Colorado
Denver, CO
www.imlss.com/Events.html

JULY

July 25-31

**2021 ALOA Convention &
Security Expo**
Caribe Royale, Orlando, FL
conventions@aloea.org

SEPTEMBER

September 22-25

GPLA 2021 Convention
DoubleTree Hotel
Philadelphia Airport
Philadelphia, PA
www.gpla.org

OCTOBER

October 20-24

Yankee Security Convention
The MassMutual Center
Springfield, MA
www.yankeesecurity.org

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Keep Your Certification Active

SPRING IS HERE, AND IT'S TIME TO GET OUT OF THE HOUSE AND BREATHE some fresh air! I am so looking forward to the ALOA Convention in Orlando this July. This should be a new awakening for our industry as the first event in over a year. There will be classes and hands-on events for everyone in the forensic field. Whatever your forensic specialty, make sure you have the latest knowledge so that you can be the best in your chosen field.

I am scheduled to have my first Zoom deposition taken this month since the courts and law offices are closed with COVID restrictions. I will report back in next month's page about how that went.

I have asked John Truempy, CFL, and Vernon Kelley, CFL, to start working on a new investigative locksmith manual that will be used for all basic forensic classes. Our latest one was first published in 2000 by IAIL founder Jim Glaizer, CFL. It was last updated in 2012 but is now ready for a complete makeover. As forensic investigators, if you have any suggestions for John and Vernon, email them at truempy@gmail.com or vernon.kelley@gmail.com.

Get Recertified

During these trying times, we understand that recertification is somewhat difficult to accomplish, but it's not impossible. Dawne Chandler in the ALOA Education office will process the paperwork and coordinate with the CFL committee for a speedy turnaround recertification process.

For those of you who are active investigators, the requirements are nothing but restating your past and active cases over the past three years. For those of you who have not worked a case in the past three years, you will be required to do a case report on a topic of the CFL committee's choosing. This is to show that you still have the skills to meet your credential.

Continuing education is incredibly important to forensic investigators, and taking classes is something that we always encourage our division members to do. During the pandemic, in-person classes may be more difficult to come by, but online classes have been available. Those provide an easy way to keep your skills up to date and stay well versed in the latest techniques and procedures.

"Continuing education is incredibly important to forensic investigators, and taking classes is something that we always encourage our division members to do."

If you have any questions, suggestions, or ideas please contact me directly at IAILPresident@aloe.org. ☺



Tom Resciniti Demont, AHC, CAI, CFDI, CFL, CMIL, CML, CMST, ICML, IFDI, LSFDI, ARL. President, International Association of Investigative Locksmiths.

IAILPresident@aloe.org

Get Published!

IAIL members: Submit your articles for the Investigative Spotlight department. Send your information to Ross Squire at ross@abcforensic.com.



Get Ready for ALOA 2021!

Get your class choices in now and get in on the magic!

IT'S BEEN A LONG WAIT FOR ALOA 2021, BUT REGISTRATION is finally here! Take a look at the registration brochure included in this issue of *Keynotes* to see complete class and event information.

Classes

With more than 60 classes and seminars to choose from, you're sure to find selections to meet your educational needs. From classes for industry newbies to classes for advanced students looking to refine their skills, ALOA 2021 has something for everyone. Add to your business skills with marketing and customer service classes, or learn a new skill such as access control.



Take PRP tests while the material is fresh on your mind! ALOA is offering two PRP test sessions in addition to the after-class elective tests.

Security Expo

We have exhibitors from every segment of the industry, from automotive to electronic locksmithing, hardware, tools and more. You'll have access to all of the latest products, with the ability to get demos and in-depth product knowledge you can't find elsewhere. Network with suppliers, get some show deals and maybe even win some prize drawings while you're at it.

Keeping You Safe

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A Dangerous Lock

Badly designed RV locks can cause potential lock-ins. **By Ralph Forrest-Ball**

THE NEXT TIME YOU WORK ON A LOCKING HANDLE FROM A motorhome, travel trailer or other RV, take a closer look at the dead-bolt mechanism. There is a strong chance that it has a design flaw that is a safety hazard. In my opinion, it's your duty as a locksmith to inform the customer of this hazard and offer to repair it. Left uncorrected, this design flaw can lead to a situation where the deadbolt is locked from the outside and the door cannot be opened from the inside. Some worn keys are removable in a position where the tumblers become trapped. The plug seizes up, and the inside thumbturn becomes inoperable. This could be deadly.



Figure 1. This RV lock is installed on a trailer door.

Think about a similar situation with an automotive ignition lock. You're driving down the highway at 55 mph with the key in the "run" position. Suppose your passenger wants to open the glove box, but it's locked. So you pull the key out and hand it to the passenger. Whoops. You shouldn't be able to do that. If the lock and the key are working properly, you shouldn't be able to pull the key out while it's turned. But, we've all seen cases where worn automotive keys *do* pull out while in the run position. It's a rather simple formula: normal wear + time = excessive wear. It might not happen until the car is 14 years old or 40, but only a fool would pretend it will happen.

Fortunately, very little danger is created when the car key is removed from the ignition while it's still in the run position. All the really dangerous scenarios I can think of involve turning the cylinder back to the lock position, which usually requires shifting into park (for an automatic transmission) or pushing in on the key (for a manual transmission).

A declining step key (where each cut is as deep as or deeper than the preceding cut, from bow to tip) has a much greater potential to pull out in the wrong position (see *Figure 2*). With most door locks, the worst that can happen is that the user thinks the lock has been secured, but it really hasn't. With an automotive lock, removing the key in the accessory position can lead to a dead battery or, worse,

“I consider this to be a question of ethics. Now that you know about this danger, it’s your duty to be on the lookout for locks of this type.”

a stolen car.

In some locks, you can create a situation where the lock becomes inoperable from the outside, but it still works from the inside. With other locks, including some mortise locks and the RV lock being discussed here, you can create a situation where the lock becomes inoperable from the inside. If there’s a fire, people might be unable to use this door to escape. This is one of the reasons we avoid declining step keys in master key systems. It’s also one of the reasons that life safety codes specify that sleeping areas need two ways to escape: usually a door and a window.

How to Recognize a Flawed Lock

When I first encountered one of these flawed locks, I thought most of the blame was on the key itself. The problem generally manifests itself when the key becomes extremely worn. Then it occurred to me that *all keys wear*, and it’s only a matter of time before they will eventually reach that stage. Relying on the integrity of the key is a recipe for disaster. A better plan is to modify the lock so that, even if the key pulls out in a position where it shouldn’t, the lock can still be operated from the inside.

Here’s how you determine if the lock



Figure 2. This declining step key is a KW1 13346.

you’re working on is flawed. First, look to see if it has a deadbolt feature. Determine which direction the plug has to turn to extend and retract the latchbolt. Typically, you’ll see that there are actually three positions that the plug can be in: extend, retract and neutral.

Normal operation of the lock usually goes like this: To secure the door, insert the key in the neutral position, turn it 90 degrees counterclockwise to the extend position, then back to neutral, then remove the key. To open the door, insert the key in the neutral position, turn it 90 degrees clockwise to the retract position, then back to neutral, then remove the key.

In many cases, it’s possible to remove the key in the retract position. This is a

harmless consequence of one of the lock’s features and can’t possibly cause a lock-in because the bolt is retracted. However, it should *not* be possible to remove the key in the extend position.

If you were able to remove the key in the extend position, check to see if the inside thumbturn will retract the latchbolt from this state. If it won’t, then you have a flawed lock. But even if the key won’t come out in the extend position, you need to simulate what would happen if and when the key eventually does come out in the extend position.

Turn the key back to neutral, remove the key and pick the lock to the extend position. Note that the latchbolt is extended while you are picking, which

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Know Thy Key

LONG GONE ARE THE DAYS WHEN your vehicle key was a simple machine-cut blade. Just like the vehicles that use them, the modern key is the antithesis of simple. Here's a review of the latest key types.

Flip Key or switchblade key is so named for its design, which enables the bladed key to be folded within its remote fob when not in use and to pop up with a button press. This key also contains a transponder programmed to the vehicle and enables the vehicle to start and be driven.

FOBIK is a kind of remote keyless entry device. FOBIK stands for Fob Integrated Key. The FOBIK's square-topped tip plugs into the dash port and starts the ignition once turned. The remainder of the device acts as a typical buttoned remote that can open the vehicle door and trunk. An emergency door key is hidden within the device.

Smart/Proximity/Intelligent Key contains a copper coil that transmits immobilizer and remote information to the vehicle when at a certain distance to the vehicle, unlocking the vehicle and enabling the driver to start the vehicle by push-button. Inside the Smart key fob is an emergency bladed key that slides out and can be used to enter the vehicle; the key is inserted into a special slot to start the ignition.



Figure 3. The bolt is extended and won't retract.

should make it easier to pick. If you don't have a key, extend the latchbolt with the inside thumbturn before you start picking. Now, with the plug in the extend position, check the inside thumbturn to see if it will retract the latchbolt. If it won't, then you have a flawed lock (*Figure 3*).

Be on the Lookout

I consider this to be a question of ethics. Now that you know about this danger, it's your duty to be on the lookout for locks of

this type. Whenever you encounter one, perform this simple test. Remove the key in the extend position (or pick the lock to the extend position) and see if the inside thumbturn has become inoperable. If it has, you must inform the customer of the safety hazard. Offer to repair the lock to remove the hazard. But what if the customer refuses?

If the reason you're working on this lock in the first place is the fact that the customer doesn't have a key and they asked

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you to make one, then you have a simple answer to the dilemma. *If they refuse to let you repair the lock, you can refuse to make the key.* When there is no key, there is no danger. If the lock can't be secured from the outside, a person can't be locked inside. The situation is safe. Leave it that way.

If the customer already has a key and they refuse to pay for correcting the flaw, that is a tougher problem. Personally, I would feel very guilty knowing that this hazard has the potential to be deadly. I might offer to repair the lock for a reduced price, or even for free.

This reminds me of a situation we often face when a customer has double cylinder deadbolts on every door of their house and they want us to rekey all the locks. Before I start the job, *before I even remove one of the locks from one of the doors*, I immediately inform the customer that, for safety reasons, they need to have at least one door that they can open from the inside with no special knowledge. I tell them we need to replace at least one of their double cylinder deadbolts with a single cylinder deadbolt. If they refuse, I turn down the job. I will not take those double cylinder deadbolts off the doors, rekey them and put them back. Reinstalling the locks would make me partly responsible for the safety hazard.

ALOA Technical Standards #20 and #21 can offer some guidance here:

20. Hazardous Conditions: If any service conditions exist which pose potential risk or lockout hazard, the client will be notified and recommended action proposed.

21. Codes & Ordinances: No lock or security device will be installed or recommended for any application which will violate ICC, UBC, NFPA, ADA or any local code or ordinance or pose a threat to life safety.

“Relying on the integrity of the key is a recipe for disaster.”

Yes, I am aware that the AHJ (Authority Having Jurisdiction, which is usually the local fire marshal) doesn't inspect private residences. I'm also aware that building codes almost never apply retroactively to previous construction. And I'm aware that it's quite likely that when those deadbolts were installed, the code in place at the time did not prohibit them. Despite these facts, I still say it is my duty as a locksmith not to create a dangerous situation. I won't touch those locks unless they are safe when I'm done.

I have heard it suggested that one way to resolve the safety dilemma is to have the customer sign a waiver that states that they are aware of the danger and give you permission to proceed without fixing it. In my opinion, this makes things worse, not better. All you've done is document, in writing, the fact that *you knew it was wrong and you did it anyway*. I'm not a lawyer, but it seems to me that if something bad happens, this makes you more liable, not less. Do the job safely or don't do it at all.

A Typical Wafer Tumbler Cam Lock

Before we get to the details of the flaw that makes these locks dangerous and how to correct it, let's take a look at a typical wafer tumbler cam lock.

The plug contains five wafers that slide up and down. Looking into the keyway, we can see the upper portion of each wafer where it contacts the key. When the proper key is inserted, it lifts each tumbler up just to the right height so that

the plug is free to rotate within the shell. There are actually two shear lines at work here rather than just one, as we'd expect in a pin tumbler lock.

When there is no key in the plug, all the wafers are pushed down by the springs and they block the lower shear line. When an incorrect key is inserted, some of the cuts may be too shallow. Hence, the wafers are lifted up too high, blocking the upper shear line. If either shear line is blocked by even one of the five wafers, that should be enough to prevent the plug from rotating.

A typical cam lock has four slots in the shell. Let's label them top, bottom, left and right. Starting with a vertical keyway and no key inserted, all the wafers are pushed down by the springs, and the bottoms of the wafers are resting in the bottom slot, blocking the lower shear line.

As we insert the key, with the cuts pointing up, each wafer has to move up out of the way of the key, temporarily crossing the upper shear line. If the top slot wasn't there, we couldn't insert the key because the wafers would have nowhere to go. Once the proper key is fully inserted, none of the wafers are blocking either shear line.

Now let's turn the key 90 degrees to the right. The cuts of the key are pointing to the right, and the spine is pointing to the left. If we withdraw the key, the wafers temporarily move into the right slot to get out of the way of the key.

After the key is withdrawn, all the wafers are being pushed into the left slot by the springs. If the right slot wasn't there, we wouldn't be able to remove the key in this position. If the left slot weren't there, we could remove the key but the lock wouldn't be secured. The plug would be free to rotate because none of the wafers would be blocking either the upper or the lower shear line.



Not all cam locks have four slots; some only have two: top and bottom. When you turn the key 90 degrees, the key is not removable from that position. The lock is key retaining. To remove the key, you first have to return the key to the starting position.

But what would happen if we had a declining step key? If each of the cuts from bow to tip is the same or deeper than the previous cut, that means each of the wafers from front to back is the same or taller than the previous wafer. As we begin to withdraw the key, the wafers only need to move up and out of the way of the steeples. The lack of a slot may not be enough to prevent a declining step key from being removed. This is a reason for avoiding declining step keys.

A Look at the RV Deadbolt Lock

Now let's look at this RV deadbolt lock. There are two cylinders. The one in the handle is an ordinary cam lock, and it's usually master keyed. This one uses the MK9901 master key, in addition to the user's key. The shell has four slots, so you can remove the key in either of two positions. The cylinder in the corner of the lock body operates the latch bolt. It's a cam lock with a lazy cam. The shell has three slots instead of two or four. In normal operation of the lock, you only need two slots: top and bottom. This is the neutral position for the lock. To secure the door, you insert the key in the vertical position, rotate 90 degrees counterclockwise to the extend position, rotate back to the neutral position and remove the key. The key should not be removable in the extend position. Assuming that the manufacturers do not sell any declining step keys, we should be safe... theoretically. But remember that badly worn automotive key in an old ignition lock. It's not supposed to pull out in the run position, but it does. We'll come back to this in a minute.

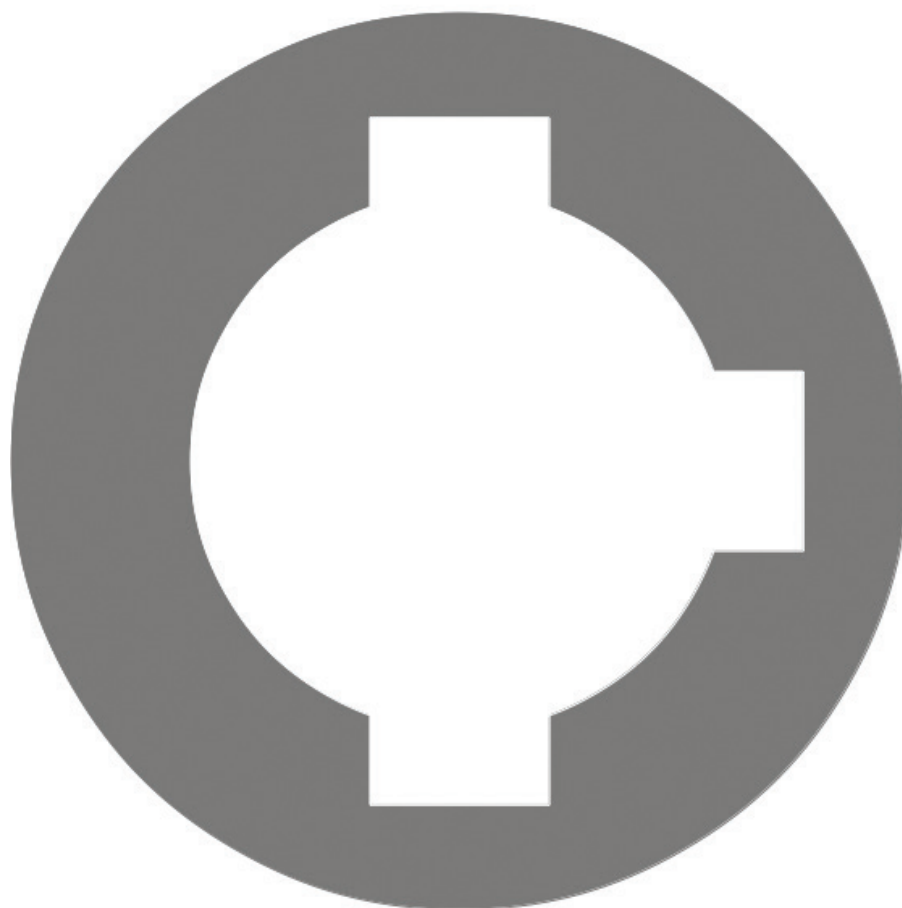


Figure 4. The shell has three slots.

As I said, the third slot is not used in the normal operation of the lock. Its purpose is removing and replacing the plug. The plug uses a retainer in the 6th position, which is accessible from inside the keyway. To prevent removal of the plug while the door is secured (which would defeat the purpose of having a lock at all), the retainer can't slide forward using the top and bottom slots. It needs the third slot to slide forward. This allows the manufacturer to sell replacement plugs and keys to any customers who want to rekey their own lock. The new plug arrives with two black keys and a special blue key that's longer than the operating key, designed to trip the retainer.

The procedure is: Use the old key to turn the old plug to the retract position,

remove the key in that position, insert the blue key, pull out the old plug, put the blue key into the new plug, insert the new plug into the lock, turn it to the neutral position, remove the blue key and test the lock with the new black key.

It seems to me that this procedure is rather complicated for the customer to be expected to "do it yourself." It would be much simpler if the retainer was only accessible from the back side of the lock and they simply told customers that to replace the plug, you have to remove the lock from the door, depress the retainer, slide out the old plug, slide in the new one and return the lock to the door. In my opinion, this procedure isn't much more difficult, and it would eliminate the need for the third slot entirely.



Figure 5. The author is removing the lock from the door.



Figure 6. The hook pick is ready to remove the plug.



Figure 7. The author is removing the plug.



Figure 8. The plug is removed.

The Danger

The danger occurs when the plug is rotated to the extend position and the key is removed. The key isn't supposed to be removable at this point. The lock is supposed to be *key retaining* in this position. But, given enough time and wear, it's inevitable that some of the keys will be removable from some of the locks.

When one of those keys is removed in the extend position, the bottoms of the wafers will fall into the third slot. And they will be stuck there. The plug cannot move. Now, the inside thumbturn is inoperative, and we have a potentially deadly lock-in situation. All this can be prevented by simply beveling one side of the third slot.

If the clockwise edge of the third slot were beveled, the bottoms of the wafers wouldn't be trapped. They could slide out of the slot when torque is applied to the

inside thumbturn. With nothing to prevent the thumbturn from moving, there is no lock-in.

This is how I suggest you fix it: Bevel the clockwise edge of the third slot. The lock is held on the door by four Phillips screws on the inside and two countersunk Phillips screws from the edge of the door. Removal from the door may be helpful, but it's not necessary (*Figure 5*). The plug retainer can be accessed from inside the keyway using a hook pick, for example. This only works if the plug is in the retract position (*Figures 6-8*).

Once the plug is removed, look inside the shell and locate the third slot (*Figure 9*). It's the only slot that doesn't have another slot opposite it. In this photo, it's at the 3 o'clock position. The edge of the slot needs to be filed down to about a 45-degree angle. The corner that needs to



Figure 9. The shell with three slots is shown.



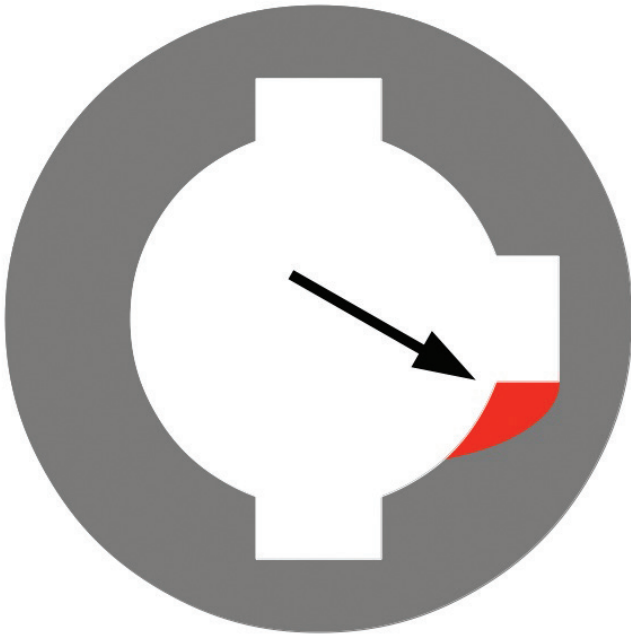


Figure 10. The area in red is the place to be filed.



Figure 11. The Dremel tool is ready for use.



Figure 12. The cutting bit is shown up close.



Figure 13. The author is using the Dremel tool.



Figure 14. The shell has been filed.

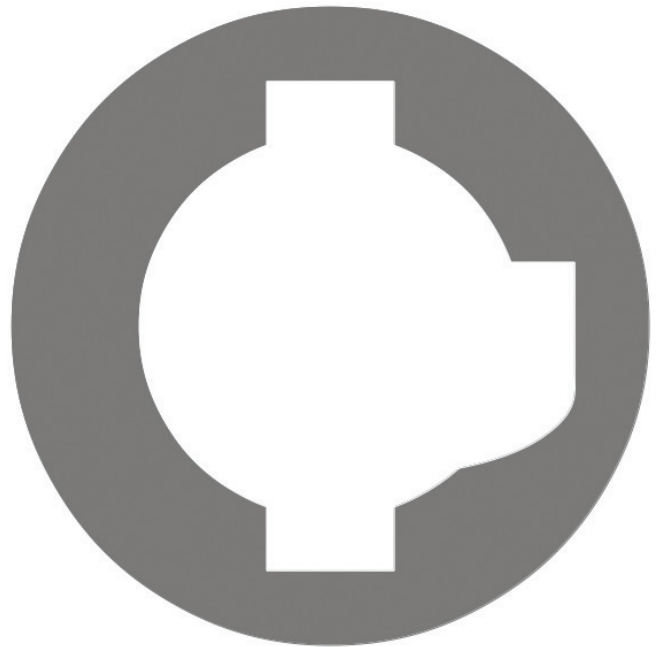


Figure 15. This shell is *not* dangerous.

be beveled is in the 4 o'clock position in this photo. For this demonstration, I used a Dremel tool (*Figures 11-14*). When you think you've filed it enough, test it. Pick the lock to the extend position and see if the inside thumbturn is operable. If it's not, remove the plug and file some more.

I initially considered the idea of rounding the corner of the wafers themselves rather than filing the shell. That would allow them to slip up and out of the third slot. But it would also allow them to slip up and out of the bottom slot, which would mean that you could turn the plug from neutral to retract without a key. That defeats the lock.

It's worth noting that the third slot may appear on the left or the right, depending

on the model and the handing of the lock. When I say to bevel the clockwise edge, I'm assuming that clockwise is the direction that retracts the latch bolt. If you run into one of these locks that retracts the latch bolt counterclockwise, you need to bevel the counterclockwise edge of the third slot. Think about the position of the tumblers that are trapped in the slot and how they need to escape so the plug can rotate from extend to neutral. That's how you know which edge of the slot needs to be beveled. If you're not sure which side to bevel, it probably won't hurt anything to just go ahead and bevel both sides of the middle slot.

If new locks were manufactured with this beveled edge at the factory, the dan-

ger would be eliminated from that point forward. But there would still be thousands of old locks out there that still have the flaw. That's why all of us need to be on the lookout for these dangerous locks and fix them whenever we find them. 🛠️



Ralph Forrest-Ball was a math teacher for 12 years before becoming a full-time locksmith. He joined ALOA in 1997 and earned the CML credential in 2009. From 2009

to 2019, he was the owner of Emerald City Locksmith in Eugene, OR, and he was the winner of ALOA's Best Shop contest in 2011. He currently works part-time as a consultant in Corvallis, OR.

Demystifying Your Income Statement

Learn what it all means and how it's set up. **By Noel Flynn**

THIS IS THE 20TH ARTICLE IN OUR “TOOLS FOR MANAGING YOUR Business” series. Many individuals — especially those who are new to business ownership or management roles — tend to struggle with understanding financial statements. Whether we like it or not, this is how the world keeps score in the game of business, and there isn't any sign of that changing. We can add financial statements to the list of inevitables, which already includes death and taxes!

Why do intelligent owners and managers still struggle with basic financial stuff? At least one of the reasons is that there is a certain mystique surrounding accounting. It's a bit like the medical world where doctors and nurses appear to speak in tongues when discussing medical conditions, etc. Obviously, terminology has a lot to do with it. And like so many other things in life, sometimes those who are the most knowledgeable about a topic are actually the worst individuals to explain the subject matter to us mere mortals.

Two Types of Accounting

As business owners or managers, most of us only need to have a good grasp of what's called “managerial accounting,” which is internally focused. However, if you intend to make your living as a CPA, then you need to study “financial accounting” (externally focused), which includes debits, credits and other accounting mumbo jumbo terms. With this in mind, let's see if we can translate some of that managerial accounting stuff into concepts and applications that we non-accountants can understand and apply.

There are two primary financial statements used to measure the performance of a business: balance sheet and income statement, aka profit and loss statement, or P&L. (A third, statement of cash flows, will not be covered in this article.) We'll use a sports analogy that can help explain these two primary financial statements.

The Income Statement: A One-Season Scorecard

An income statement is a one-year scorecard, sort of like one season for a football team. At the end of each season, we can see the team's performance for the 16 regular games. But for the next/new season, we hit the reset button, and the performance scoring begins all over again. Your business generates an income statement for each month of the year, plus a cumulative set of numbers for any past monthly

numbers of that same year. Thus, we say that an income statement (or P&L) tells us what happened for a period of time, which could be one month (each game), several months (several games) or one year (the full season).

So, we could have a P&L for only the month of March, or one for the first quarter of the year (three months combined), or for the entire fiscal (financial) year of, let's say, 2020. This last one would commonly be known as a December, year-to-date (YTD) P&L. The period of time represented by a P&L is indicated on top in the header. Pay attention to this so you know what period of time is covered.

A common layout for the top/header of an income statement for, say, March, for example, would include two side-by-side sets (columns) of numbers. One set representing the *period*, or in our example, only the month of March. The other (second column) set of numbers is for year-to-date (YTD) which represents the *cumulative* numbers for however many months of this year are covered.

In our example, since this is the March P&L, the YTD numbers would be for the first quarter or the first three months of the year (January + February + March). Such a P&L would be formatted something like what you see in *Figure 1*.

This typical header format enables us to look at the company's performance for

the period of the month of March (numbers on the left side column). We can also see performance for the YTD first quarter (cumulative three months January +February +March), as a set of corresponding numbers on the right-side column. If this were our P&L for the month of December (instead of March), the YTD right-side column would typically represent the cumulative numbers for all 12 months of that year. In addition to the dollars listed on each line, a “percent of sales” is also commonly listed.

Space limitations don’t permit us to illustrate a format that includes both period and YTD on our illustrations later in this article. Companies that use budgets would also include columns providing a comparison of actual performance to the budgeted (expected) performance and the difference, which is known as a favorable or unfavorable “variance.”

So, what happens to this P&L business’ performance scorecard (as measured by profitability, rather than touchdowns) at the end of the year? In simple terms, the end result (bottom line, Net Income) migrates over to the company’s balance sheet, which, unlike the P&L, represents a cumulative snapshot of the company’s financial position at a *moment in time*. Our focus will be on the P&L rather than the balance sheet (BS). The company’s performance over multiple years is seen on the BS.

Income Statement/ (P&L) Format and Content

Our very close friends at the IRS (or Revenue Canada) require your business to keep certain records (such as receipts, invoices and bank statements), usually for seven years. More germane to our discussion is the requirement that corporations generate two types of standard financial statements: balance sheet and income statement, or P&L. As previously mentioned, these two financial statements are how the accounting world keeps score of your business’ performance.

For just a moment, let’s reflect on that special moment that every business owner or manager looks forward to: A stranger uttering the welcome words of joy: “Hello, I’m from the IRS, and I’m here to help you.”

Let’s take a look at the format of a typical income statement/P&L statement. Again, a critical point to remember is that an income statement essentially resets anew at the beginning of a new year. Cumulative performance for previous years is reflected in your company’s balance sheet. We’ll eat this P&L apple slowly by revealing one section at a time, from top to bottom. *Figure 2* shows what the upper section of a typical income statement/P&L would look like. Remember, we don’t have enough space to show the YTD (right) side column of the format or the percentages of sales.

XYZ Company Income Statement			
PERIOD (Month of <i>March</i>)		YEAR-TO-DATE (YTD) (3 months ending March 31)	
\$	%	\$	%

Figure 1. A one-month income statement would be formatted like the above.

INCOME STATEMENT OF XYZ COMPANY	
For the period <u>XXX</u> (Typically for one month. Issued for each month of the year)	
In the most rudimentary form, to be of any value at all, a P&L would need to include:	
Income	How much money came IN (earned but not necessarily collected)
Less Cost & Expenses	How much money went OUT (billed obligations, even if not yet paid)
<hr/>	
Profit or (Loss)	Money IN, less money OUT

Figure 2. This is what an oversimplified and highly condensed income statement format would look like.

But you will quickly see that this minimal level of detail does not really tell a business owner or manager much, except perhaps the final score of the game for a particular period of time. So, let’s add more lines for additional details to help us run the business.

INCOME STATEMENT OF XYZ COMPANY

For the period XXX (Typically for one month. Issued for each month of the year)

INCOME:	(Overarching category of <u>all</u> money that came in – earned)
Gross Sales	\$525,000 (Sales before discounts/returns/allowances (DR&A))
Net Sales	\$500,000 (Services and/or products you sold, less DR&A)
Less Cost of Sales (COS)	-\$300,000 - (“Direct” costs incurred, such as labor and materials)
Gross Profit	\$200,000 (Net Sales, less cost of sales (COS))
Gross Margin %	40% (Percentage of gross profit from those sales)

Figure 3. Adding a few details to this income statement helps paint a more complete picture.

Note that because some business is done on credit, when we say “money *in* and money *out*,” this does not necessarily mean that we received payment of all our invoices or paid all our bills yet.

Looking at this expanded top INCOME section enables us to determine that:

- We generated \$525k in gross sales (what we invoiced).
- We had \$25k in discounts, returns and allowances (DR&A), which reduced our sales for a *net* sales of \$500k. (gross sales, less DR&A).
- our ‘*direct*’ cost (cost of sales or COS) of providing those sales was \$300k.
- gross profit on sales is \$200k *** (net sales, less cost of sales)
- gross margin (GM) is 40% (respectable for a typical service business).

*** Your *gross profit* is what’s left over to cover operating expenses and overhead.

Let’s dive a bit deeper into the cost of sales (COS) issue. If your company were a wholesale distribution business, you would buy products and then resell them at a higher price to make a profit. In this scenario, at the end of each month, you would know how much (and what) you sold, and you’d also know what you paid for those products. What you paid for the stuff you sold would represent your COS.

In our distribution business, accountants would likely use the term “cost of goods sold,” instead of “cost of sales,” because there isn’t any direct labor involved in generating these sales. You buy products (goods) and you sell those products (goods), hopefully at a profit. Thus, the term “cost of goods sold.” The same principle is used in a retail business. Note that in this section of the P&L, we refer to our costs rather than “expenses.” This is a very important distinction that helps to understand the COS concept!

However, if you are a service business, you will likely be doing jobs that involve installations, repairs and other services that add or provide value. You’ll also likely be selling materials and/or products, either separately (such as over-the-counter sales, if you have a retail shop) and/or as part of your jobs or projects. We need to know what these jobs cost you, and that usually means primarily your direct labor plus materials used on those jobs.

We need this cost data separated because, if we did not, we’d be unable to determine whether we were making money (or how much) from selling our services and/or products, before we considered the impact of operating expenses and overhead for our business. Again, it’s helpful to use the term “cost” at this juncture and use the term “expenses” later on. This gross profit (net sales less COS) tells us how much we have left over to pay for operating expenses and overhead such as rent, phone, utilities, salaries, payroll taxes, insurance, travel and other expenses of running the business (and also, ideally, some profit).

To recap this very important point, remember that only those costs that are *directly* related to our sales (services and/or products sold) are included in COS. *It’s imperative that you grasp this important point before proceeding.* If not completely clear, please reread the previous section. If we are not making a respectable gross profit, then we need to reexamine our pricing and our job/order/quotation related costs. If your gross profit is too low, it’s highly unlikely that you will be able to make up for that by sufficiently reducing your operating expenses, and you will probably *not* make a profit. Next, let’s look at that P&L format again, but this time, we’ll move further down to see what comes next: expenses.

Now that we’ve recorded our sales and what it cost us directly to provide those sales (COS), we need to know about expenses we incurred in running the business. Such expenses are typically known as operating expenses and are further grouped into summary subcategories of sales, general and administrative (SG&A).

EXPENSES:	Overarching category of all <i>indirect</i> money that went out
Sales and Marketing	Your sales and marketing expenses
General and Administrative	Your general and administrative expenses
Operating Expenses	All sales, general and administrative (SG&A) expenses
Income From Operations	Gross profit, less operating expenses
Other Income:	
Interest Income	Interest, possibly from a savings account or CD
Rental income	Possibly rental income from your tenant
Total Other Income	Your total “other income” from all sources
Other Expense:	
Other Expense	Some other expense(s) of a miscellaneous nature
Income Taxes	Everyone’s favorite
Total Other Expense	Your total “other expense” from all sources
Net Income	Gross profit, less all expenses

Figure 4. Expenses have now been added to the income statement.

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NEW!
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MEETS FUNCTION

Now that we've looked at and explained the primary sections, let's unveil what the full view of our P&L might look like. Again, we don't have space to feature the YTD column or percentages.

INCOME STATEMENT OF XYZ COMPANY	
For the period <u>XXX</u> ((Typically for one month. Issued for each month of the year)	
INCOME:	(Overarching category of <i>all</i> money that came in - earned)
Gross Sales	\$525,000 (sales before discounts/returns/allowances (DRA))
Net Sales	\$500,000 (services and/or products you sold, less DRA)
Less Cost of Sales (COS)	-\$300,000 (<i>direct</i> costs incurred, such as labor and materials)
Gross Profit	\$200,000 (net sales, less cost of sales (COS))
Gross Margin %	40% (percentage of <i>gross</i> profit from those sales)
EXPENSES:	Overarching category of all indirect money that went out
Sales and Marketing	Your sales and marketing expenses
General and Administrative	Your general and administrative expenses
Operating Expenses	All sales, general and administrative (SG&A) expenses
Income From Operations	Gross profit, less operating expenses
Other Income:	
Interest Income	Interest, possibly from a savings account or CD
Rental income	Possibly rental income from your tenant
Total Other Income	Your total "other income" from all sources
Other Expense:	
Other Expense	Some other expense(s) of a miscellaneous nature
Income Taxes	Everyone's favorite
Total Other expense	Your total "other expense," from all sources
Net Income	Gross profit, less all expenses

Figure 5. This is what a full income statement might look like without all of the numbers or percent columns.

Of course, it's commonplace for P&Ls to break down primary expense categories such as sales, general and administrative (SG&A) into more detailed sub-categories such as:

- Rent
- Salaries
- Insurance
- Phone
- Payroll taxes
- Travel
- Utilities
- Benefits
- Other

INCOME STATEMENT OF XYZ COMPANY

For the Period December 1 - 31, 2020

INCOME:	PERIOD (Month of December)	% Of Net Sales	YEAR-TO-DATE (12 Months - Jan-Dec)	Y-T-D % Of Net Sales
Gross Sales	\$50,000	105.26%	\$900,000	105.88%
Less Discounts, Returns & Allowances (DR&A)	(\$2,500)	-5.26%	(\$50,000)	-5.88%
-----	-----	-----	-----	-----
Net Sales	\$47,500	100.00%	\$850,000	100.00%
-----	-----	-----	-----	-----
Less Cost of Sales (COS)	\$32,000	67.37%	\$500,000	58.82%
-----	-----	-----	-----	-----
Gross Profit	\$15,500	32.63%	\$350,000	41.18%
-----	-----	-----	-----	-----
EXPENSES:				
Sales & Marketing	\$5,000	10.53%	\$75,000	8.82%
General & Administrative	\$12,000	25.26%	\$150,000	17.65%
-----	-----	-----	-----	-----
Operating Expenses	\$17,000	35.79%	\$225,000	26.47%
-----	-----	-----	-----	-----
Income From Operations	(\$1,500)	-3.16%	\$125,000	14.71%
-----	-----	-----	-----	-----
Other Income:				
Interest Income	\$250	0.53%	\$5,000	0.59%
Rental Income	\$1,200	2.53%	\$24,000	2.82%
-----	-----	-----	-----	-----
Total Other Income	\$1,450	3.05%	\$29,000	3.41%
-----	-----	-----	-----	-----
Other Expense:				
Other Expense:	\$1,000	2.11%	\$12,000	1.41%
Income Taxes	\$4,500	9.47%	\$30,000	3.53%
-----	-----	-----	-----	-----
Total Other Expense	\$5,500	11.58%	\$42,000	4.94%
=====	=====	=====	=====	=====
Net Income	(\$5,550)	-11.68%	\$112,000	13.18%

Figure 6. Above is an example of a full year end income statement.

Filling Up the P&L's Category Buckets

Reflecting upon this simplified P&L, we see only one expense summary category on each line. But we realize that there can be many individual transactions behind that consolidated category number. As an example, our “sales” number on the P&L could possibly be comprised of dozens or even hundreds of individual sales transactions and invoices. It’s easy to see that we need some sort of mechanism to keep track of our activities and transactions, in such a manner as to be able to facilitate grouping or rolling up all of these income and expense items into organized category and subcategory summary buckets. These organized buckets represent the category lines on our P&L.

We should mention that certain activities will be grouped and recorded on our balance sheet instead of the income statement (P&L), but let’s focus on the P&L to avoid confusion. Instead of buckets, our accounting system uses “accounts,” just like they did back in the day of paper ledgers and journals. The master list of our accounts is called the “chart of accounts,” and these will correspond with the categories on our P&L/balance sheet. Let’s look at some analogies that may help us to imprint these conceptual principles in our brains.

General Ledger and Chart of Accounts

The general ledger is the heart of any accounting system, whether manual or computerized using software, and the chart of accounts is the heart of the general ledger. Rather than risk immediately getting turned off by sinking into the quagmire of accounting mumbo jumbo, let’s instead picture a Home Depot, Lowes, Sam’s Club or other big-box type of store where there is signage indicating the product categories found in each particular aisle. Plumbing, hardware, lighting etc. The general ledger (GL) uses a chart of accounts to essentially list a directory of the various “aisles” in your metaphorical warehouse, set up in the same fundamental manner. Of course, unlike the big-box store, our GL is storing information by category rather than products.

Did you ever wonder if the real reason they call it “do it yourself” (DIY) is because you can never find any help in such stores when you need it? Perhaps it should be called FIY or “find it yourself.”

To use our accounting system in a traditional for-profit company (not-for-profit principles are the same, but formats and categories are a bit different), we must first set up our GL with various categories (aisles) to record and store our information.

A File Cabinet Metaphor

If the big-box warehouse example doesn’t float your boat (sorry if this nautical reference is perhaps sensitive because you have personally been responsible for numerous business shipwrecks), an alternative would be to think of a room with four walls. Each wall has a set of file cabinets, and each file cabinet has four drawers. Each wall is for one of these categories: income, cost of goods (COS), expenses and profit.

Within each wall, separate file cabinets are dedicated to subcategories. For instance, on the expenses wall, we might find a cabinet for occupancy-type expenses. In this cabinet, one drawer might be for utilities, one might be for rent, one might be for lawn care, etc. (See Figure 7.)

Whether we use the “aisle in a big-box store” metaphor, or the “file cabinets” approach, the organizational concept is the same. We have categories and subcategories for tracking and grouping various activities. Since file cabinets on this wall are expenses, you’d expect to find paperwork such as paid bills or invoices for products or services we received from our suppliers. The category labels on each file cabinet tell us the type of category in each cabinet, whereas each drawer label tells us which subcategories are in that drawer. Thus, if I am looking for an Uber expense record (referring to our illustration), I know to look in cabinet #5, drawer #3. Fortunately, we have software to perform what would otherwise be a nightmarish tracking task, but we still need to enter the details into our accounting system.

On a fundamental level, the general ledger’s chart of ac-

One Wall of File Cabinets – Expenses Category

1	2	3	4	5
OCCUPANCY	COMMUNICATIONS	MARKETING	PAYROLL	TRAVEL
Utilities	Phone	Advertising	Salaries	Air
Property taxes	Internet	Social media	Hourly	Auto
Common area Maintenance	Mail	Web	Overtime	Taxi/Uber
			Payroll taxes	Rental car

Figure 7. Picturing a filing cabinet can be a useful visual, whereby each cabinet has one expense category, and each drawer is a subcategory of expenses.

counts does the same thing as the file cabinet system, except that we are using accounts (as electronic buckets or file cabinets and drawers), into which we record highlights of the various transactions and activities. Of course, we still store the actual paperwork (aka source documents) in file cabinets, but the primary transactional elements and details are recorded in the appropriate general ledger accounts. How else would we keep track of this stuff?

Of course, we need to place our business transaction information into the appropriate electronic buckets (called accounts), to organize our information into categories that are consistent with our financial statement categories and line items. Ordinarily, computers would not know if we inadvertently parked some activity in the wrong account. This happens periodically in business but can be corrected. Let's take a look at an abbrevi-

ated Chart of Accounts (*Figure 7*).

Let's take a look at these chart of accounts column headings.

Account Numbers

Some companies don't need or use account numbers for their chart of accounts, but you can turn this feature on in QuickBooks (QB) and other accounting software applications. Such numbers can be helpful if you have many accounts and possibly if you prefer to force a different order in which your accounts are listed in your chart of accounts. The default list order is usually alphabetical, within certain boundaries. You can also move the placement of accounts, but if you do, keep in mind that a parent-level account will carry with it any related child-level sub-accounts.

Chart of Accounts

Account Number	Account Name	Type	Financial Statement
	Accounts Receivable	Accounts Receivable	Balance Sheet
	Inventory Asset	Other Current Asset	Balance Sheet
	Fixed Asset:	Fixed Assets	Balance Sheet
	Building	Fixed Assets	Balance Sheet
	Accumulated Depreciation	Fixed Assets	Balance Sheet
	Cost	Fixed Assets	Balance Sheet
	Accounts Payable	Accounts Payable	Balance Sheet
	Payroll Liability	Other Current Liability	Balance Sheet
	Sales Tax Payable	Other Current Liability	Balance Sheet
	Retained Earnings	Equity	Balance Sheet
	Services Sales	Income	Income Statement
	Product Sales	Income	Income Statement
	Other Sales	Income	Income Statement
	Cost of Goods Sold	Cost of Goods Sold	Income Statement
	Utilities:	Expense	Income Statement
	Gas	Expense	Income Statement
	Electric	Expense	Income Statement
	Water/Sewer	Expense	Income Statement
	Phone	Expense	Income Statement
	Internet	Expense	Income Statement
	Advertising:	Expense	Income Statement
	Print	Expense	Income Statement
	Web	Expense	Income Statement
	Social Media	Expense	Income Statement

Figure 8. Above is an abbreviated chart of accounts.



Account Name

This is the common name of the account.

Type

This pertains to the financial statement (balance sheet or income statement) category description.

Financial Statement

This column would not be part of your chart of accounts, but I added it to illustrate how the accounts that are listed would be related to each of your two primary financial statements.

Balance

Although not shown because of space limitations, your chart of accounts would also include a column for “balance,” reflecting the current balance amount for each account. I did not include such a column, nor are actual numbers provided.

Setting Up Your Company’s Chart of Accounts in Accounting Software

After you install a software program such as QuickBooks on your computer, you will need to set up your company or com-

panies. In order to make this setup process easier, QB provides an electronic questionnaire. Beyond the obvious information about your company, probably the area of most influence initially is the general ledger chart of accounts. Based on your answers in the setup questionnaire, QB chooses a canned selection of accounts that is most likely appropriate for your type of business. But, you can add, delete and/or change your accounts later on.

Conclusion

The income statement, or P&L, is one of the two primary financial statements that you need to manage your business and comply with taxing authority requirements. This P&L keeps score for a one-year period and then resets for the next year. Numbers representing losses on your P&L are often presented within brackets, e.g. (\$xxxxx), and are sometimes in red color.

The cumulative results of previous years’ profits or losses will appear on your balance sheet as retained earnings under the equity section. The general ledger (GL) is the heart of any accounting system, and the chart of accounts is the heart of the GL. These “accounts” are where transactions

are recorded in electronic buckets representing the various categories and sub-categories that comprise the line items on your P&L.

Expanding the categories and subcategories of your P&L can help a business owner or manager keep score of performance results but, more importantly, it provides valuable insights into the economics of your company. Use this tool and generate both summary and detail versions so you can either just see the bigger picture or drill down to learn more details. As an example, instead of just a sales category, add meaningful subcategories to your chart of accounts, such as:

Product sales
Repair sales
Installation sales
Other sales

Total Sales

In addition to listing the dollars for each line item on your P&L, add percent of sales columns for each of the line items so that you can see what *percentage of sales* each subcategory

and line item represents and how they are trending over time.

After reading and absorbing this article, hopefully you're now more comfortable with the basic concepts and have achieved at least a rudimentary understanding of a basic income statement/P&L. Don't be intimidated by the terminology; every industry has some. Best wishes for success.

The topic for our next article in this series will be "Demystifying Your Balance Sheet," where we will discuss the basic terms and setup to help you understand your company's financial position at a particular moment in time. ☺



Noel Flynn is a degreed business management consultant with global senior leadership experience, including more than 20 years in manufacturing, wholesale distribution and consulting sectors of the security industry. Noel has been a senior executive, officer, board director and adviser to not-for-profit and for-profit companies in numerous industries worldwide. This includes being an ALOA SPAI board member since 2011, and he is also an ACE instructor, developing and teaching business management. Contact him at nflynn@aloe.org

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ALL THE RIGHT MOVES: ROCK AND ROLL

Gene Gyure, CRL, GSAI, CAI, explains one of his favorite safe-moving techniques.



Figure 1. The author used this safe to demonstrate the “rock and roll” technique.

NO, WE’RE NOT TALKING ABOUT THE MUSIC GENRE. THIS is a series is about moving safes and the methods used to accomplish these moves. One of my favorite techniques is what I like to call “rock and roll.”

Where do I use this technique, you might ask? The answer is just about anywhere you need to move a heavy or awkward safe in generally a straight line. Turning and curves are a completely different technique, and I will be happy to explore those in a future article. For now, let’s talk about the simple stuff.

Rock and roll uses only a few items from your safe-moving arsenal. You will need a lifting tool such as a Grizzly Bar, Gorilla Bar, Johnson Bar or similar item. Additionally, you will need blocks of wood or wedges. You might need flat bar steel if you are traveling over cribbing, wood or soft materials. Finally — and most important — you will need rollers.

The Rollers

So, let’s discuss the rollers. These can be made from various materials, but the two styles I use exclusively are Schedule 80 PVC tubing and drill rod. There are other items that could be used, but these are my favorites.

The PVC is usually in a ½" size, which is the inside diameter, or a little over ¾" outside diameter. The standard color for the Schedule 80 is always grey. I have these cut to shorter lengths: anywhere from 5" to 16".

Drill rod is available in many diameter sizes. My go-to sizes are ¼", ⅜" and ½". The standard length is 36", but they can be



Figure 2. The first step is to lift the leading edge high enough to place a wedge or short block of wood under the safe to lean it toward the trailing edge.



Figure 3. Allow the roller to stick out past both sides and slide it as far away from the leading edge as possible.

ordered in longer lengths. I have several $\frac{1}{2}$ " rods that have been cut down to make them easier to fit through doorways without jamming.

On a side note: The $\frac{1}{2}$ " size can also be used for hinge repairs on some of the older Mosler Designer Series safes. I know because I've done it several times.

The Technique

Okay, enough of that. How do we rock and roll? We will use this heavier safe removed from a retail store a few years ago and that is now in storage in our warehouse (see *Figure 1*).

The first step is to decide which way you want to go with the safe you are moving. We call this the leading edge. For our purposes, the leading edge will always be in the direction of movement. The opposite side will be the trailing edge.

Using a lifting bar, lift the leading edge high enough to place a wedge or short block of wood under the safe to lean it toward the trailing edge (*Figure 2*). After inserting the wedge or block of wood, insert a roller from the side across to the



Figure 4. The author has inserted a second roller about an inch or two from the leading edge.

other side. Allowing the roller to stick out past both sides, slide it as far away from the leading edge as possible (*Figure 3*). Now insert a second roller about an inch or two from the leading edge or behind the wedge or block of wood (*Figure 4*).

If you are moving a lighter or taller safe, another method of placing wedges and rollers is to work with a second technician. The second tech would push from the top of the leading edge side to tip the safe away from the leading edge while the



Figure 5. As the roller closest to the leading edge reaches the center of the safe and the roller that was in the center reaches the trailing edge, stop forward progress.



Figure 6. Remove the roller from the trailing edge and rock the safe back, exposing the leading edge.



Figure 7. The author has placed the roller under the leading edge.

first tech inserts the wedges. Then insert the rollers as described above.

Once the rollers are installed, remove the wedges in much the same way as you inserted them: either by using a lifting bar or a second tech tipping the safe out of the way. Slowly lower the safe onto the rollers. Make sure that the safe will not roll by itself. If it does, maintain control at all times.

Now comes the rock and roll part of this move.

Slowly roll the safe on the two rollers toward the leading edge by pushing from the rear. Push from the center of the trailing edge of the safe. Maintain a grip with the thought of catching or slowing down the safe if there is the feeling that the safe is not stable. As the roller closest to the leading edge reaches the center of the safe and the roller that was in the center reaches the trailing edge, stop forward progress. Allow the leading edge to drop onto the



Figure 8. The author has again stopped forward progress and allowed the leading edge to drop to the surface.



Figure 9. The safe has been rocked onto its leading edge so the author can remove the roller from the trailing edge.



Figure 10. Use the wedge or block of wood to lift the safe high enough to remove the remaining roller. Then remove the wedge or block.

surface of whatever it is you are rolling across (Figure 5).

Now remove the roller from the trailing edge and rock the safe back, exposing the leading edge (Figure 6). Place the roller under the leading edge (Figure 7) and rock the safe back onto the forward roller. As before, slowly push and roll the safe along the surface until once again the leading edge roller reaches the center and the center roller reaches the trailing edge. Again, stop forward progress and allow the leading edge to drop to the surface (Figure 8).

Remove the roller from the trailing edge, rock the safe back and slide it under the leading edge. Now repeat the process until you reach wherever you want to go. When you reach your destination, rock the safe onto its leading edge once more and remove the roller from the trailing edge (Figure 9). Once the trailing edge roller is out, use the wedge or block of wood to lift the safe high enough to remove the remaining roller. Then — using the lifting bar or tipping method — remove the wedge

or block (Figure 10).

And that's how we rock and roll a safe.

Safety Tips

Let's talk about safety. There are safes that can be moved in this manner by a single person, but these are usually lighter-weight safes of anywhere from 200 to 600 pounds, or something a person can easily control even if it starts to get away from the technician. A properly trained and experienced technician can move much heavier items by himself, but safety must be at the forefront of his or her mind at all times.

Since quite a few safe moves are involving heavier or more unwieldy units, for safety purposes it is better to have two or more technicians involved in this type of move. All parties can keep an eye out for anything that might cause an issue.

When placing rollers, never wrap your fingers completely around the roller, but grab it in a manner more like a pinch. What you want to avoid is placing your fingers under the roller and then having the safe fall or slip and pinch you between

the roller and the floor. You might only get a nasty bruise, but you could just as easily end up with an amputation. Think about it before you do it.

Along those same lines, never put your arm, hand or fingers underneath a safe. If for any reason it should fall or slip, you would be in a world of hurt. If there is an item under the safe that you need to remove, use something to hook or push it out. Remember, safety first at all times.

As always, it is all about the right moves. ☺



Gene Gyure, CRL, GSAI, CAI, started his locksmith career in 1980 and is the founder and co-owner of Starfleet Lock & Safe, Inc., which began operations in 1994. A safe and vault technician who specializes in safe deposit box and custom safe work, he is experienced in a variety of locksmith and safe service techniques, yet prefers working on safes and safe locks. In his spare time, he volunteers with three youth groups.

A safe and vault technician who specializes in safe deposit box and custom safe work, he is experienced in a variety of locksmith and safe service techniques, yet prefers working on safes and safe locks. In his spare time, he volunteers with three youth groups.

WORKING WITH AMSEC WALL SAFES

Matthew Holley, CML, provides technical information on this simple safe.

THE AMERICAN SECURITY PRODUCTS — AMSEC FOR SHORT — SAFE model shown in *Figure 1* is one that I have come across many times in my career. They are not very tough safes in their construction. The walls are rather thin, the electronics are quite simple and they cannot be retrofitted with “magic module” footprint safe locks. Even the key override seems to be inexpensively produced (more on that later). This safe has the batteries stored on the inside of the safe. Therefore, if the user ignores the low battery warning (or there is an electrical failure), the mechanical key override will need to be used to gain entry to the safe.

If approaching this safe as a lockout, yet there is still battery power, attempt to open the safe with the original combo, which I believe is 159A. If that fails, see if any particular buttons have wear marks on them; you might just get lucky.

When the Combo Isn't Working

In the event the default combo doesn't work, remove the round cover for the concealed key override cylinder. Unfortunately, the cover I speak of is missing from the safe seen in the following photos. This cam lock uses a double-sided key with wafers on both sides of the plug.

Of the several units I've attempted picking, I have picked approximately...



Figure 1. This style of AMSEC wall safe has thin walls and simple electronics.



Figure 2. The cam is in the home position.

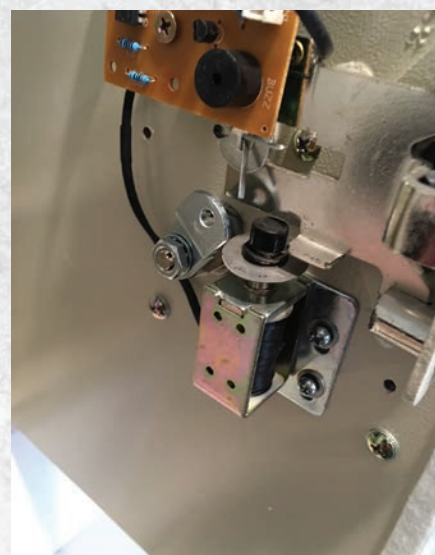


Figure 3. The cam is traveling toward the solenoid.

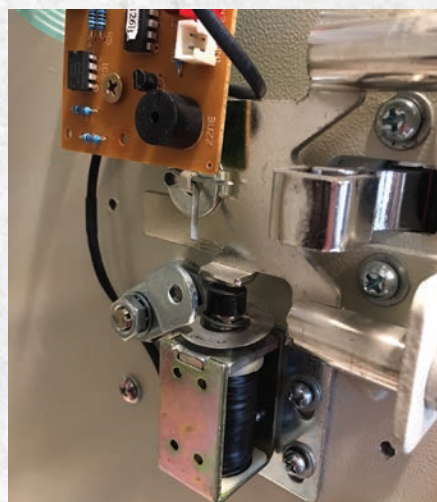


Figure 4. The cam is depressing the flat washer around the solenoid, thus manually overriding the solenoid to open the safe.



Figure 5



Figure 6

Figures 5 and 6. There is enough of a gap between the plug and the shell to insert curved shims.

zero. I've even had two plugs crumble as I was picking. Granted, I wasn't being overly aggressive with my picking, but I had escalated from feather tension and feather raking to more rigorous raking. Once the plug crumbled on two units, I was able to extract the plug pieces and brass wafers to rotate the remaining portion of the plug with a flat-blade screwdriver. This in turn rotates the cam to depress the solenoid to open the safe.

Figure 2 shows the cam lock with the cam in the home position — no key inserted. *Figure 3* shows the cam traveling toward the solenoid. *Figure 4* shows the cam depressing the flat washer around the solenoid, thus manually overriding the solenoid to open the safe.

While picking this style of AMSEC wall safe (when the plug didn't crumble), I noticed there was enough of a gap between the plug and the shell to insert

curved shims (*Figures 5 and 6*). The reason why it's relevant is the ability to use the shims to hold the wafers at the shear line. I insert one shim, maintaining gentle inward pressure, and manipulate the brass wafer until the shim would advance beyond that wafer. I continue the process until the shim is holding down all wafers on that particular side. I repeat the process on the opposite side. With both shims in place, I use a flat-blade



Figure 7. To change the combo, depress the red button and immediately enter the new desired code.



Figure 8. The hinge side of the door is shown.

screwdriver to rotate the plug counter-clockwise to depress the solenoid, keeping the safe locked. Once depressed, pull on the silver handle to open the safe.

Upon opening the safe, it is recommended to change the batteries. There should be four AA batteries, if memory serves me correctly.

To change the combo if all codes are lost (or if the owner wants a new code), simply depress the red button seen in *Figure 7* and immediately enter the new desired code. The button is on the hinge side of the plastic housing inside the safe. *Figure 8* shows the hinge side of the door, and the button is not visible. As always, test the new combination several times with the door open.

The next step is to replace the cam lock. Personally, I wouldn't order key blanks for this safe for several reasons. One, I haven't used them for anything

“In the event the default combo doesn't work, remove the round cover for the concealed key override cylinder.”

else in the past. Two, having more than one of these plugs crumble while picking doesn't sit well with me. I wouldn't want the plug to fall apart on a customer. A third reason why I replace the original cam lock is I usually stock tubular cam locks. They seem to hold up quite well.

All in all, these are rather inexpensive safes but not worth scrapping when customers lose keys and combinations. Instead, security professionals can breathe life into these units, provided the electronics aren't fried. ☺



Matthew Holley, CML, is an ambitious Certified Master Locksmith whose background spans all areas of locksmithing including automotive, institutional and military. He is currently the president of the California Locksmith Association-San Diego chapter, which has affiliations with ALOA. In 2015 and 2016, Matthew received the “Outstanding Person of the Year” award. He can be reached at Matthew.safe.cracker@gmail.com for questions or comments.

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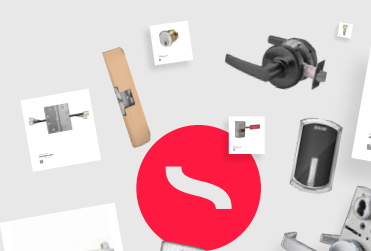
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“IT’S JUST A PADLOCK”

How hard can it be? **By Jason Biel**

WHAT SHOULD HAVE BEEN AN EASY COMBINATION RESET FOR A Sargent and Greenleaf Model 8077AD combination padlock turned into a methodical troubleshooting lesson.

A little over six years ago, these padlocks could be found all over the place securing file cabinets and just about anything else classified. But, nowadays, I see organizations — including government offices, cleared industries and the like — generally using the Sargent and Greenleaf Model 8077AD combination padlock to secure their active Secret Internet Protocol Router Network (SIPRNET) lock boxes. These boxes protect the direct access to their secret internet when their work area isn’t built to the controlled area or SCIF standards required. In some organizations, these wall- or conduit-mounted boxes are prolific. I have seen rooms with nearly 100 boxes, each with its own combination padlock and corresponding tight tolerances frustrating everyone in the morning as they attempt to plug in their secret computers.

It was in one of these settings where I had a security manager present himself with an 8077 padlock that he couldn’t get to work. He said something about having problems with changing the combination. The back cover was off, so I assumed this lock would be an easy candidate for a reset. Always looking to keep the big-spending folks happy, I said I would drop it off on my next scheduled visit, as I had another event to get to. Spending excess time troubleshooting a customer’s non-response padlock isn’t always the best use of my time. But, these locks can be expensive in the customer’s mind, and I had the intent of pawing this job off on my son anyhow. I figured I would show him the many mysteries of this finicky padlock first and then cut him loose. Besides, he was likely in possession of all the skills he needed, as he uses padlocks and other small combination dials at school all day long.

With the intended steps of explaining and then showing him the process first, I easily conducted the reset procedures using MBA’s fine tools later that eve. I even got the lock to open once. When I went to show him how to set a new combination, I fully inserted the change key, turning the change key its required 90 degrees, and tried to dial in a new combination. The dial wouldn’t progress, as if one of the wheel centers

was still locked into the wheel case. I re-did the reset procedure again just to see if I had messed up a step, but I again ended with the same result. The more I repeated these simple steps, the more inconsistent the response got at different steps. It was not the optimal teaching lesson to master the 8077 padlock, but it was a great opportunity to apply some critical thinking and troubleshooting skills.

Recovery

This task shouldn’t have been this hard. Recovery is generally straightforward, as there are only a few exact circumstances in which you can use it. The primary requirement is that the back cover has to be off. S&G, MBA and Lockmasters all make special change keys or sets for resetting these padlocks (see *Figure 1*). The first key has the shaft milled down so when it is inserted, only the tip has the square cross section that engages a single change key cam at a time. This first key also has indicator marks on the shaft that correspond to the height of each wheel. Insert the change key one wheel at a time and unlock it, and then rotate the dial to move another wheel’s change key cam

opening into line with it. Once you have them all lined up and unlocked, then insert the second change key that only has the flag removed and turn it back to lock all the wheels. In accordance with most instructions, you can then use the regular change key provided with each lock and continue with the combination changing process.

My troubleshooting senses were tingling somewhere between wheel slippage and an unlocked wheel. I went into full investigation mode for the son. I got a short scope out (Figure 2) to see in the malfunctioning 8077's change key hole, etc. I also found an older, unserviceable 8077 and cut it open so we could see what was what in there. We learned a ton about what this lock is doing. Some things I just have always assumed, and others I was surprised to learn.



Figure 1. In addition to MBA selling some fine reset tools, their container makes a handy stand to balance the padlock against.



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Figure 2. Scoping through the CKH between change key cams adjustments ensured they were aligned, but the author could not see where the inner arm teeth made contact with the inner hub on anything besides the closest wheel.



Figure 3. Security is everywhere. In addition to two other serial numbers, even the padlock's rear cover plate gets its own serial number.



Figure 4. Not unlike some high-security safe locks available, there seems to be an additional piece of steel behind the dial to discourage drilling.

About the Lock

So, what do we know about this expensive workhorse? The 8077 series has gone through a few changes over the years, but you can readily identify some of the series by the dial color. The 8077, 8077A, and 8077AB all have green dials. The 8077AC and 8077AD have black dials. According to the literature, the 8077AD — S&G's latest model — is a combination padlock that meets Federal Specification FF-P-110J. It is designed to resist surreptitious entry methods and show signs of tampering. It can be set to any of its 125,000 possible combinations (50x50x50). There is no forbidden zone on any version of the 8077 padlock.

Obviously, security was forefront in this lock's design. Security was so paramount that the federal specifications go so far as to ensure both the shackle serial number and the case cover serial number are randomly different from and have no association to each other (*Figure 3*). Besides a case designed to keep you from

peeking inside and a thick back cover that keeps your access limited until you have dialed the lock open, there is what appears to be a thin piece of hardplate behind the dial (*Figure 4*).

The three wheels have 16 false gate cut-outs and an additional V notch that I am sure does something important. Additionally, dialing tolerances on the 8077 are very tight, as the gates are super skinny. Rumor has it — and a small trivia point here — is that there are 168 gear teeth on the inner hub.

Diagnoses

Without cutting it open to confirm (and who doesn't enjoy a good lock dissection), my estimation of the fault on my troublesome lock fell between two possible options.

Maybe a worn change key with a little bend in it caused a cam or two to over-rotate a smidgen a few combination changes ago, producing a small initial misalignment. Then jam in a change key until you make it fit for the next few combination

changes, and now there is no telling how much change key cam movement you get when you rotate a change key 90 degrees in accordance with the directions. This might explain the condition of wheel one's change key cam. The no-longer-square center truly looked rounded and beat up and not like the other two.

There is a "Do Not Pull On The Shackle" warning in the combination change instructions. Maybe that has happened a few times, causing wheel slippage. It wouldn't likely take much force to damage the disengaged or mostly disengaged inner arm teeth, or damage the interior square edges on a change key cam when each time you pull up on the shackle, it fulcrums the fence into the wheels and drive cam. If you have seen most operators open these locks, they do treat the opening sequence — shall we say — aggressively. I can easily see the same poorly timed aggression incorrectly directed at the shackle by an overzealous operator.



Figure 5. The lock's internals are generally of a straight-tailpiece design. It's all cantilevered and fancy but still a direct-entry lock.



Figure 6. Obviously, the dialing tolerances on the 8077 are very tight.



Figure 7. If you need to try dialing high or low to open a stubborn lock, use half-number increments. Sometimes these slight adjustments make the difference between success and failure.

The bottom line was that, despite my extensive tinkering with each change key cam, there was at least one wheel I could not trust to consistently behave. It was not worth my nor my customer's time to take a chance on a lock that will likely fail when they could least afford it to. Nonetheless, this was a fine opportunity to work through some troubleshooting, learn some things and break some stuff with the son.

As a parting shot: While these padlocks are generally the purview of security managers and operators but not safe technicians, they are GSA-related. Security problems often drift into our lane, offering additional opportunities to provide our valued services. On that note of providing valued services: If your customers don't know, Sargent and Greenleaf has some operating tips for this lock that can easily be printed and handed to them. It's a nice way to keep your customers consistently thinking of your company's added value. Contact the company for more information. ☎



Jason Biel originally learned to open safes and vaults as part of his military duties, but he wasn't required to return them to a serviceable condition. After some world-class training (thanks, SAVTA and Lockmasters), he is now a small-business owner, SAVTA member and darn fine safe technician serving the greater eastern Kansas region.




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MAKING A TOOL FOR BROKEN BROKEN SPINDLES SPINDLES

Learn how to create this useful tool in your workshop.

By Blaine Lucas, CJS, CML, CPS, ARL

AWHILE BACK, I FOUND AN INTERESTING THREAD ON THE CLEARSTAR Security Network about dealing with broken dial spindles. One of the suggestions was to use a brass tube glued to the broken spindle. I like the idea of using a brass tube but was nervous about putting glue down the spindle hole. I started thinking about a different way to attach the tube to a broken spindle.

The most common mechanical safe lock I come across is the S&G 6700 series and all of its clones. They mostly use a $\frac{5}{16}$ " spindle. Off to the local hobby shop with an S&G spindle I went in search of brass tubes that a $\frac{5}{16}$ " spindle would fit snugly. They had brass and aluminum tubes available in 12" lengths. Some time later while at my local Ace hardware store, I discovered that they carry the brass tubing also. I thought the brass tubes would be stronger than aluminum. They had $1\frac{1}{32}$ " tubes, slightly larger than $\frac{5}{16}$ ". I started this project with the idea to use it on a $\frac{5}{16}$ " spindle, but I think everything I did would apply to a $\frac{1}{4}$ " spindle. Just use a tube the next size larger than $\frac{1}{4}$ ". The $1\frac{1}{32}$ " tube fits snugly on the $\frac{5}{16}$ " spindle but does not produce a tight enough grip to use as a turning tool.

I went out back to the safe lock junk pile — I mean the used parts bins — in search of some old spindles. Going through the bin, I came across an old Major safe dial with a steel spindle. I thought this would be much more durable than using a brass spindle as a guide. *Figure 1* shows the brass tube in Vise-Grips on the Major safe steel spindle, using a small screwdriver as a forming tool. I used a small screwdriver placed over the spline groove and gently tapped on the screwdriver handle, reforming the tube. I think many small taps would be better at forming the brass tube than a few heavy taps.

Figure 2 shows the brass tube formed very well on the Major steel spindle. It took a fair amount of effort to pull the tube off the spindle. *Figure 3* shows an end view of the brass tube. This groove in the tube is strong enough to turn even



Figure 1. The author is using a Major Safe steel spindle as a template.



Figure 2. The brass tube is formed on the Major steel spindle.

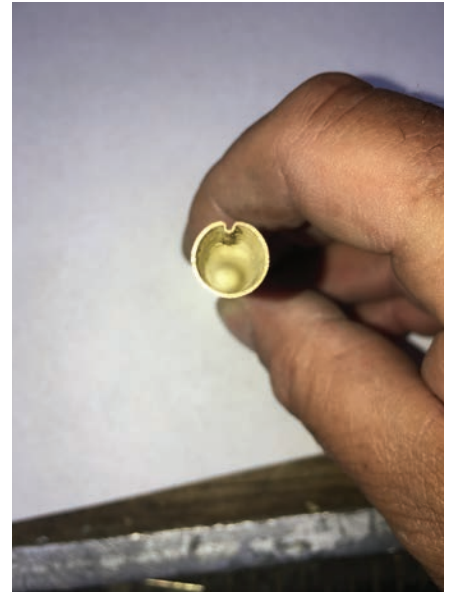


Figure 3. This photo shows an end view of the brass tube.



Figure 4. The author is drilling a $\frac{23}{64}$ " hole in the dial.



Figure 5. The author created two different-length brass tubes.



Figure 6. A smaller dial might work better than large dial.

a binding wheel pack without the tube slipping on the spindle. To have a better grip on the tube and give me reference points when dialing, I drilled a $\frac{23}{64}$ " hole in a larger dial so it would fit over the $1\frac{1}{2}$ " brass tube (Figure 4). I thought a large dial would be best. The brass tubes come in 12" lengths, so I cut about $\frac{1}{3}$ off to make a short and a long tube from the

original tube (Figure 5). I drilled a hole all the way through the dial to use headless Allen screws to hold the dial to the tube. The brass tube is a soft metal, and when you tighten setscrews on the dial, you can deform the tube. I found some long $\frac{5}{16}$ bolts to insert into the brass tube so the tube would not collapse when tightening the dial mounting screws.

After contemplating, I thought an old spindle might be the simplest and work best. After some bench testing, I thought a smaller dial would work better (Figure 6). After further bench testing, I thought it would work better if the emergency dial had a stabilizing dial ring. Sargent and Greenleaf has many dials and dial rings. How to choose the right match?



Figure 9. A double-ended brass tube is shown.

Figure 10. The SDR Tool Set from Dib's Safe and Lock can be used to dial open a safe.

S&G makes a secret decoder ring to help choosing the right combination. Well, I guess it is not really a secret and it is not a ring, but it is very handy in choosing the right dial and ring (*Figure 7*).

I have a Keedex transfer tool I thought I could use for a dial, but the hole for the spindle is just the right size for a $\frac{5}{16}$ " spindle less the tube (*Figure 8*). If I wanted to use the Keedex tool, I would need a

different spindle conversion. In *Figure 9*, I made a double-ended brass tube. One side slides over the broken spindle, and the other side has an old spindle in it. Now the Keedex tool would work. I could also



Figure 11. The SDR tool pointer is shown.

use the SDR Tool Set from Dib's Safe and Lock to dial open the safe (Figure 10). We have used this dial puller and a transfer tool for many years, and it works great. I noticed that on the SDR pointer they put the spindle-grabbing screws at about five and 7 o'clock, with the pointer at 12 o'clock. This seems more like a universal mounting screw position (Figure 11).

I was looking at the Lockmasters website and saw that they sell an inexpensive small dial and thought this might even work better than the other dials I modified (Figure 12). I was curious how the commercially available broken dial spindle kits would differ from what I made, so I purchased the Gizmo kit from Lockmasters. It is a good kit. I put all my toys — I mean tools — in a nice travel box and I was ready for my broken spindle safe job (Figure 13).

The Job

Well, the call came in: a customer with a safe where the dial had fallen off. I assumed that either it had to be a broken spindle or a loose dial fell off the spindle. When I arrived at the customer's place of business, I was shown the safe in Figure 14 (nice paint



Figure 12. A small Lockmasters dial is shown.

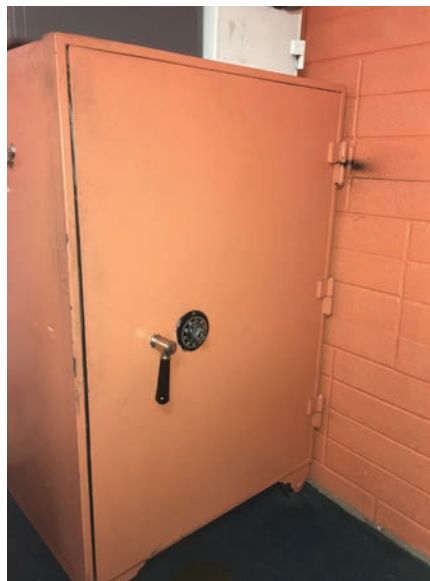


Figure 14. The dial appeared intact.

job... the safe matched the wall). The dial seemed to be intact. I guess the customer saw my puzzled look and told me that the dial had fallen off and they just put it back on, but the safe would not open. Oh, OK. There are only about 100 different positions you could put it on, so it is not surprising that they got it wrong.

I touched the dial, and it came off in my hand (Figure 15). Figure 16 shows us the spindle and dial ring. This was an S&G



Figure 13. The author's spindle tools are in a plastic travel box.



Figure 15. The back of the dial is shown.

Centi-Spline dial. The Centi-Spline dials are field adjustable to accommodate any lock mounting position. The way this dial works is that you can set any spline position you want. Before the four-way drive cams were common, with this dial you could set the correct drop-in for any hand lock. I assumed that this dial was originally splined at 50, a common dial splining.

According to an S&G catalog I found, S&G dials can have the spindle pressed



Figure 16. The spindle and dial ring are shown.

into a dial with its spline keyway to either 41 or 50 on the dial. The #41 splining location is required to ensure full lock bolt extension when key locking dials are locked with zero under the opening index. I reinstalled the dial after I found the contact points (5-15) and set the dial on the spindle accordingly. After trying a few variations of their combination, the lever dropped and the safe was open.

I was a little surprised at the lock that was in this safe (Figure 17). I was expecting an S&G 6730 but ended up with an S&G 6709. I removed the drive cam, reassembled the dial and reinstalled it. This dial

“I WENT OUT BACK TO THE SAFE LOCK JUNK PILE — I MEAN THE USED PARTS BINS — IN SEARCH OF SOME OLD SPINDLES.”

screws together with a spanner wrench, and there is a setscrew to hold it in place. With a loose setscrew, the dial unscrewed itself from its spindle. Well, I did not get

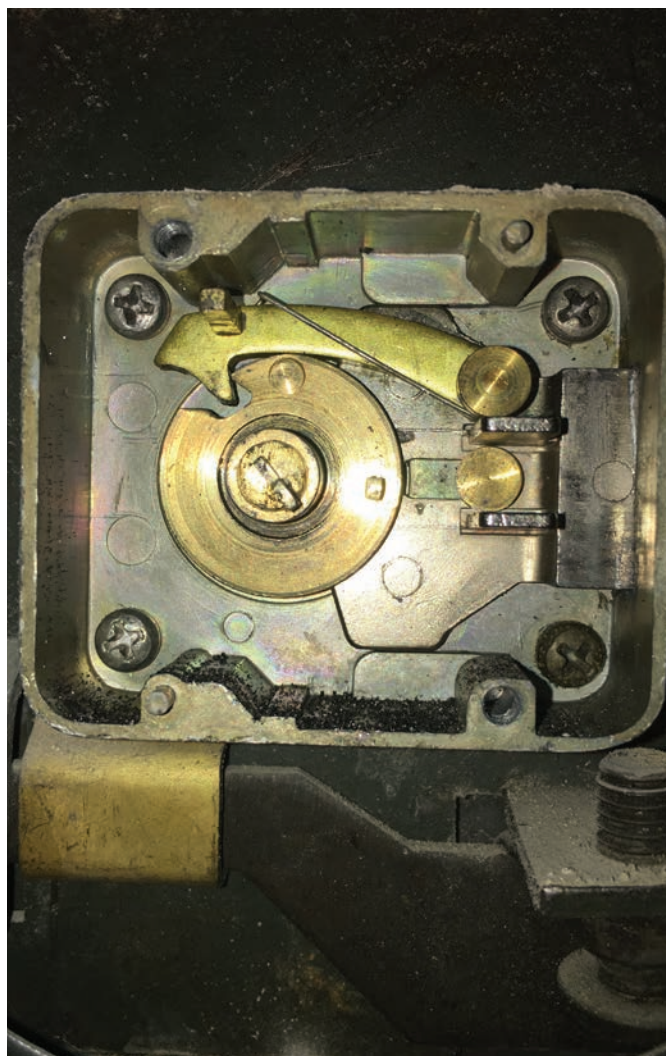


Figure 17. The author was surprised at the lock that was in this safe.

to use my new broken spindle tools, but the job was completed — and I am ready for the next broken spindle. ☺



Blaine Lucas, CJS, CML, CPS, ARL, is a third-generation locksmith and president of Foothill Locksmiths, Inc., which offers security solutions to residential, commercial and automotive customers throughout the East Bay in Hayward, California. Blaine's grandfather founded the company in 1956. Blaine was 12 years old when he started working with his grandfather on Saturdays.

to use my new broken spindle tools, but the job was completed — and I am ready for the next broken spindle. ☺



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Name _____ Company _____ Phone Number _____

Name _____ Company _____ Phone Number _____

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Telltale Signs of Mistakes and Carelessness

Tony Wiersielis, CPL, CFDI, goes over a few situations that will make you shake your head.

LAST MONTH, I LEFT OUT SOMETHING I NOTICED ON ONE OF THE DOORS we were working on. *Figure 1* in the “Back to Basics” article in the March issue of *Keynotes* shows the tracks of hydraulic fluid leaking out of a door closer and running down the door. *Figure 2* shows the telltale stain on the carpet where the fluid collected. Usually, the stain is all you’ll see since the custodians will usually clean the windows and remove the fluid.

What happened here? It’s very likely the person who installed the closer didn’t pay close attention to the directions and doesn’t really understand closers. The uninformed tend to change the position of the main arm on the spindle to make the door close. This is extremely bad karma since the closer is designed to operate within a certain degree of door swing.

If you move the main arm to a different position (that’s the one attached to the spindle for the newbies), what you’re doing is placing the closer part of the way into its range of travel. That means that — with the door closed and at rest — it’s a lot closer to the limits of its travel.

Another way to look at it: Consider the closed position to be 0 degrees and the open position to be 90 degrees. With the arm in a different spindle position,



Figure 1. You can see the tracks of hydraulic fluid leaking out of a door closer and running down the door.

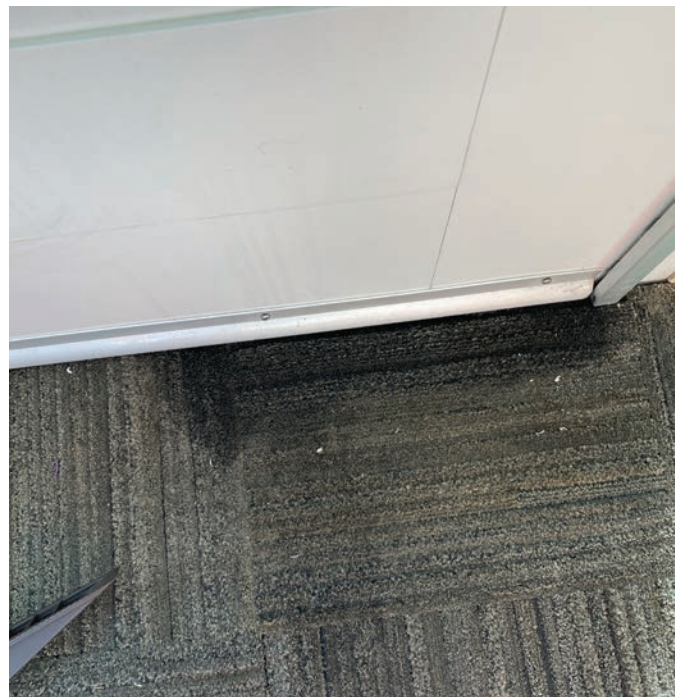


Figure 2. This image shows the stain on the carpet where the hydraulic fluid collected.



Figure 3. The closer on the left is *not* preloaded. On the right door, the arm is close to where it should be.

the closer may be at 20 degrees while still closed.

Because the piston and gears will be partially advanced and the spring compressed, this will cause two things to happen: First, the latch speed will be out of whack or nonexistent along with the back-check, which will kick in early. When the door is pushed to 90 degrees, it's actually going beyond 90 before it even gets there. Second, the hydraulic fluid flowing from one side of the closer to the other is now being over-compressed by the piston. This tends to blow out the seals around the valves that you turn to adjust the closer and often the seal around the pinion (what the main arm of the closer fits over).

The most dangerous thing about this fluid loss, regardless of what caused it, is the violence of the closing action that could occur. This is a critical issue around young children, the handicapped and the elderly. The hydraulic fluid, the piston and the regulator valves suppress the speed of the closer to manageable levels. When the fluid is gone, the spring acts like one of those black gate springs that slams shut with a bang. There's nothing to adjust except more or less bang.

Somewhat the opposite of this is when the part of the arm that's attached to the main arm isn't in the correct position. I don't mean installed wrong or at the wrong place on the frame; I mean not

preloaded, and you can often tell by the position of the arm.

For the newbies, preloading a closer means that you position the arm — usually the one attached to the main arm — so there is some spring tension on it. Look at *Figure 3*. These are identical closers, and we're looking at the position of the arm attached to the door. The one on the left is *not* preloaded. You can tell because the arm should be perpendicular to the door. On the right door, the arm (while not really perpendicular) is close to where it should be.

By preloading, you ensure that there's sufficient spring power to close the door against the stop moulding and latch. Imagine if you installed the closer correctly and removed all stop moulding from the frame. With the door closed and at rest, it would be slightly past where it would normally hit the stop. This is what you want and why you preload. If you *don't* preload (the left door), you'll often find that the door barely latches and the latch speed regulator valve doesn't help. It's easy to loosen the screw and move the arm to the correct position to clear up the issue.

The “Vito Test”

Some years ago, I wrote about the “Vito Test,” which I named after my first boss, Vito Monaco, and it's worth repeating. He taught us to test the door closer installation by pulling the door open until the latch just clears the strike. Then let it go. The door should close and latch firmly. If it doesn't, you need to figure out why before you leave. This test simulated someone grabbing a doorknob just as someone behind him called out to him. With the door barely open, the person let go of the knob, turned around and walked away, oblivious to whether it latched or not. That happens all the time.

Pretty much every door closer needs



Figure 4. This Adams Rite Herculite door lock has a broken cylinder setscrew.



Figure 5. Whoever installed the cylinder deemed it necessary to load it all up with thread locker.

to be preloaded. Of the three surface-mounted closer configurations you'll see (pull side, over-door mounted and parallel arm), the lack of preload is easiest to spot on the first two. On parallel arm, you'll usually find the knuckle of the arm (the joint between the main and door arm) touching the door. If it is, it's not preloaded and needs to be fixed. We used to use the handle of a Craftsman #2 screwdriver under the knuckle as a spacing guide, but I digress.

Final thought on preloading: If you do a lot of work on apartment buildings, you'll probably get calls about the main entrance door not latching around the first of each month. What happens is tenants move in and out around that time. Both tenants and movers will often dis-

connect the closer arm so it's easier to pass through the opening. When they reattach the arm, they don't preload. Probably the easiest service call you'll get that day.

Another Telltale Sign

Figure 4 is a shot of an Adams Rite Herculite door lock with a broken cylinder set screw. *Figure 5* is a sign that I was going to have a rough time. Notice the red Loctite on the set screw and the threads for the cylinder. Apparently, whoever installed the cylinder deemed it necessary to load it all up with thread locker.

For the newbies, it's always a good idea to use Loctite on your screws, but you need to know what kind to use. Blue Loctite is appropriate for most of the

machine screws we use as locksmiths, and you can always unscrew it if you need to. Red Loctite is the kind of stuff you'd use on car engines, and it tends to be nearly permanent.

The reason the set screw broke was because of the red Loctite. The screw wouldn't move. *At all.* I had to get the screw out because I don't carry that type of lock on my truck, so I couldn't replace it. I tried grabbing it with needle-nose pliers, but it wouldn't budge.

Then it dawned on me that I had a propane tank with a self-igniting torch in my truck. Why? I've always had American 2000 padlocks on the doors on my vehicles. About 10 years ago, I found myself in Cooperstown, NY, in 20 degree weather, and the padlocks froze. I



Figure 6. The author tried using this torch to melt thread locker.



Figure 7. The author alternated heating with sticking the lock into a nearby pile of snow to cool it and then turning the set screw with pliers.

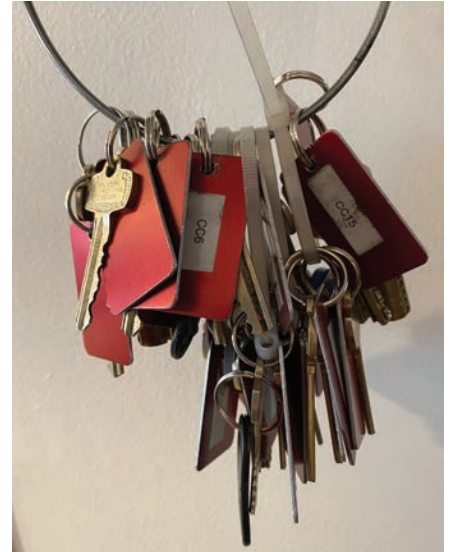


Figure 8. All the control keys for the cores in the four buildings are shown.

couldn't get to my tools except for what I had in the cab. I was fortunate that those tools were all I needed.

The next day, I bought the torch (*Figure 6*) that I now keep in the cab of the truck. I've used it numerous times in severe cold to thaw the padlocks. I decided to try using the torch to melt the thread locker. I clamped my locking pliers on the lock and fired up the torch, aiming at the set screw. I alternated heating with sticking the lock into a nearby pile of snow to cool it and then turning the set screw with the pliers (*Figure 7*).

It took a while, but I removed the screw a quarter turn at a time. I replaced it with an 8-32 Allen set screw from my stash of screws with various lengths and was able to complete the job.

And Yet Another Telltale Sign

I'm currently doing a very large Best core retrofit in a school district in northern New Jersey. There are four buildings, each close to 100 years old but renovated — mostly in the 2000s, but one in 1967. There are about 500 cores overall. The new buildings-and-grounds guy there is trying to

fix the myriad keying issues he inherited.

The former B&G guy was an older guy who probably had a boiler license and extensive experience as a custodian but little to no knowledge about locks. *Figure 8* is the telltale sign of the rank amateur and someone not interested in expanding his knowledge.

That picture shows all of the control keys for the cores in the schools. I counted six keyways and 29 individual keys. I've run across Best, Arrow and Brand X cores in all the buildings. The one with the 1967 renovation is mostly six-pin cores and housings. Of course, the cores are seven pins.

Back to the menagerie of control keys and how the situation came to be: It seems that when the old guy needed a new core, he'd go to the well-established locksmith the next town over. He'd ask for a core and control key to no specific keying. He didn't hand them a control key, apparently, but who knows if he did sometimes and not others times. So, they made him a new core, and off he went.

When I heard this story the first time, I called a friend of mine who worked at

the lock shop and asked him about it. He told me they would question him about whether that was what he really needed, and the guy was adamant about getting what he wanted. So, they gave it to him.

Take a moment and think about what's involved in using that monster key ring. Trying sometimes six keys to find the right keyway, then trying another six control keys and maybe finding a seven-pin core won't fit in and having to note everything down.

It didn't help that the guy had an affinity for mixing graphite and unknown liquid lubricants and applying them in copious amounts... All over your hands and the notes, and hopefully your nose doesn't itch. You can't make this stuff up. ☹



Tony Wiersielis, CPL, CFDI,

has more than 30 years of experience and has worked in most phases of the trade throughout the New York metropolitan area. He was named *Keynotes* Author of the Year for 2016 and serves as ALOA's Northeast Director. Reach him at aew59@juno.com

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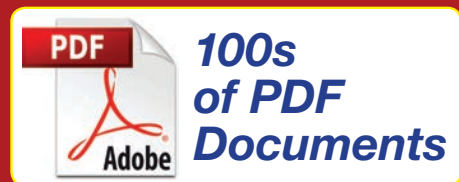


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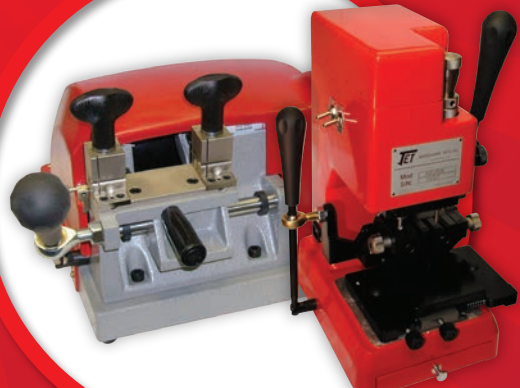
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