e Official Publication of ALOA—An International Association of Security Professionals

lanuary 2005

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Blometrics Experts Dr. Simon Liu and Mark Silverman provide a biometric technology primer

PLUS!

Biometric Resources

Greg Perry gains entry to a Mosler Class 5 Black Label Vault Door

In-Depth coverage of the "999" or Bump Key

Review, Editorials, and More!

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presidential viewpoint

Important Notice



The Headquarters of the Associated Locksmiths of America will be relocating to a new office building some time early next year. During the time of the move, some ALOA services will be temporarily unavailable. These services include, but ar not limited to, the following:

- Incoming Calls
- Database Inquiries
- Staff Support for the Web and all other departments

It is suggested that all ALOA and SAVTA members make note of this change. (This ad will be ammended when the actual move dates are confirmed.)

The ALOA staff is looking forward to the new location and the opportunity to provide you with improved member services during the New Year.



Dear Members,

I hope that 2004 was a prosperous year for all of you and that 2005 will bring more of the same. My business achieved its highest sales total ever and, I attribute that to heightened public and private awareness of security issues and our ability to deliver quality, high security products and technologies.

Your ALOA board had a productive fall meeting in November and several important issues were hammered out. The most

important issue, in my opinion, deals with raising the level of professionalism of our membership. The ALOA board laid the groundwork for this and we hope that the membership sees the advantages of these changes and votes them into effect. The board approved a recertification program for certified members and will require new members to become certified within a specified period. ALOA's education department did an excellent job in setting up guidelines that will enable members to accomplish this in a simple and realistic fashion. And, for longtime members, there will be grandfather clauses.

The board also set member recognition as a high priority. What this means is that as money is available, ALOA will promote its members in as many ways possible, to the general public. We will be getting the ALOA symbol out there and extolling the virtues and skills of our certified locksmiths.

The ALOA board also did an evaluation on ourselves and determined that we will govern as efficiently as possible and still adequately serve our membership. We have voted to shrink the board by having one international director instead of two and, limiting directors in a region to no more than two. That would mean that the northeast would lose one director. We also instituted a program that would help us identify and encourage the most qualified and dedicated individuals to serve on the board and lead ALOA to higher levels.

I am pleased to announce that ALOA has hired an assistant education manager. Bob Stafford, CML, former head locksmith at the University Of Hartford, has decided to relocate to Dallas and allow us to use his educational, organizational, and practical skills to advance our educational programs, both "in-house" and on the road. Welcome aboard, Bob!

Sincerely,

William L. Young, CML/CPS

William L. Young, CMI President







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As organizations search for more secure authentication methods for user access, e-commerce, and other security applications, biometrics is gaining increasing attention. But should your company use biometrics? And, if so, which ones should you use and how do you choose them? There is no one best biometric technology. Different applications require different biometrics. by Simon Liu, PhD and Mark Silverman

Biometrics Resouorces

A helpful guide to companies and resources for Biometrics products and services.

18 Go Your Own Way

This month we'll look at a Mosler Class 5 Black Label Vault door. The job was simple enough. The instructions were to open the vault door because the combination was lost. On a GSA door, if the label is to be maintained, holes must be placed under the dial ring. In addition, a hole must be repaired properly. How would you drill it? by Greg Perry, CML, CPS

Opening Locks with the "999" or Bump Key

This article will examine a technique that allows a conventional pin tumbler, dimple, or axial pin tumbler lock to be opened in seconds with little skill and no apparent damage. The procedure poses a real threat to the security of many pin tumbler mechanisms but can also provide the locksmith and rapid entry team with a quick method to open a cylinder. It is important for security professionals to understand the process and the means to defeat it. by Marc Weber Tobias

Review: LSS+

LSS+ is not only the best reference in this industry, but also extremely invaluable in other areas. In the class, Defense Against Methods of Entry (DAME), the major learning objective is to be able to identify the weak points in any locking device (including unfamiliar locks) and to determine the most likely and best methods of attack. This makes for professional entry and helps a techinician determine how to best defend against these methods of entry. by Harry Sher, CL, CPS

34 Editorial: Tubular Locks and the **Kensington/Kryptonite Fiascos**

In August, there were two alerts on www.security.org regarding the insecurity of the tubular locks utilized by Kensington and other computer cable lock manufacturers. As a result, over 100,000 hits to the website were received in the following days from corporations, governments, schools and private individuals throughout the world, wondering why their locks could be easily and quickly bypassed with a ball point pen. A public relations nightmare followed, as well as significant costs to repair the damage and replace the locks. by Marc Weber Tobias

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Additional contact information for the ALOA Board and most Keynotes authors is available through "Locksmith Search'" on the ALOA Web site- www.aloa.org or by contacting the ALOA office at 3003 Live Oak Street; Dallas, TX 75204; (800)532-2562; FAX (214)827-1810; e-mail aloa@aloa.org.

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EB	5	West Coast Lock Collectors Show El Segundo, CA 310-395-4407	9 New York Master Locksmiths Monthly Meeting NYC/Long Island Area 718 274-6930	Assoc.		
RCH	3-6	MLANJ 2005 Convention & Security Expo	7-12 SAFETECH 2005 Lexington, KY	15 - 20 Texas Locks Annual Co Trade Shov 210-649-2	miths Association nvention and v 166	
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UPCOMING ACE CLASSES

UPCOMING PRP SITTINGS

1/5-16/2005	/2005 Kalamazoo, Michigan • West Michigan Locksmiths Assn R. Paul Bentley, CPL 269-327-8400 • Small Format IC w/L-38 PRP		Saturday • 9:00am Roseville, MI • Locksmith Security Assn Robert Noble, CPL 810-385-9329
2/12/2005	Large Format IC w/L39 PRP Detroit, Michigan • Locksmiths Security Association	2/27/2005	Sunday 9:00am • Maplewood, MN • Minnesota Chapter Dana Lee, CML 952-887-1199
	Robert C. Nobel, CPL 810-385-9329 Complete Door and Door Closers w/L-05 PRP	3/5/2005	Saturday 8:00am • Somerset, NJ • MLANJ 200 • Bill Timmann, CML 908-839-3135
2/19-20/2005	Kalamazoo, Michigan • West Michigan Locksmiths Association R. Paul Bentley, CPL 269-327-8400	3/12/2005	Saturday 8:00am • Lexington, KY • SAFETECH 2005 Hope Rodriauez 800-532-2562x30
2/25-27/2005	Motorcycle Locksmithing w/L-22 PRP Minneapolis, Minnesota • Minnesota Chapter of ALOA •	3/19/2005	Saturday 8:00am • Corpus Christi, TX • TLA Convention Ed Stites 979-240-9083
3/3-6/2005	Somerset, New Jersey & Master Locksmiths of New Jersey Annual	4/30/2005	Saturday 6:00pm • Denver, CO • Central & Southern Colorado Locksmiths Assn • Gordon Racine, CML 719-384-4707
	21 ACE Classes	7/22/2005	Friday 6:00pm • Rosemont, IL ALOA 2005 • Hope Rodriguez
3/19-20/2005	Kalamazoo, Michigan • West Michigan Locksmiths Association R. Paul Bentley, CPL 269-327-8400 Combination Lock Manipulation (2 days)	10/09/2005	Sunday 9:00am • Orlando, FL • SERLAC 2005 • James Barnhardt, RL 813:689-5979
4/28-30/2005	Denver, CO · Central & Southern Colorado Locksmiths Assn		

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70 full day classes • 35 half day classes & evening seminars



All Tubular Locks are Not Created Equal!

After reading many of the articles surrounding the Kryptonite bike lock, it wasn't until I read the mention in the November issue which inspired me to respond.

I am surprised by the Kryptonite spokeswoman's statement, "It's anything with a tubular cylinder"! I am also surprised that their parent company, Ingersoll Rand, who has many years of experience in security would allow this individual to make such an accusation about all tubular cylinders.

It is very clear that several of the Kryptonite products using .500 tubular cylinders had a design flaw which allowed this unfortunate circumstance to happen. In an effort to reduce costs on their products to compete in the marketplace, they forgot the most important part of manufacturing. When you reduce the overall size of a security lock cylinder from its original size, you need to pay special attention to closer tolerances, special drivers and top tumblers along with driver springs for pick resistance. It would appear this was not done.

I have been in the tubular lock manufacturing business for over 28 years and during this time supplied many cylinders to Kryptonite and other companies who have made the tubular lock a standard for its affordable security and craftsmanship. If you ask any professional locksmith, he will tell you that a properly-designed and built tubular lock is tough to beat.

The claim about a Bic pen on all tubular locks by Kryptonite is simply not true. It is unfortunate that their spokeswoman made a comment which denigrates other tubular lock products which they are not familiar with.

I think the public should know that many, if not most of the tubular lock products in the field perform very well to prevent unauthorized entry. Certainly, the products manufactured by our company do just that.

Sincerely,

Dale N. Padjen Camlock Systems.

Notes on a December 2004 Keynotes Article

Regarding "The Job the Other Guys Didn't Want." by Greg Perry CML, CPS.

Photo #12 has a very obvious life safety code issue. There should be one locking device on the door. The Adams-Rite lock should have been made inactive by replacing the cylinder with a dummy or removing the lock completely and filler plates installed.

John G. Fenner, Sr.

Your concern about photo 12 was handled by initially turning the cylinders over as mentioned in paragraph 2 of the article. A couple of days later we replaced the upside cylinders with dummys. My apologies, the picture was obviously taken before we installed the exit devices and at the end of the job we turned them over. I guess I should have added a note to the captions about turning the cylinders over.

Greg Perry, CML, CPS

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A Practical Guide to Biometrics Security Technology

by Simon Liu, PhD and Mark Silverman (© 2001 IEEE. Reprinted, with permission, from IEEE and the authors)

WHAT IS A BIOMETRIC

As organizations search for more secure authentication methods for user access, e-commerce, and other security applications, biometrics is gaining increasing attention. But should your company use biometrics? And, if so, which ones should you use and how do you choose them? There is no one best biometric technology. Different applications require different biometrics.

To select the right biometric for your situation, you will need to navigate through some complex vendor products and keep an eye on future developments in technology and standards. Your options have never been more diverse. After years of research and development, vendors now have several products to offer. Some are relatively immature, having only recently become commercially available, but even these can substantially improve your company's information security posture. We briefly describe some emerging biometric technologies to help guide your decision making.

The security field uses three different types of authentication:

- something you know—a password, PIN, or piece of personal information (such as your mother's maiden name);
- something you have—a card key, smart card, or token (like a SecurID card); and/or
- something you are—a biometric.

Of these, a biometric is the most secure and convenient authentication tool. It can't be borrowed, stolen, or forgotten, and forging one is practically impossible. (Replacement part surgery, by the way, is outside the scope of this article.)



Figure 1. How a biometric system works.

(1) Capture the chosen biometric; (2) process the biometric and extract and enroll the biometric template; (3) store the template in a local repository, a central repository, or a portable token such as a smart card; (4) live-scan the chosen biometric; (5) process the biometric and extract the biometric template; (6) match the scanned biometric against stored templates; (7) provide a matching score to business applications; (8) record a secure audit trail with respect to system use. Biometrics measure individuals' unique physical or behavioral characteristics to recognize or authenticate their identity. Common physical biometrics include fingerprints; hand or palm geometry; and retina, iris, or facial characteristics.

Behavioral characters include signature, voice (which also has a physical component), keystroke pattern, and gait. Of this class of biometrics, technologies for signature and voice are the most developed.

Fingerprints

A fingerprint looks at the patterns found on a fingertip. There are a variety of approaches to fingerprint verification. Some emulate the traditional police method of matching minutiae; others use straight patternmatching devices; and still others are a bit more unique, including things like moiréfringe patterns and ultrasonics. Some verification approaches can detect when a live finger is presented; some cannot.

A greater variety of fingerprint devices is available than for any other biometric. As the prices of these devices and processing costs fall, using fingerprints for user verification is gaining acceptance—despite the common-criminal stigma.

Fingerprint verification may be a good choice for in-house systems, where you can give users adequate explanation and training, and where the system operates in a controlled environment. It is not surprising that the workstation access application area seems to be based almost exclusively on fingerprints, due to the relatively low cost, small size, and ease of integration of fingerprint authentication devices.

Hand Geometry

Hand geometry involves analyzing and measuring the shape of the hand. This biometric offers a good balance of performance characteristics and is relatively easy to use. It might be suitable where there are more users or where users access the system infrequently and are perhaps less disciplined in their approach to the system.

Accuracy can be very high if desired, and flexible performance tuning and configuration can accommodate a wide range of applications. Organizations are using hand geometry readers in various scenarios, including time and attendance recording, where they have proved extremely popular. Ease of integration into other systems and processes, coupled with ease of use, makes hand geometry an obvious first step for many biometric projects.

Retina

A retina-based biometric involves analyzing the layer of blood vessels situated at the back of the eye. An established technology, this technique involves using a low-intensity light source through an optical coupler to scan the unique patterns of the retina. Retinal scanning can be quite accurate but does require the user to look into a receptacle and focus on a given point. This is not particularly convenient if you wear glasses or are concerned about having close contact with the reading device. For these reasons, retinal scanning is not warmly accepted by all users, even though the technology itself can work well.

Iris

An iris-based biometric, on the other hand, involves analyzing features found in the colored ring of tissue that surrounds the pupil. Iris scanning, undoubtedly the less intrusive of the eye-related biometrics, uses a fairly conventional camera element and requires no close contact between the user and the reader. In addition, it has the potential for higher than average template-matching performance. Iris biometrics work with glasses in place and is one of the few devices that can work well in identification mode. Ease of use and system integration have not traditionally been strong points with iris scanning devices, but you can expect improvements in these areas as new products emerge.

Face

Face recognition analyzes facial characteristics. It requires a digital camera to develop a facial image of the user for authentication. This technique has attracted considerable interest, although many people don't completely understand its capabilities. Some vendors have made extravagant claims—which are very difficult, if not impossible, to substantiate in practice—for facial recognition devices. Because facial scanning needs an extra peripheral not customarily included with basic PCs, it is more of a niche market for network authentication. However, the casino industry has capitalized on this technology to create a facial database of scam artists for quick detection by security personnel.

Signature

Signature verification analyzes the way a user signs her name. Signing features such as speed, velocity, and pressure are as important as the finished signature's static shape. Signature verification enjoys a synergy with existing processes that other biometrics do not. People are used to signatures as a means of transaction-related identity verification, and most would see nothing unusual in extending this to encompass biometrics. Signature verification devices are reasonably accurate in operation and obviously lend themselves to applications where a signature is an accepted identifier. Surprisingly, relatively few significant signature applications have emerged compared with other biometric methodologies. But if your application fits, it is a technology worth considering.

Voice

Voice authentication is not based on voice recognition but on voice-toprint authentication, where complex technology transforms voice into text. Voice biometrics has the most potential for growth, because it requires no new hardware—most PCs already contain a microphone. However, poor quality and ambient noise can affect verification. In addition, the enrollment procedure has often been more complicated than with other biometrics, leading to the perception that voice verification is not user friendly. Therefore, voice authentication software needs improvement. One day, voice may become an additive technology to finger-scan technology. Because many people see finger scanning as a higher authentication form, voice biometrics will most likely be relegated to replacing or enhancing PINs, passwords, or account names.

USES FOR BIOMETRICS

Security systems use biometrics for two basic purposes: to verify or to identify users. Identification tends to be the more difficult of the two uses because a system must search a database of enrolled users to find a match (a one-to-many search). The biometric that a security system employs depends in part on what the system is protecting and what it is trying to protect against.

Physical Access

For decades, many highly secure environments have used biometric technology for entry access. Today, the primary application of biometrics is in physical security: to control access to secure locations (rooms or buildings). Unlike photo identification cards, which a security guard must verify, biometrics permit unmanned access control. Biometric devices, typically hand geometry readers, are in office buildings, hospitals, casinos, health clubs, and even a Moose lodge. Biometrics are useful for high-volume access control. For example, biometrics controlled access of 65,000 people during the 1996 Olympic Games, and Disney World uses a fingerprint scanner to verify season-pass holders entering the theme park.

Engineers are developing several promising prototype biometric applications to support the International Air Transport Association's Simplifying Passenger Travel (SPT) initiatives. One such program is EyeTicket, which Charlotte/Douglas International Airport in North Carolina and Flughafen Frankfurt/Main Airport in Germany are evaluating. EyeTicket links a passenger's frequent-flyer number to an iris scan. After the passenger enrolls in the system, an unmanned kiosk performs ticketing and check-in (without luggage).

The US Immigration and Naturalization Service's Passenger Accelerated Service System uses hand geometry to identify and process preenrolled, low-risk frequent travelers through an automated immigration system. Currently deployed in nine international airports, including Washington Dulles International, this system uses an unmanned kiosk to perform citizenship-verification functions.

Virtual Access

For a long time, biometric-based network and computer access were areas often discussed but rarely implemented. Recently, however, the unit price of biometric devices has fallen dramatically, and several designs aimed squarely at this application are on the market. Analysts see virtual access as the application that will provide the critical mass to move biometrics for network and computer access from the realm of science-fiction devices to regular system components. At the same time, user demands for virtual access will raise public awareness of the security risks and lower resistance to the use of biometrics.

Physical lock-downs can protect hardware, and passwords are currently the most popular way to protect data on a network. Biometrics, however, can increase a company's ability to protect its data by implementing a more secure key than a password. Using biometrics also allows a hierarchical structure of data protection, making the data even more secure: Passwords supply a minimal level of access to network data; biometrics, the next level. You can even layer biometric technologies to enhance security levels.

E-commerce Applications

E-commerce developers are exploring the use of biometrics and smart cards to more accurately verify a trading party's identity. For example, many banks are interested in this combination to better authenticate customers and ensure nonrepudiation of online banking, trading, and purchasing transactions. Point-of-sales (POS) system vendors are working on the cardholder verification method, which would enlist smart cards and biometrics to replace signature verification. MasterCard estimates that adding smart-card-based biometric authentication to a POS credit card payment will decrease fraud by 80 percent.

Some are using biometrics to obtain secure services over the telephone through voice authentication. Developed by Nuance Communications, voice authentication systems are currently deployed nationwide by both the Home Shopping Network and Charles Schwab. The latter's marketing catch phrase is "No PIN to remember, no PIN to forget."

Covert Surveillance

One of the more challenging research areas involves using biometrics for covert surveillance. Using facial and body recognition technologies, researchers hope to use biometrics to automatically identify known suspects entering buildings or traversing crowded security areas such as airports. The use of biometrics for covert identification as opposed to authentication must overcome technical challenges such as simultaneously identifying multiple subjects in a crowd and working with uncooperative subjects. In these situations, devices cannot count on consistency in pose, viewing angle, or distance from the detector.

THE FUTURE OF BIOMETRICS

Although companies are using biometrics for authentication in a variety of situations, the industry is still evolving and emerging. To both guide and support the growth of biometrics, the Biometric Consortium formed in December 1995. The recent Biometric Consortium annual conference highlighted two important areas.

Standardization

The biometrics industry includes more than 150 separate hardware and software vendors, each with their own proprietary interfaces, algorithms, and data structures. Standards are emerging to provide a common software interface, to allow sharing of biometric templates, and to permit effective comparison and evaluation of different biometric technologies.

The BioAPI standard released at the conference, defines a common method for interfacing with a given biometric application. BioAPI is an open-systems standard developed by a consortium of more than 60 vendors and government agencies. Written in C, it consists of a set of function calls to perform basic actions common to all biometric technologies, such as

- enroll user,
- verify asserted identity (authentication), and
- discover identity.

Not surprising, Microsoft, the original founder of the BioAPI Consortium, dropped out and developed its own BAPI biometric interface standard.

Another draft standard is the Common Biometric Exchange File Format, which defines a common means of exchanging and storing templates collected from a variety of biometric devices. The Biometric Consortium has also presented a proposal for the Common Fingerprint Minutia Exchange format, which attempts to provide a level of interoperability for fingerprint technology vendors. Biometric assurance—confidence that a biometric device can achieve the intended level of security—is another active research area. Current metrics for comparing biometric technologies, such as the crossover error rate and the average enrollment time, are limited because they lack a standard test bed on which to base their values. Several groups, including the US Department of Defense's Biometrics Management Office, are developing standard testing methodologies. Much of this work is occurring within the contextual framework of the Common Criteria, a model that the international security community developed to standardize evaluation and comparison of all security products (Kimberly Caplan, "Building an International Security Standard," IT Professional, Mar.-Apr. 1999).

Hybrid Technology Uses

One of the more interesting uses of biometrics involves combining biometrics with smart cards and public-key infrastructure (PKI). A major problem with biometrics is how and where to store the user's template. Because the template represents the user's personal characters, its storage introduces privacy concerns. Furthermore, storing the template in acentralized database leaves that template subject to attack and compromise. On the other hand, storing the template on a smart card enhances individual privacy and increases protection from attack, because individual users control their own templates.

Vendors enhance security by placing more biometric functions directly on the smart card. Some vendors have built a fingerprint sensor directly into the smart card reader, which in turn passes the biometric to the smart card for verification. At least one vendor, Biometric Associates, has designed a smart card that contains a fingerprint sensor directly on the card. This is a stronger secure architecture because cardholders must authenticate themselves directly to the card.

PKI uses public- and private-key cryptography for user identification and authentication. It has some advantages over biometrics: It is mathematically more secure, and it can be used across the Internet. The main drawback of PKI is the management of the user's private key. To be secure, the private key must be protected from compromise; to be useful, the private key must be portable. The solution to these problems is to store the private key on a smart card and protect it with a biometric.

In the Smart Access common government ID card program, the US General Services Administration is exploring this marriage of biometrics, smart cards, and PKI technology. The government of Finland is also considering using these technologies in deploying the Finnish National Electronic ID card.

SELECTING A BIOMETRIC TECHNOLOGY

Biometric technology is one area that no segment of the IT industry can afford to ignore. Biometrics provide security benefits across the spectrum, from IT vendors to end users, and from security system developers to security system users. All these industry sectors must evaluate the costs and benefits of implementing such security measures.

Different technologies may be appropriate for different applications, depending on perceived user profiles, the need to interface with other systems or databases, environmental conditions, and a host of other application-specific parameters (see Table 1).

Ease of Use

Some biometric devices are not user friendly. For example, users without proper training may experience difficulty aligning their head with a device for enrolling and matching facial templates.

Error Incidence

Two primary causes of errors affect biometric data: time and environmental conditions. Biometrics may change as an individual ages. Environmental conditions may either alter the biometric directly (for example, if a finger is cut and scarred) or interfere with the data collection (for

instance, background noise when using a voice biometric).

Accuracy

Vendors often use two different methods to rate biometric accuracy: false-acceptance rate or false-rejection rate. Both methods focus on the system's ability to allow limited entry to authorized users. However, these measures can vary significantly, depending on how you adjust the sensitivity of the mechanism that matches the biometric. For example, you can require a tighter match between the measurements of hand geometry and the user's template (increase the sensitivity). This will probably decrease the false-acceptance rate, but at the same time can increase the false-rejection rate. So be careful to understand how vendors arrive at quoted values of FAR and FRR.

Because FAR and FRR are interdependent, it is more meaningful to plot them against each other, as shown in Figure 2. Each point on the plot represents a hypothetical system's performance at various sensitivity settings. With such a plot, you can compare these rates to determine the crossover error rate. The lower the CER, the more accurate the system.

Generally, physical biometrics are more accurate than behavioral biometrics.

Cost

Cost components include

- biometric capture hardware;
- back-end processing power to maintain the database;
- research and testing of the biometric system;
- installation, including implementation team salaries;
- mounting, installation, connection, and user system integration costs;
- user education, often conducted through marketing campaigns;
- exception processing, or handling users who cannot submit readable images because of missing appendages or unreadable prints;
- productivity losses due to the implementation learning curve; and
- system maintenance.

Table 1. Comparison of biometrics						
Fingerprints	Hand geometry	Retina	Iris	Face	Signature	Voice
High	High	Low	Medium	Medium	High	High
Dryness, dirt, age	Hand injury, age	Glasses	Poor lighting	Lighting, age, glasses, hair	Changing signatures	Noise, colds, weather
High	High	Very high	Very high	High	High	High
	•	*	•	•		•
Medium	Medium	Medium	Medium	Medium	Very high	High
High	Medium	High	Very high	Medium	Medium	Medium
High	Medium	High	High	Medium	Medium	Medium
	Ta Fingerprints High Dryness, dirt, age High * Medium High High	Fingerprints Hand geometry High High Dryness, dirt, age Hand injury, age High High * Medium High Medium High Medium High Medium	Table 1. ComparisorFingerprintsHand geometryRetinaHighHighLowDryness, dirt, ageHand injury, ageGlassesageage-HighHighVery high***MediumMediumMediumHighMediumHighHighMediumHighHighMediumHigh	Table 1. Comparison of bioFingerprintsHand geometryRetinaIrisHighHighLowMediumDryness, dirt, ageHand injury, ageGlasses lightingPoor lightingHighHighVery highVery high*•••MediumMediumMediumHighMediumHighHighMediumHighHighMediumHighHighMediumHighHighMediumHigh	Table 1. Comparison of biometricsFingerprintsHand geometryRetinaIrisFaceHighHighLowMediumMediumDryness, dirt, ageHand injury, ageGlasses ightingPoor lighting, age, glasses, hairLighting, age, glasses, hairHighHighVery highVery highHigh*****MediumMediumMediumMediumHighMediumHighVery highMediumHighMediumHighVery highMediumHighMediumHighVery highMedium	Table 1. Comparison of biometricsFingerprintsHand geometryRetinaIrisFaceSignatureHighHighLowMediumMediumHighDryness, dirt, ageHand injury, ageGlassesPoor lightingLighting, age, glasses, hairChanging signaturesHighHighVery highVery highHighHigh••••••MediumMediumMediumMediumMediumVery highHighMediumHighVery highMediumMediumHighMediumHighVery highMediumMediumHighMediumHighVery highMediumMediumHighMediumHighHighMediumMedium

The large number of factors involved makes a simple cost comparison impractical

User Acceptance

Generally speaking, the less intrusive the biometric, the more readily it is accepted. However, certain user groups—some religious and civil-liberties groups—have rejected biometric technologies because of privacy concerns.



Required Security Level

biometric accuracy Figure 2. Crossover error rate attempts to combine to measures of biometric accuracy.

Organizations should determine the level of

security needed for the specific application: low, moderate, or high. Thi decision will greatly impact which biometric is most appropriate. Generally, behavioral biometrics are sufficient for low-to-moderate security applications; physical biometrics, for high-security applications.

Long-term Stability

Organizations should consider a biometric's stability, including maturity of the technology, degree of standardization, level of vendor and govern ment support, market share, and other support factors. Mature and standardized technologies usually have stronger stability.

Biometric technology has been around for decades but has mainly been for highly secretive environments with extreme security measures. The technologies behind biometrics are still emerging. This article gives a snapshot of the dynamics under way in this emerging biometric market and we hope it will help you consider all the possible alternatives when acquiring new biometric technologies.

Biometrics Resources at Your Fingertips

ADEL

http://www.allproducts.com/manufacture99/adellock/supplier.html ADEL fingerprint technology includes three categories: optical fingerprint reader technology, fingerprint verification algorithm technology which obtains a state invention patent, and build-in application technology (TIDSP technology). Adel fingerprint technology products include: fingerprint locks, fingerprint safes and fingerprint Bio-Guard or Bio-pass to PC. Adel fingerprint technology also offers a platform for the second time development in many fields. Our Adel solution, your Ideal selection.

Association for Biometrics

http://www.afb.org.uk/

Aims to promote the awareness and development of biometrics-related technologies. It provides an international forum for research and development, system design and integration, application development, market development, and other issues.

Avanti

http://www.securityconfig.com/resources/biometrics/avanti.htm A reference site for biometrics, Avanti contains considerable amount of background information about biometrics, their use in everyday business situations and how to deploy them.

Axxis Biometrics

http://www.axxisbiometrics.com/

Axxis Biometrics is a technology dealer committed to selling biometric products that utilize the fingerprint as a unique form of identification. They offer fingerprint door locks and other biometric fingerprint products that are leading technologies in the biometric security industry. Simply click on the pictures of the biometric fingerprint door locks and other biometric security products below for a detailed description. Check out the Services page if you are a Contractor or Developer looking for Bid Support pricing on biometric locks for your large projects.

BIO-key

http://bio-key.com/

BIO-key develops and licenses advanced biometric finger identification technologies that are cost effective, scalable and easy to deploy. BIO-key products provide 'True User Identification™' for the prevention of data and identity theft while preventing false aliases. BIO-key pioneered the only finger identification algorithm that has been certified by the ICSA, and today continues that innovation by offering cost effective, high-performance one-to-many finger and one-to one identification solutions, that provide security and positive identification for both government and enterprise applications.

The Biometrics Catalog

http://www.biometricscatalog.org/

The Biometrics Catalog is a U.S. Government sponsored database of information about biometric technologies including research and evaluation reports, government documents, legislative text, news articles, conference presentations, and vendors/consultants. Adding and retrieving information in the Biometrics Catalog is free and encouraged.

The Biometric Consortium

http://www.biometrics.org/

Serves as the US government's focal point for research, development, test, evaluation, and application of biometric-based personal identification and verification technologies.

Biometrics Direct

http://www.biometricsdirect.com/

Biometrics Direct is committed to providing relevant, readily useable biometric solutions into homes and workplaces to improve the quality of life, enhance personal security and empower personal privacy. As an authorized SAFLINK solutions provider, Biometrics Direct incorporates multiple biometric methods and devices into a cohesive network biometric authentication solution to meet our clients most rigorous requirements. Biometrics Direct features biometric solutions for facility, personal security, corporate data and network access.

Biometrics USA

http://www.biometrics-usa.com/

This site features affordable fingerprint locks, plus Biometrics 101 information and a biometrics FAQ sheet

bioSecure

http://www.bio-secure.us/biosecure/about.htm

bio-SECURE™ produces, markets, and distributes a line of biometric safes and safe storage devices. These safes and devices incorporate a "bio-SECURE™" biometric activation module proprietary to bio-SECURE. During the summer of 2002, bio-SECURE staff members developed and demonstrated a pre-production design of the first commercially viable biometrically activated safe. This groundbreaking safe eliminates unauthorized access to firearms, jewelry and valuables utilizing the "bio-SECURE™" biometric locking device. The locking device contains a fingerprint scanner and a processing device that verify that the individual is the authorized user of the bio-SECURE™ Safe by reading his or her actual fingerprint and comparing the scanned print with fingerprint data stored within the device.



Cogent Systems

http://www.cogentsystems.com/

Cogent is a leading provider of Automated Fingerprint Identification Systems, or AFIS, and other fingerprint biometric solutions to governments, corporations, law enforcement agencies and other organizations worldwide. Our solutions enable customers to capture fingerprint images electronically, encode fingerprints into searchable files and accurately compare a set of fingerprints to a database containing potentially millions of fingerprints in seconds.

Corporate Safe Specialists

http://www.corporatesafe.com/fingerprint.asp

Biometrics safes eliminate unauthorized access to firearms, jewelry and valuables through the use of industry leading fingerprint scanning, storage and management technologies. Products feature Quick access, State-of-the-art technology, Quick and easy reconfiguration, Recognition of up to 50 fingerprints, Key back-up

Fingerprint Cards

http://www.fingerprint.se/page.asp?languageID=2

Fingerprint Cards (publ) is established as a leading source of embedded biometric systems (can operate independently of a PC processor); it has also asserted itself successfully as a leading provider of low-cost biometric systems technology with the completion of the two-chip fingerprint verification system based around the FPC1030 swipe sensor.

Find Biometrics.com

http://www.findbiometrics.com/

Features vendor information, news and helpful guides: a comprehensive glossary, What are "Biometrics"?, Biometrics Glossary, Biometrics in the 21st Century, Biometrics 101, Identification vs Verification, Choosing a Biometric Solution

Global Sources

http://www.globalsources.com/manufacturers/Fingerprint-Lock.html

A clearinghouse of biometric lock products, this site features industry information, online publications and a user-specific catalog feature.

The Home Security Store

www.HomeSecurityStore

Seller of home security products including fingerprint locks.

International Biometric Industry

Association

http://www.ibia.org/

A trade association founded in September 1998 in Washington, D.C., to advance, advocate, defend, and support the biometric industry's collective international interests. Governed by and for biometric developers, manufacturers, and integrators, IBIA aims to serve all biometric technologies in all applications.

Journal of the International Biometric Society

http://stat.tamu.edu/Biometrics/

Published quarterly, Biometrics aims to promote and extend the use of mathematical and statistical methods in various disciplines. It describes and exemplifies developments in these methods and their application for experimenters and those primarily concerned with data analysis.

The Keyless Lock Store

http://www.nokey.com/biomfinlocst.html

This company features a unique fingerprint door lock along with resources for installation and setup.

Såflink

http://www.saflink.com/physical/

Offers two primary solutions: SAFpassage, a full-featured biometric access control system, and SAFcard which allows you to add biometric protection into your existing physical access system.

SENSE Holdings, Inc.

http://www.senseme.com/

SENSE Holdings Inc. is a leading provider of biometric identification systems. SENSE integrates cuttingedge biometric technology into mechanical and electronic devices that improve many business processes including Homeland Security applications, Time and Attendance, Access Control, SmartCard Technology, Biometric Identification and Secure Log-on.

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Go Your Own Way

by Greg Perry, CML, CPS

This month we'll look at a Mosler Class 5 Black Label Vault door. The job was simple enough. My instructions were to open the vault door because the combination was lost. I tried some simple combinations; 50, 50 - 25 - 50, 10 - 20 - 30 etc. with no luck. Since this door came from the factory with an S&G 8560 Group 1R manipulation proof lock, I decided it was drill time.

On a GSA door, if the label is to be maintained, holes must be placed under the dial ring. In addition, a hole must be repaired properly.

How would you drill it?

If you are unfamiliar with this lock you might be surprised when trying to dial it. Sargent and Greenleaf designed the lock a little different than most safe locks. The proper way to open the lock is to dial the combination like most locks: 4xL, 3xR, 2xL then dial right to 0. Next, push the dial in and release. Then, continue right to retract the bolt. The push-in movement of the dial moves the drive cam towards the back of the lock to release an accelerator spring attached to the lever assembly from a catch on the lock case. This action moves the fence into the wheel pack. If the gates of the wheels are aligned under the fence, the lever nose will be in the drive-cam cutout and the dial can be turned to retract the lock bolt. If the gates are not under the fence, a second S-shaped spring will lift the lever nose off the wheel pack and drive cam. This is how manipulation resistance is achieved.

The first choice is to remove the dial or drill through the dial. Each has an advantage and a disadvantage. Drilling though the dial makes sense if you use a lever rig and want to drill at drop in. The lock has a rear drive cam and looking through the hole into the lock case at drop in is easy. First, pin the dial at 0 (the spyproof ring makes it easy). In the past, I've used a pair of screwdrivers wedged on both sides, although a better technique is to drill a hole through the dial ring and use a screw to keep the dial from moving. Once the hole is drilled, simply dial four times to the left, stopping at 5. Then, return the dial to 0 and look into the hole. If you see a gate, or portion of the gate, center it to the hole and you will know the first number. If you don't see the gate, turn the dial left to 10 then back to the 0 to look in the hole. Continue moving the wheel pack five numbers at a time until you find the first number. Sometimes, as you are looking for the first number, you will be able to see the gate of wheel number two. If you do see it, record the number. If not,

once the first number is found, dial right four times to a number five numbers or so below your first number, then back left to 0. Look in the hole. If you do not see the second gate, turn the dial back right, moving five numbers further down the dial. As before, turn left back to 0 to look in the hole. For example, if the first number you found is 67, start looking for the second number at 60, then 55, 50 etc. Once you find the edge of a gate, center it. Finally, dial the first two numbers and look for the last number. Start turning the dial left to a number about 5 higher than the second number, then back to 0. Once you've found a gate on the third wheel, center it. Push the dial in and release. The lever should have dropped into the wheel pack and you can now continue turning right to retract the lock bolt.

The second option is to remove the dial. This dial will not pull. That leaves two remaining removal options. The First, is to grab the dial knob with locking pliers and rock it off. This can be a little dangerous if the spindle breaks off below the face of the door. A better option is to drill down the center of the dial and drill away the spindle until the dial can be removed. This leaves a very short section of the spindle, enough to grab with locking pliers but just barely. I prefer this method.

Once the dial is removed there are several options for a drill location. The most common option is drop in or 7/8" at 97. This door was drilled there sometime in the past (poorly). After removing the dial, I found a 3/8" hole was drilled at the drop in location. I chucked up a carbide bit to see if I could freehand drill into the lock case. The bit dulled quickly. I prefer to drill a scope hole. Doing this will help you avoid nicking the first wheel or the fence as you enter the lock case. If you are using the StrongArm Mini-rig template number two hole H or 1 1/2" at about 87 provides a great hole location to view the wheel pack under the fence. Since this door already had a hole at drop in and I really didn't know how the repair was performed, I decide to drill a new hole. Ten minutes and a single bit later, I was aligning the wheel gates under the fence. Once the combination was dialed in and the lock bolt retracted, I cleaned up my tools. I then had the customer come over to open the door. (I make this a standard practice as my job is to unlock the container not open it.)

The opening and repairs on this door are specified in Federal Specification 809. A Black label can be repaired with ball bearings, hardened drill rods or carbide. So I inserted a carbide pin into the hole I drilled. The existing hole is larger than my car1





Photo 1 shows a rear view of a different 8560 lock from my collection of cutaway locks. The catch can be seen holding the end of the silver accelerator spring.

Photo 2 shows the lever with the accelerator off the catch in the retracted position.



Photo 3 shows the S shaped spring that lifts the lever back off the wheel pack if the wheel gates are not properly aligned.



Photo 4 is the first shot of the vault door. The smaller hole is the one I drilled.



Photo 5 shows the outside ball bearing installed in the larger hole. The carbide pin was installed from the back to leave some room to weld the ball bearings in the larger hole.



Photo 6 shows the masking after texturing and gray paint.



view of the outside of the door.

Photo 8 is of the inside lock box. The door boltwork is locked and the lock bolt is retracted.



Photo 9 shows the boltwork retracted.



Photo 10 shows a full view of the back with the cover plate removed for an understanding of the overall operation.



bide pins so I placed three ball bearings in the hole and welded them in place. The inner surface was also welded and subsequently ground down to a smooth surface. The outer surface was ground smooth, puttied with auto body glazing compound, and sanded smooth. The next step was to mask off the area outside of the dial ring. I used a stone paint to provide texture. After it dried, a couple of coats of GSA gray paint were applied.

The old lock and dial ring was reinstalled and a new dial was provided. Some of you may be wondering, since this is a GSA Class 5 door, why I didn't install a KabaMas XO7, 8, or 9. The specification FFL2740 that requires the XO type lock is a requirement for storage of classified materials. This door, even though it is a GSA class 5 door, is being used in a pharmacy. The repair still needs to meet the federal requirements in case someone decides to use it later for storage of classified materials. If that happened, the lock would need to be upgraded.

Finding an already-drilled improperly-repaired hole can sometimes make the job easier, especially if you are having trouble determining a good drill point on an older container. But it speaks volumes about the lack of caring and lack of professionalism of the previous technician. Don't let someone else find your poorquality work. Do the job right. "Storefront glass doors should be outfitted with interchangeable core cylinder housings on both sides of the door whenever possible."





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Opening Locks with the "999" or Bump Key

by Marc Weber Tobias



INTRODUCTION

This article will examine a technique that allows a conventional pin tumbler, dimple, or axial pin tumbler lock to be opened in seconds with little skill and no apparent damage. The procedure poses a real threat to the security of many pin tumbler mechanisms but can also provide the locksmith and rapid entry team with a quick method to open a cylinder. It is important for security professionals to understand the process and the means to defeat it. The technique of opening pin tumbler locks by using a specially cut key has been known for quite some time. Variously called a bump key, 999 key or percussion key, the procedure can result in the bypass of a cylinder within seconds. I recently attended a weekend workshop in the Netherlands with several experts in various aspects of bypass of high security locks. At that meeting, detailed discussions and demonstrations were provided with regard to the use of the bump key for a variety of cylinders. As a result, a paper was published on the Internet that describes the method to open many European locks.

This issue has received a great deal of attention in Germany and was the subject of a national television program showing a locksmith opening many door locks on businesses almost instantly. Although some American locksmiths are familiar with the practice, the general public is not aware of the potential problems inherent in pin tumbler locks. I will summarize the relevant issues and dispel some of the misinformation that presently exists regarding the technique. The topic was fully described in the latest edition of LSS+ (Version 5.0). Additional in-depth treatment and video has been inserted into Version 5.1, scheduled for release in 2005.

THEORY OF THE BUMP KEY

A bump key can only work with a split pin tumbler locking mechanism because a shear line must be present and a gap in that shear line must be created by the action of the impact upon each pin. Certain locks cannot be opened because of their mechanical design and will be detailed subsequently in this article.

A famous English physicist, Sir Isaac Newton, can be credited for first describing the premise upon which the bump key is based. Little did he know that his Third Law of Motion would be responsible for opening many of the high security locks two centuries after he first published his theory. The law of physics which is familiar to most science students, states "for every action, there is an equal and opposite reaction." As discussed in LSS+, it explains why all impact picking tools can cause a lock to open.

Mechanical and electric pick guns create an impact or shock at the base of each bottom pin in each chamber, which in turn causes the next pin in the pin stack to bounce for a few milliseconds. When done correctly, there will be created a momentary gap between each bottom pin and the pin above it. If torque is applied at the precise moment, this gap can be exploited to remove all pins from blocking rotation of the plug. For a brief instant, the shear line is open.

In order to properly cause this to occur, three actions must happen simultaneously. First, the precise amount of torque must be applied that will cause binding of the bottom pin that comes into contact with the impact device (but not bind the next pin) so it can bounce within its chamber. If too little or too much tension is applied, the process will not work. Second, sufficient impact must be presented to the base of each pin and the correct amount of energy must be transferred to the pin above it at the same time as all other pins. Finally, there can be no impediment to movement of each of the pins.

THE DESIGN OF THE BUMP KEY

Conventional pin tumbler, dimple, and some axial pin tumbler locks can be opened with specially cut keys, as shown.

Conventional pin tumbler locks





The standard bump key requires that all cuts be made to the deepest value.

The bump key must transfer energy to all pins simultaneously. In order to accomplish this, the bitting must be specially created to make equal contact upon impact. There are two primary means to accomplish this with a conventional pin tumbler lock; in both instances, a blank is cut to the deepest code value for each pin position. In the preferred method, the shoulder is trimmed about .5mm. This will allow a forward movement of the key when it is seated under each pin. In the original technique, the "999" key (so named because nine denoted the deepest possible cut), was withdrawn from the keyway by one pin prior to rapping. As it was forced forward, it would contact each pin with force.

Dimple locks









Dimple locks, even high security systems, can be opened with a bump key. Shown are examples of four different keys. Note that all cuts in all positions are made to their lowest value. In certain cases, even telescoping pins can be opened.

A dimple lock, even certain high security models, can be opened with a bump key as shown. All of the pin positions must be cut to their deepest value, and the end of the key must be trimmed approximately .25-.5mm, to allow forward movement. A stop made of rubber bands or insulator can be effective. Another technique is to utilize a glue gun to create a shoulder, as shown.



A shoulder is created by glue or a rubber seal for use on bump keys because they do not have any way to stop forward motion. Rubber bands or cable ties can also be utilized.

Axial pin tumbler locks

Tubular locks can be bypassed by the same technique as conventional pin tumbler locks. In fact, they can be easier to open because there is equal access to all pins without the problem of forward movement of the key within each cut.

The author has had good luck with five pin locks; six and seven pin mechanisms can be opened less reliably. Tubular keys were cut so that all positions had the maximum depth, and cuts were made extra wide so the pins would not bind when torque was applied. Note that the top portion of the keyway index pin must be removed or the key will not be able to turn.

HOW TO OPEN A LOCK WITH A BUMP KEY

In order for a lock to be successfully opened, energy must be transferred to the base of each pin at the same time. A key that is specially cut provides the means to transmit the shock to each tumbler. There are two recognized methods to bypass a cylinder with a bump key: withdrawal of the key by one chamber position (pull-back) and creating a forward path for the key to transfer energy to the pins by reducing the shoulder length (negative shoulder). There are also two methods to apply energy to the head of the key when using the negative shoulder method: create a forward movement of the key of up to .5mm, which transfers energy to the pins; or seat the key slightly off center from the base of the root of each cut so that the pins are resting against each pin when the key is struck. This will transmit a shock to each pin without the key appreciably moving forward.

Pull Back-Method

The original method of utilizing the bump key required that the bitting be cut to the deepest cut in each position. The key would be fully inserted into the plug, then withdrawn one position. Torque would be applied and the head of the key would be rapped with a plastic or wooden mallet, causing energy to be transmitted to each pin. Although this procedure is fairly reliable, there could be a problem with the last bitting position not making proper contact with the adjacent pin tumbler. The preferred method is described in the next section.

Negative Shoulder Method #1



Up to .5mm is trimmed from the shoulder to allow the ramps of each cut to make contact with the base of each pin.

This method is more reliable than the pull-back technique because the interface between the bitting of the key and the base of each pin is constant. A key with each bitting position having the deepest cuts is prepared. Then, the shoulder is trimmed approximately .25mm-.5mm, which will allow the key to be moved forward enough that the base of each pin can make contact with the ramp of each cut. When shock is applied to the key head, the key will move forward until stopped by the shoulder. Torque must be properly applied in order to open the lock. The advantage of this technique is that the key will always return to its "home position" when torque is released, allowing for rapid reapplication of energy. Note that if too much material is removed from the shoulder, the pins may be lifted too high before shock is applied.

Negative Shoulder Method #2

The negative shoulder method #2 utilizes the same basic key design as shown in Figure 4. To open the lock, the key is first pushed forward until it is stopped by the shoulder, resulting in each of the pins making contact with the ramps of their associated cut. Torque is applied and the head of the key is rapped. This method requires virtually no forward movement of the key.

Critical Design Issues of the Bump Key for Conventional Pin Tumbler Locks

Whether the pull-back or negative shoulder method is utilized, there are three critical issues in the design of the bump key: the centering of each bottom pin at the root, the distance between the center of the root and the associated ramp, and the angle of the ramp. If keys are not cut correctly, the lock will be difficult or impossible to open.

Each pin must be centered within the root for its cut. This is especially important for the pull-back method. If not, then the timing of transmission of energy will not be equal which could cause the pins to move at different times, resulting in an uneven gap being created at shear line. In addition, the distance between the position of the pin with relation to the center of the cut and the ramp must be the same, otherwise the pins will be contacted at different times when a shock is applied to the key head. If the cuts are too wide or misaligned, the key will not work because energy will not be transferred to the base of the pins.

Finally, if the ramp angles are too steep, they will present a barrier to the movement of the pin which will result in the insufficient amount of energy being applied to each pin. The angle of the ramp must be significant enough to engage the pin and allow it to move vertically. It cannot be too steep, nor can it be too flat. If the negative shoulder method is employed, then there should not be more than about .5mm removal of material from the shoulder because the forward movement of the key and associated vertical movement of the pins could be higher than the shear line. This could occur if the length of the bottom pin was equal to the deepest cut of the key.

Keys that are used for this process should be made of nickel silver or steel or brass that will not distort, bend, shear or tear upon the application of force.

Some keys do not have shoulders; dimple locks are a perfect example. In such cases, material is removed from the end of the key to allow slight forward movement, and a pliable stop is provided. Rubber bands, rubber insulators or glue from a hot glue gun can be used to create such a stop. Dimple locks can present other challenges because their internal construction can be damaged by repeated application of shock.

Application of Energy to the Head of the Key

The author has utilized wooden and plastic-handled tools to apply shock to the head of the key. However, the best tool appears to be one that was designed by Kurt Zuhlke in the Netherlands, which allows controlled force to be applied rapidly and easily. This is a plastic mallet with flexible material to provide the correct recoil when the blank is struck.

Locks that can be opened

Virtually all conventional pin tumbler locks are subject to this method. Manufacturers have employed a variety of techniques to frustrate bypass by picking, impressioning and decoding through the use of security pins (mushroom, spool, serrated and similar designs), telescoping pins (pins within pins), as well as secondary locking systems that employ some form of sidebar. These measures will not make the lock secure against this form of attack. Extensive testing has been done in Europe, and the following locks have specifically been identified by Barry Wels (in his White paper that was issued on November 5, 2004) as being subject to compromise. The list is not all inclusive, and the author has also tested many American locks that can be easily opened. It appears that the more expensive locks are easier to open.

> Assa Twin 6000 Mul-T-Lock pin-in-pin Mul-T-Lock interactive Mul-T-Lock 7x7 LIPS Octro LIPS Keso DOM IX KG DOM 5-pin **EVVA TSC** Zeiss IKON 5-pin Corbin 5-pin ICEO dimple D.L.C. 5-pin Lince dimple ABUS 5-pin Pfaffenhaim Schlage five and six pin

Within the class of locks that can be opened are certain sidebar locks and dimple locks, and even locks with telescoping pins and security pins.

Locks which are not subject to the practice

Certain locks are not subject to the bump key technique. These would include any mechanism with a sidebar or secondary locking system, although there is an exception. As was noted earlier, rapping is possible because a momentary gap is created within each pin stack that is between pin segments. If pins cannot be "split" through the application of energy, then the lock will not open.

There is a caveat, however. Certain high security locks, such as the Assa 6000, can be bypassed if the torque is applied while using a portion of the key that has the correct sidebar code. This will effectively neutralize the effect of the sidebar and allow the lock to be manipulated as a conventional pin tumbler device. This appears to be true in any sidebar locking device that splits the functions of the side millings and conventional bitting. Thus, Medeco locks would not be subject to the practice, because the action of the pins to control the shear line and sidebar are integrated.



Certain high security sidebar locks can be opened by rapping. Shown is a key for the Assa with the proper sidebar code. Unless the sidebar and conventional bittings are integrated, some of these locks can be opened.

Any portion of a locking mechanism that does not employ split pin tumblers cannot be opened by this technique. Thus, for example, the Emhart interlocking pins, Medeco, Assa and Schlage (sidebar portions), Abloy, Evva 3KS laser track and MCS magnetic code system, and Miwa magnetic locks would not be subject to compromise.

Interestingly, the better grade of locks are seem to be more susceptible to the technique of bumping. Thus, locks with higher tolerances and harder metals are opened more easily than those of softer metal or sloppy tolerances. In the case of metal content, less deformation occurs as shock is applied. Higher tolerances appear to result in the more efficient transmission of energy to the pins. Note that paracentric keyways have nothing to do with the resistance of a lock to rapping.

Forensic Implications and Effect of Applied Force





Physical indicia of the use of a bump key can be seen if repeated blows are required to open the lock. Note the indentations on the front of these plugs. There may be internal indications as well.



Locks can be damaged by the use of a bump key and will leave traces that they were manipulated, whether they were opened or not. Specifically, the face of the lock can show compression marks, as can the base of each pin. In addition, springs can be compressed with repeated shocks which can cause mechanical failure of the lock. Internal components can also be damaged, which is a particular problem in dimple locks. Deformation of the keyway or chambers can also occur and which may cause the key to become lodged within the keyway. Locks with relatively soft plugs or those made of nylon or other non-metallic materials should be viewed with caution, as they may be severely damaged. These issues may be moot however, if the lock can be opened with the application of force one time, as is often the case.

How to prevent the bump key from working

The use of a bump key to open a lock can be prevented. Moshe Dolev, an Israeli inventor and co-designer of the Mult-Lock has patented a solution that works quite well in frustrating this type of attack. The special spring-biased two-part pin catches within each chamber upon the application of a shock and will prevent the plug from turning. A more detailed discussion of this pin can be found in LSS+, together with a detailed video showing the physical action of the bump key and the way to prevent the movement of the pin within each chamber.



The Dolev patent provides a solution to the bump key by interlocking a special lower and top pin upon the introduction of shock to the base of the tumbler.



Bump Keys and Security

Most mechanical locks can be bypassed through picking, impressioning or decoding. However, each of these techniques require various skill levels that are commensurate with the security of the mechanism. Often, special tools are needed. The inherent threat of the bump key is that relatively no skill is necessary to open most conventional pin tumbler mechanisms. Keys can be easily cut to act as a bump key, and the acquisition of blanks, even restricted keyways, is not a significant issue, as has been noted by the author in LSS+, relating to the use of the profile milling machine.

The author has opened high security locks in seconds by rapping. In fact, in a recent television interview, the reporter, although totally unskilled in bypass techniques, was able to open a six pin Schlage cylinder in about five seconds. The author views the inherent design of a pin tumbler lock as a potentially serious threat to security. Unless anti-rapping pins are employed, such as developed by Dolev, then the security of any facility that relies upon conventional locks may be at risk. This is an excellent opportunity for locksmiths to take the initiative and educate their customers as to the risks in utilizing locks that do not employ secondary locking systems, such as sidebars, or protection against rapping techniques.

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LSS+ Product Review

by Harry Sher, CML, CPS

I purchased LSS+ at the 2002 ALOA Convention. My expectation was to use the material primarily as a reference. I have found it to be not only the best reference that I have seen in this industry, but also find it extremely invaluable in other areas. These days I primarily teach and the course that I am asked to teach most often is Defense Against Methods of Entry (DAME). The major learning objective is to be able to identify the weak points in any locking device (including unfamiliar locks) and to determine the most likely and best methods of attack, to make entry in a professional manor, and to determine how to best defend against these methods of entry. With such a comprehensive learning objective I cannot always anticipate student interest in specific locks, tools, methods etc. LSS+ allows me to find illustrations, pictures; video and audio clips immediately in response to student questions in class and through the use of an LCD projector cover this unforeseen material straight away. The ability to find material quickly is due to a sophisticated search engine that allows you to go directly to any subject. I often refer students to various chapters and books in LSS+ for further study when they express a need to advance their skills. LSS+ can be used to learn many basic and advanced locksmithing skills such as picking, impressioning, manipulation, etc. I do not hesitate to recommend this material to students pursuing the ALOA Proficiency Registration Program due to the Author's meticulous adherence to the ALOA Glossary. I am grateful to Marc Tobias (LSS+ author) not only for providing this fine reference to the industry but also for serving as an assistant instructor for the DAME class at the last three ALOA conventions. He and many others such as Ken Persson the owner and inventor of Peterson tools and Gale Johnson the editor of Locksmith Ledger volunteer

their time so that on the second day of the class the students get their hands on instruction from the actual authors, inventers and manufacturers of tools discussed and demonstrated on the first day of the class.

LSS+, the multimedia version of Locks, Safes, and Security is based on the 1400 page hardbound treatise. I have a copy of the 2nd edition of the hardbound text which was published in 2001. There has always been a problem with the length of time that it takes to publish a completely revised text. Things change in our industry, often overnight. A case in point is the masterkeying controversy arising from a NY Times article last year. One of the major advantages (not to mention video and audio clips, etc.) of the multimedia version over the hardbound version is the speed that it can be updated and in our hands.

The latest release of LSS is now available in six volumes for the Locksmith edition and fourteen volumes for Government. LSS+ version 5.0 contains a great deal of new material in the form of text, graphics, audio and video files. I have reviewed much of the new material and think that Marc Weber Tobias, the author, has provided extremely valuable data to the locksmith and security community in this latest release.

Of special interest are the revised chapters on master keying systems and their compromise. Tobias was one of those quoted in the New York Times article last year with regard to the release by AT&T and Matt Blaze of the method to derive the top level master key for a conventional master key system. The author, who is both an attorney and security expert, believes, as do many in the industry, that the ability to compromise the TMK can pose an extremely significant threat to security and create serious liability issues. "Manufacturers have spent millions of dollars to develop locks that are difficult to pick or decode. But they have done little to deal with master key security," says Tobias. He asks "why pick a lock, with all of the difficulties that may be involved, especially in high security applications, when you can make a key to open all of them, and with little fear of detection?" I agree.

In my view, Tobias has provided the most comprehensive examination of both the theory of master keying and how it relates to the tactical aspects of compromising these systems that has ever been written. Coining the phrase "extrapolation", he takes the reader on a logical, step by step approach to the issue, from many different perspectives.

He details, with extremely well prepared and easy to understand graphics, tables, charts, and photographs, how master keying is accomplished, and integrates the theory into a detailed discussion of the tactical aspects of compromising such systems. For those of you that really do not understand this process, reading of this material and viewing of the accompanying videos is a must. The problem can be quite complicated, as is pointed out by the author. Tobias goes into extreme detail with regard to all aspects of the extrapolation process, including the use of secondary locking systems, such as sidebars, to protect the integrity of the master key system. Unfortunately, as Tobias points out, most locks were designed to be resistant to picking and decoding, but not to the extrapolation of the TMK. Sidebar locks, even those with a UL 437 rating, may not offer any added security to prevent the practice.

Master key systems can be protected to some degree against extrapolation, but the implementation of locks with the capabilities of multiple sidebar codes under one top level master key, must be done properly.

But Tobias was not content to just examine how master key systems could be compromised. He did an extensive analysis of the locking systems that provide increased security against the practice of extrapolation. In this context, Tobias provides a very detailed review of the Medeco Biaxial and M3, and the Assa 7000 V10 to show how a master key system can be made much more secure, through the use of multiple sidebar codes. Yes Virginia, you can have two Medeco Biaxial locks in the same master key system each with a different angle in the same space and yet operated by the same TMK. If you thought you understood how the Medeco Biaxial worked in the master key environment, I can assure you that after reading this material, you will have an entirely different perspective and appreciation of the capabilities and limitations of this system.

I think few locksmiths really grasp the concept that Medeco and Assa have adopted. As a result of his detailed analysis, Tobias was then able to determine how to defeat the security that such enhancements can offer. Reading this material is a real eye-opener.

No discussion about the compromise of master key systems would be complete without an analysis of the machine that defeats restricted keyway protection, so important in the high security environment and touted by manufacturers. So, Tobias also presents an extensive examination of the Easy entrie profile milling machine and the PC software package that allows this system to reproduce restricted keyways. There are several demonstrations of the capabilities of the Easy entrie, including the replication of the Schlage Everest profile and use of the accompanying pick set produced by Peterson Manufacturing. The Everest blank, with its undercut, is one of the most challenging to reproduce, and clearly demonstrates the capabilities of this machine. The author used this lock to show how the Easy entrie can actually draw different profiles from a photograph, and then reproduce them. It offers an excellent insight into this system, and why every government agency should have one in their arsenal of tools for covert entry. The PC software version is only available to government agencies, but the locksmith must be aware of this machine and its capabilities when advising their customers about the security of a specific system.

Aside from the chapters on master keying, there are extensive additions to LSS+ from the original version, including picking of high security lever locks, alarm system bypass, analysis of different sidebar locks, discussion of biometric systems, use of system keys to test cylinders, new methods of forced entry, and many many other topics. The author has included many hours of new video and audio, as well as hundreds of graphics and photographs. A posting of all new additions can be found on the author's website, www.security.org. The author insures the accuracy of the technical information and defeat methods by verification with the technical experts and engineers (including manufacturers) in our industry around the world. A case in point is system key theory mentioned in the last paragraph. Marc traveled to California to interview Brian Chan, CRL at UC Berkley. Brian for my money is one of the top master key experts in the world and developed system key theory. The hundreds of video and audio clips found through out LSS+ are of experts around the world such as Brian.

If you already own the earlier release of LSS+, you will receive an automatic upgrade. If not, in my view, it is well worth its price. Of all the material incorporated into the latest edition, I believe that the most important addition is the author's material on master keying, as I described earlier. In my view, any locksmith or security professional who is charged with the responsibility of assessing the security of a facility that utilizes any form of master keying system must read and understand this material.

It will take you several weeks to digest all of the new additions to LSS+ version 5.0. I can assure you that it will be well worth your effort. Marc tells me that he is already working on Version 6.0. What next?

LSS+ is available through the ALOA Store by calling 800-532-2562 x23 or go online to www.aloa.org/store/ MarcTobias can be contacted by email at mwtobias@security.org.

LOCKS, SAFES and SECURITY Electronic Infobase now available at the <u>ALOA Store</u> at an ALOA member discount



LSS+ is the ELECTRONIC INFOBASE edition of *Locks, Safes, and Security. Locks, Safes, and Security* is a treatise on the history, technology and bypass of locks and safes. It provides extremely detailed information for locksmiths and law enforcement professionals. It is comprised of FIVE volumes (LOCKSMITH VERSION) that contain as many as 4000 new images, enhanced graphics, and approximately forty hours of audio and video.

Extensive materials on forensic investigations, forced entry, and bypass of high security locks have been included. There are four books contained within the INFOBASE, including two treatises on locks and safes that were written at the height of the industrial revolution in England.

LSS+ utilizes a sophisticated search engine to instantly access the information contained within the INFOBASE. There are three security levels: PUBLIC, LOCKSMITH, and GOVERNMENT. Many chapters of the book have been expanded with text, graphics, and multimedia.

A **preview copy** of **LSS+** is available to ALOA locksmiths. If you wish to order a preview copy, please call 800-532-2562 x23 or e-mail <u>orders@aloa.org</u> and provide your ALOA member number. Once installed, you may view the contents for three days, without limitation. The default security level is Two, which provides access to materials restricted to locksmiths. This disk actually contains information for all security levels, but has been restricted to allow Level One and Two access only. No registration is required to preview the contents. This disk will only run on one computer after installation, without uninstalling all files. If you decide to buy the **LSS+ Locksmith** level collection, the other disks will be sent to you, together with a case for the preview disk. You must receive the full set prior to registration. ALOA will issue a product serial number to you prior to shipment..

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LOCKS, SAFES and SECURITY on CDRom now available at the <u>ALOA Store</u> at an ALOA member discount Editorial

Tubular Locks and the Kensington/Kryptonite Fiascos

by Marc Weber Tobias

In August, our office issued two alerts on www.security.org regarding the insecurity of the tubular locks utilized by Kensington and other computer cable lock manufacturers. As a result, we received over 100,000 hits in the following days from corporations, governments, schools and private individuals throughout the world, wondering why their locks could be easily and quickly bypassed with a ball point pen. The technical answer was easy: the locks could be impressioned with the soft plastic material that is used in many pens. It just happened that the diameter of the pen barrel was precisely the same as the keyway for most standard axial pin tumbler locks. The more relevant answer was that the manufacturers either did not know of the bypass technique, or did not care. Either way, a public relations nightmare followed, as well as significant costs to repair the damage and replace the locks.

As the lock makers soon learned, millions of consumers were not only affected but they were definitely not happy to have paid up to \$50.00 for a computer lock and \$100 for a bike lock that could be opened in seconds by just about anyone with a pen. As a result, manufacturers have been scrambling to restore public confidence in these locks and their products. Other sectors have also been affected, such as gun cabinet and motorcycle manufacturers. The problem is not in the basic design of the tubular lock. As we all know, they have been around for more than fifty years and can be made quite secure. The real problem is in the use of cheap, low tolerance locks with poor designs that are selected solely because they can be produced very inexpensively, often for about a dollar. In addition, many companies hire engineers that are quite good a making things work, but do not have a clue about how to break things. Simply stated, a secure lock cannot be designed unless those responsible first understand methods of compromise.

The public has no idea what is secure and what is not. They make their decision based upon price and the reputation of the manufacturer. Locksmiths can play a vital role in advising their customers of potential security flaws in consumer products. In my view, they should take a proactive role in this process and make certain that their customers are educated, so that they can make an intelligent decision as to what level of security is really provided by a given product.

In December we released a detailed report regarding gun trigger locks. This is another example of the poor design of a lock that is widely used to protect access to weapons, especially by minors. These locks, which sell for about ten dollars, are designed to prevent access to the trigger and thus theoretically prevent the weapon from being fired. As we demonstrated, an eleven year old kid from Toronto was able to remove three popular gun locks in seconds from a rifle. A number of manufacturers copied each others design, and all can be shown to be easily bypassed. The difference between this design flaw and that of the computer and bike locks is that this one can potentially result in the injury or death of a kid.

The lesson to be learned: locksmiths and security professionals should pay close attention to consumer locking devices for defects and security vulnerabilities, especially ones that they sell in their shops or recommend as secure. After all, in most cases, locksmiths are considered as the first line expert to advise their consumers as to what is safe and what is not. And, it is just good business. I believe that every security professional has an affirmative duty to disclose defects in designs that can ultimately result in the compromise of locks and locking systems. Although some locksmiths may disagree with this philosophy, they must understand that there are no secrets. Security by Obscurity does not work. If there is a defect, it will be exploited. Whether it is a vulnerability in master key systems, or the ability to open a gun trigger lock, the public needs to know before they have a problem so they can take appropriate steps to protect themselves. It is simply naive to believe that if we don't talk about a problem, it will not exist or not cause difficulty. Even at the risk of educating the "bad guys" they will find out anyway. So, we might as well be up front with everyone.

Locks protect people and property from various hazards. The manufacturers would be well advised to remember that they are not only in the business to make a profit, but to produce products that do what they represent: provide security. Proper testing should be done before a product is released to insure that adults, much less kids, cannot use common implements and techniques, such as ball point pens, knives, and ice picks to defeat locks that are supposed to provide security.

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Outlook for Association Health Plan Legislation in 2005

Looking ahead to 2005 and the start of the 109th Congress in January, the outlook for the Association Health Plan (AHP) legislation (H.R. 660/S. 545) has truly never been better, while the need has never been greater. As small and medium-sized businesses continue to struggle mightily to provide affordable health benefits to workers, ALOA's Healthcare Coalition will continue working towards the goal of providing association-sponsored health plans with a new option of operating under uniform regulation provided by the federal Employee Retirement Income Security Act. This will provide AHPs with maximum plan design flexibility and other operating efficiencies that will enable associations to deliver higher quality and more affordable health benefits to employers and their workers.

The political landscape in the new Congress will be significantly improved with respect to the prospects for enactment of the AHP legislation. House Education and Workforce Committee Chair John Boehner (R-OH) has already indicated that the Republican Leadership plans to move the AHP bill through the House in early 2005. With Republicans adding slightly to their majority in the House in the 2004 elections, having the AHP bill approved again on a strong bipartisan vote, as it was in both 2003 and 2004, is highly likely.

As has been the case in previous years, the focus will turn to the Senate once the House approves the AHP legislation. The 2004 elections have improved the outlook for AHP legislation in the Senate substantially. The election of five new Senators who have supported the AHP bill during their tenure in the House provides a stronger foundation for building majority support for the bill in the Senate. These new Senators, who replace retiring or defeated Senators who were believed to have been opposed to the AHP legislation, are: John Thune (R-SD); Jim DeMint (R-SC); Johnny Isakson (R-GA); David Vitter (R-LA); and Richard Burr (R-NC). Given their past support for the AHP bill in the House, it is likely that they will continue to be supportive in the Senate. Based on this assumption, this is an increase of five votes in favor of the AHP bill!

Another new Senator, Mel Martinez (R-FL), is a former Bush Administration cabinet official who replaces outgoing Senator Bob Graham (D-FL), and this hopefully will be another vote pick-up! While Senator-elect Tom Coburn (R-OK) has raised concerns about the AHP bill during his tenure in the House, he indicated to several organizations during his Senate campaign that he will support the AHP bill in the Senate if elected. This will be a huge improvement over his processor, retiring Senator Don Nickles (R-OK), who has been an ardent foe of the AHP bill over the past ten years. Also, given our past success in attracting support for the AHP bill from both moderate and liberal Democrats in the House, the two new Democratic Senators, Ken Salazar (D-CO) and Barack Obama (D-IL), should be prime targets for our efforts to gain new support for the bill.

Another key development is that Senator Judd Gregg (R-NH), an opponent of the AHP bill, will no longer be Chair of the Senate Health, Education, Labor and Pensions (HELP) Committee, which has jurisdiction over the legislation, in the 109th Congress. Gregg will be moving on to Chair the Budget Committee. The new HELP Committee Chair will be Senator Mike Enzi (R-WY). While Senator Enzi has raised concerns about the AHP legislation in the past, he does have a record of support for small business issues, and therefore should be willing to work with supporters of the AHP legislation to address legitimate concerns while moving the bill forward. Senator Gregg never indicated any such willingness at all. This is another positive development which bodes well for the AHP bill in the Senate.

The bottom line is that the new Senate should be more favorable to the AHP legislation than at any time in the past. Senators Olympia Snowe (R-ME) and Jim Talent (R-MO) have indicated they plan to reintroduce the AHP bill and are very excited about the increased prospects for enactment. With President Bush now in a position to push the Senate to move on his health care agenda, the outlook for AHP legislation in 2005 is better than ever! However, there are still significant hurdles to be overcome for the AHP bill to be enacted into law, and a strong grass- roots lobbying effort will be essential to achieve our goal of enactment in 2005.

When the 109th Congress convenes in January, committee assignments will be one of the first orders of business, and this will give us further indication of where lobbying efforts need to be targeted. ALOA's coalition is already working with other supporting organizations to begin working with the both existing and new members of the House and Senate to build greater support for the AHP legislation. This effort will include retaining a consultant to conduct a thorough evaluation of how the AHP legislation will better enable associations to deliver high quality health benefits to employers at affordable rates, and how this will boost the expansion of affordable health benefits and ultimately benefit currently uninsured American workers. Such a detailed study will be an effective tool to utilize on Capitol Hill in support of our efforts to gain enactment of the AHP legislation.

Best Regards,

Paul M. Kanitra

LEGISLATIVE ACTION NETWORK

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- A comprehensive guide to lobbying in your state capital, so you can be the "voice of ALOA" to legislators.
- LAN stationary and envelopes for sending official letters to legislators, lobbying on ALOA's behalf.
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about the authors

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Marc Weber Tobias is the author of Locks, Safes, and Security, and LSS+, the multimedia edition of the book. He is an investigative attorney in Sioux Falls, South Dakota, and has written five police textbooks He has worked for government and private industry with regard to security issues involving the bypass of high security locks and alarm systems. The material for this article was taken from LSS+.Extremely detailed information relating to the use of Bump keys can be found in LSS+ Version 5.1, available from ALOA and other vendors.Extensive video within LSS+ shows the correct procedure for opening several different kinds of locks with the bump key. The author may be contacted at mwt5obias@security.org.

Greg Perry, CML, CPS

Greg Perry, CML, CPS, has been in the locksmith industry for 20 years. He's spent half of that time as a field technician for Security Engineering in Ridgecrest, CA. Greg is also a past president of the Desert Counties Chapter of the California Locksmiths Association. He has also won the 2002 Keynotes Author of the Year Award. You can email him at glmperry@iwvisp.com.

Harry Sher, CML, CPS

Harry Sher is a Certified Master Locksmith and Certified Professional Safe Technician. He has been a locksmith since the 1950's. He is an active member of the Associated Locksmiths of America, The Safe and Vault Technicians Association and the International Association of Investigative Locksmiths and numerous local associations. He is currently the Vice President of the Oklahoma Master Locksmith Association and Past President of the Missouri-Kansas Locksmith Association. Harry has over 37 years of Federal Service. He has taught Federal Officers beginning in 1967. Most recently, he was responsible for building a training facility for the National Nuclear Security Administration. He has taught classes for many local and regional locksmith associations as well as the Associated Locksmiths of America and the Safe and Vault Technicians Association. Although he teaches Safe and Vault classes such as GSA Containers and general locksmithing classes such as IC Core and master keying, his favorite class is Defense Against Methods of Entry.

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