Lecture 38 – Physical Security

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Security News

- Security executives leaving Uber
- US law proposed to jail executives for covering up data breaches
- Powerful new phishing tool “Mailsploit”
- Vendors starting to ship laptops with IME disabled

What Is Physical Security?

- Any physical object that creates a barrier to unauthorized access
- This includes: locks, latches, safes, alarms, guards, guard dogs, doors, windows, walls, ceilings, floors, fences, door strikes, door frames and door closers

Destructive vs. Nondestructive Entry

- Destructive entry
  - Involves using force to defeat physical security
  - Methods involve crowbars, bolt cutters and sledge hammers
  - Negative impact on IT resources is apparent
  - Remediation steps also obvious
- Nondestructive entry
  - Compromises security without leaving signs of a breach
  - Defeats intrusion detection
  - Greater and long-term threat

Is Physical Security An IT Concern?

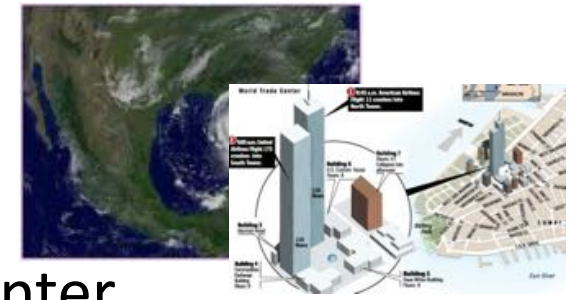
- You have been working hard to secure your network from cyber attacks
  - Redundant layers of authentication, firewalls, and intrusion detection systems should protect against electronic methods of entry
- But what if an attacker gains access to the server room or network wiring closet ...
  - Is you network still safe?

Type of Threats to Physical Environment

- Natural / Environmental
  - Earthquakes, floods, storms, hurricanes, fires, snow/ice
  - Consequence of natural phenomena
- Man made / Political Events
  - Explosives, disgruntled employees, unauthorized access, employee errors, espionage, arson/fires, sabotage, hazardous/toxic spills, chemical contamination, malicious code, vandalism and theft
  - Acts of commission or omission

Lessons-Learned for U.S.

- Major Domestic Events:
  - 2005 Hurricane Katrina (1,836)
  - 2001 9/11 Attack: World Trade Center, Pentagon, and Shanksville, PA (2,982)
  - 1995 Federal Office Building, Oklahoma City (168)



- Major International Events:
  - 1998 U.S. Embassy, Kenya (237)
  - 1983 Beirut Barracks, Lebanon (309)

Categories of Security Controls

- Management (Administrative) Controls
  - Policies, Standards, Processes, Procedures, & Guidelines
    - Administrative Entities: Executive-Level, Mid.-Level Management
- Physical Controls
  - Physical Security (Facility or Infrastructure Protection)
    - Locks, Doors, Walls, Fence, Curtain, etc.
    - Service Providers: FSO, Security Guards, Dogs
- Technical (Logical) Controls
  - Access Controls , Identification & Authorization, Confidentiality, Integrity, Availability, Non-Repudiation.
    - CCTV & Camera, IDS, Moisture detection system, Fire/Smoke detection system, Fire suppression, Environmental control system, UPS, etc.
    - Service Providers: Building Architect, Critical Infrastructure Protection (CIP) Engineer, Operations Center.

Strategic Approach to Physical Security

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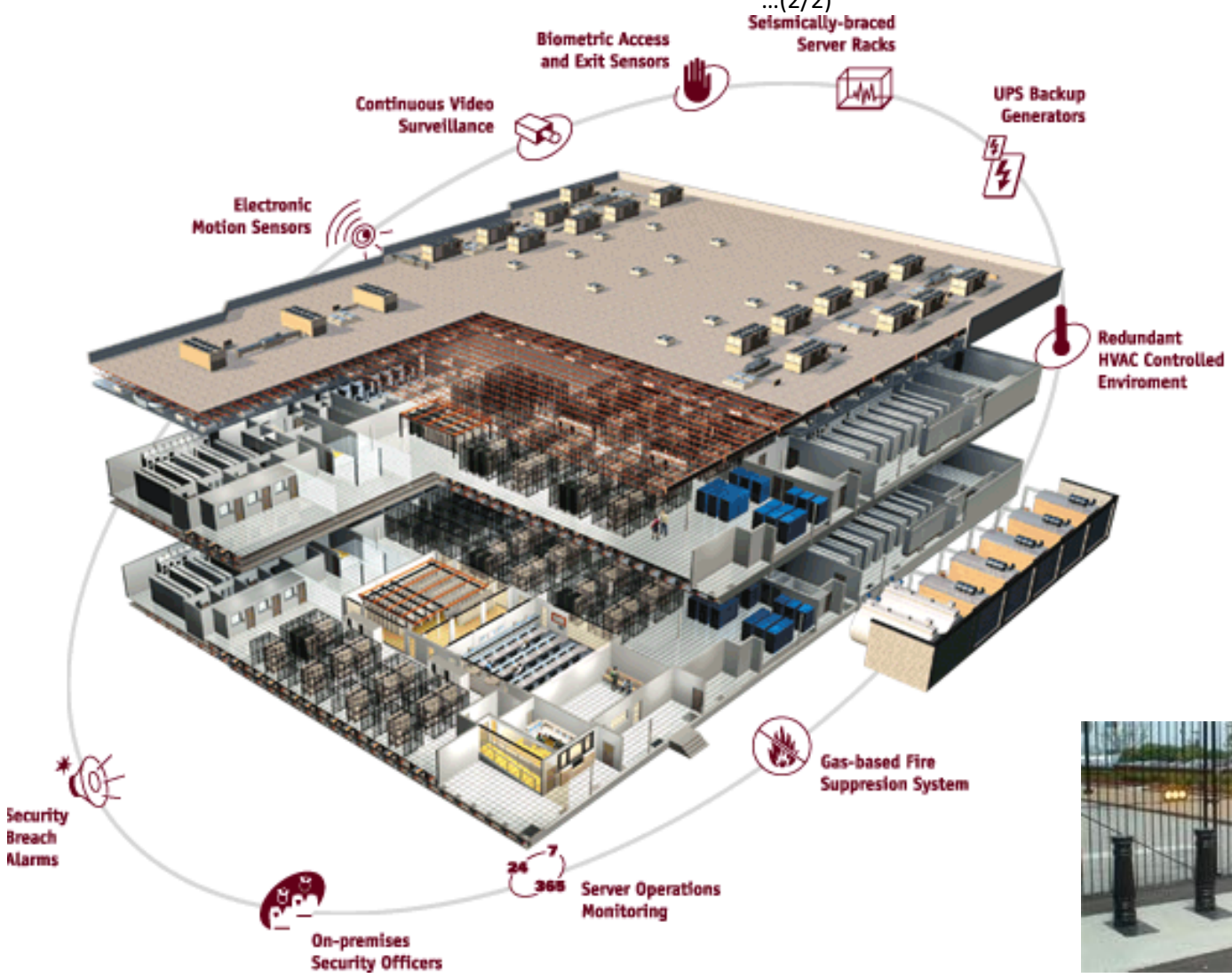


Source: Global Crossing website

Physical Controls – Facility Construction

- Structured barriers: Perimeter structure
- Walls & Fencing
  - Specific gauge and fabrication specifications (e.g. No. 11 gauge galvanized chain-link fencing material.)
  - Specify height, or need for "top guard" (e.g. 8-ft in height, 6-in. under ground with top guard.)

Height	Protection
1 meter / 3 – 4 ft	Deters casual trespassers
2 meter / 6 – 7 ft	Too high to climb easily
2.4 meter / 8 ft with top guard	Deters determined intruder

Source: *Official (ISC)² Guide to The CISSP Exam*

Physical Controls – Facility Construction

- Structured barriers: Entry points
  - Gates, bollards, roadways.
  - Doors, windows, ventilation airways, manhole covers, etc.
  - Department of State and DoD Anti-Ram Vehicle Barrier Certification Criteria (SD-STD-02.01):

Vehicle Weight: 15,000 lb.	
Speed Rating	**Speed at Impact**
K4	30 mph
K8	40 mph
K12	50 mph

Vehicle Weight: 15,000 lb.	
Penetration Rating	**Penetration Distance**
L3	< 3 ft
L2	3 – 20 ft
L1	20 – 50 ft

Reference: http://www.probarrier.com/faq/certify.asp

Technical Controls – Entrance Protection

Entry access control systems

- Turnstiles
  - Revolving doors that can be activated to “lock” and not allow unauthorized individuals to enter or leave facility
  - To prevent “piggybacking”.
- Mantraps
  - Routing people through two stationary doorways
- Fail-safe
  - Door defaults to being unlocked.
- Fail-secure
  - Door defaults to being locked.

Technical Controls

Entry access control systems –

- Mechanical locks:
  - Key
  - Combination locks
  - Magnetic locks

- Electronic locks:
  - Combination lock
  - Proximity / RFID badge
  - Bio-metric

How to evade?

- Just like any other attack:

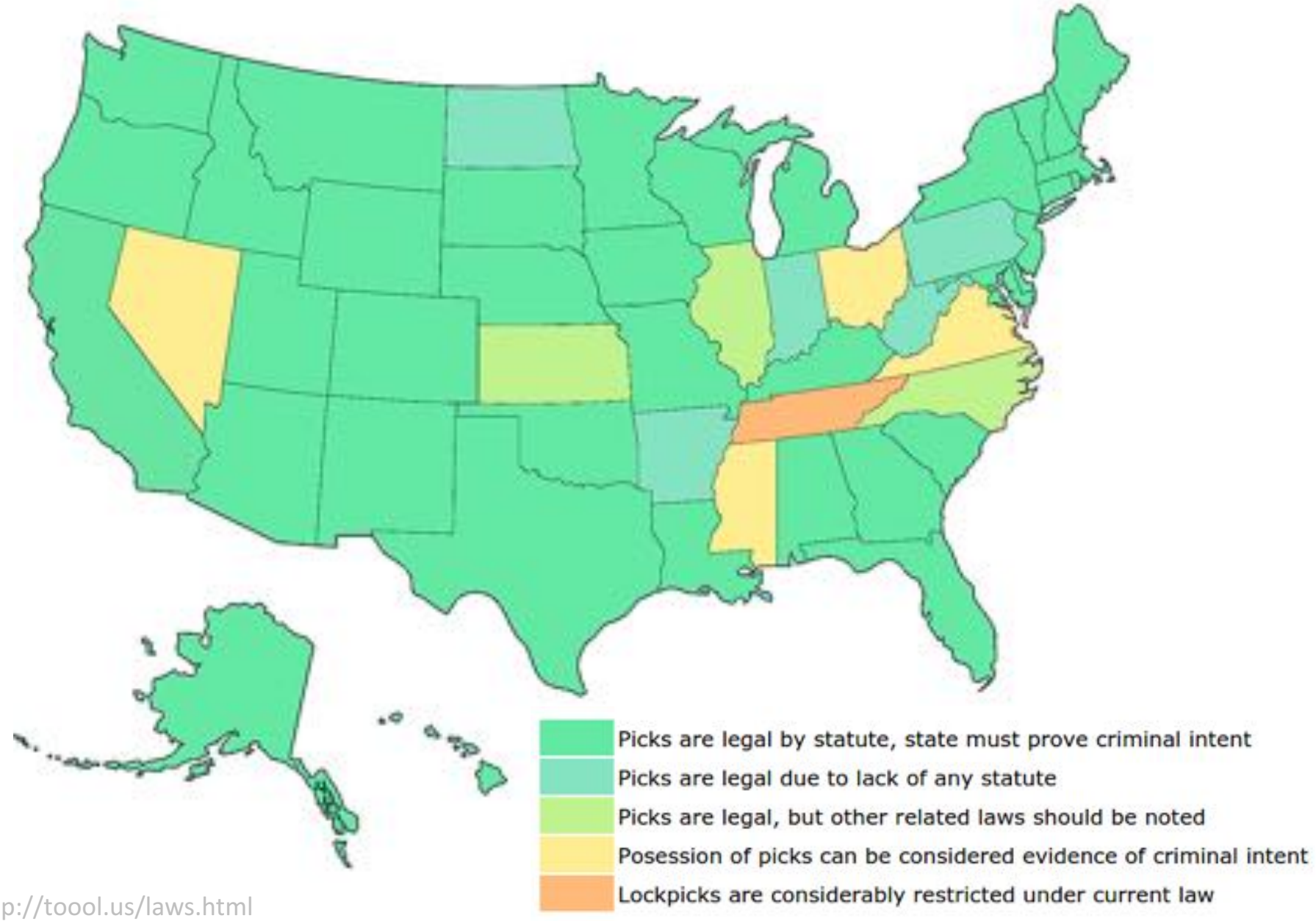
1. Understand how the system works
2. Find the weakest link
3. Look for design assumptions

Locks and Keys

Legal Notice

- Laws regarding lock picking vary significantly state-by-state
- In most states purchase and possession of dedicated lock picking tools is legal
  - Penalties are raised significantly if you get caught using them in the commission of a crime

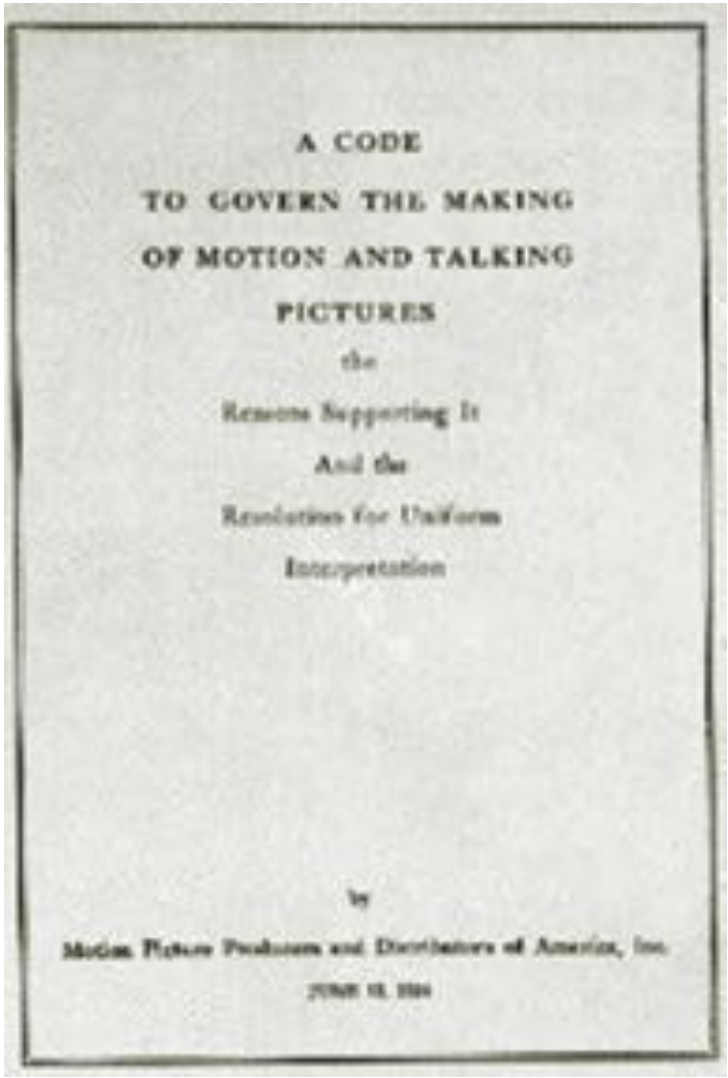
Public domain image from http://commons.wikimedia.org/wiki/File:Madame_Restell_in_jail.jpg



http://toool.us/laws.html

Lock Picking in Movies

- Genuine lock picking in movies used to be prohibited
- Before 1967, the Hays code (Motion Picture Production Code) required censorship of Hollywood movies
  - "All detailed (that is, imitable) depiction of crime must be removed, such as lock picking or mixing of chemicals to make explosives"


A CODE
TO GOVERN THE MAKING
OF MOTION AND TALKING
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the
Reasons Supporting It
And the
Resolution for Uniform
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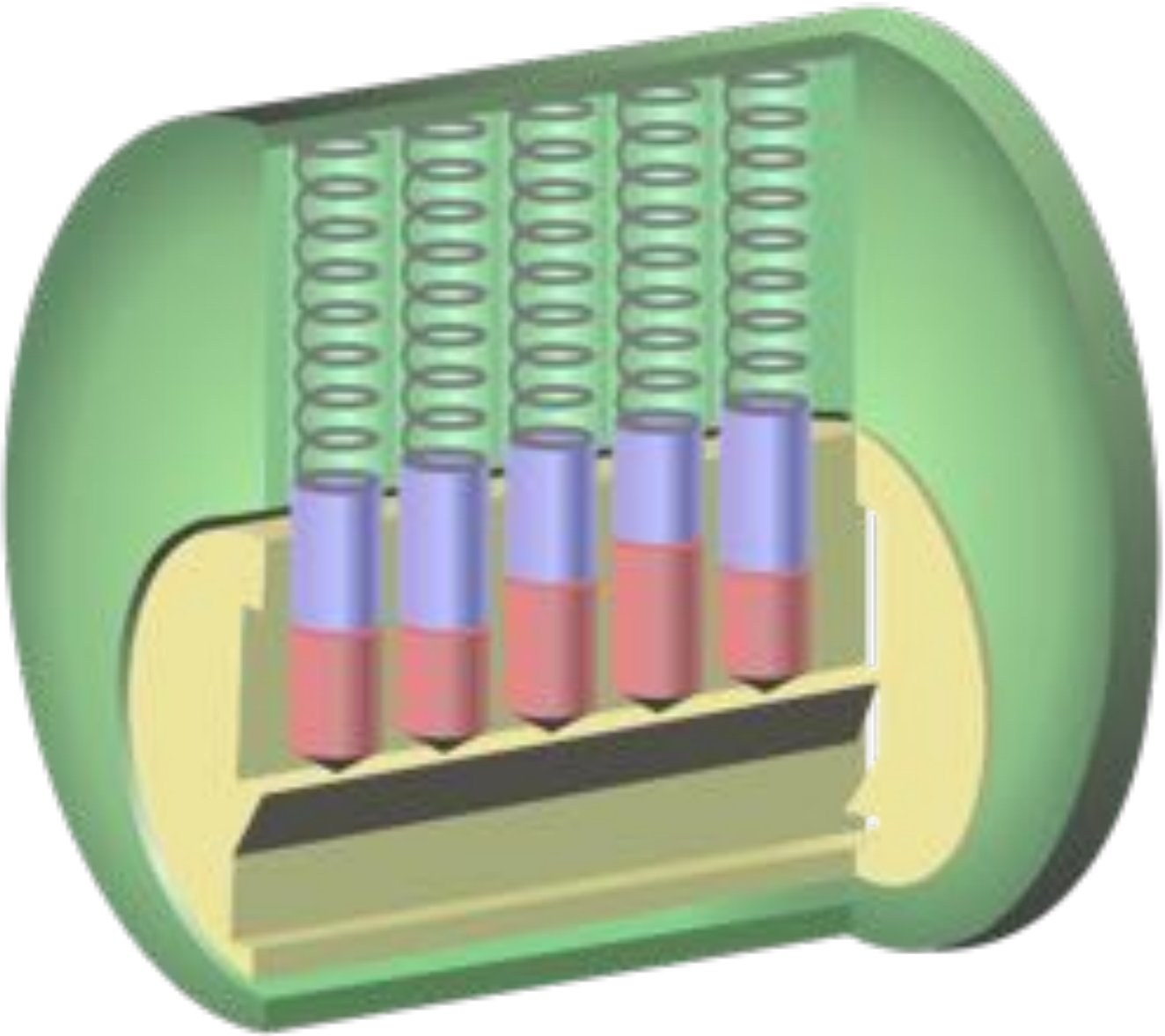
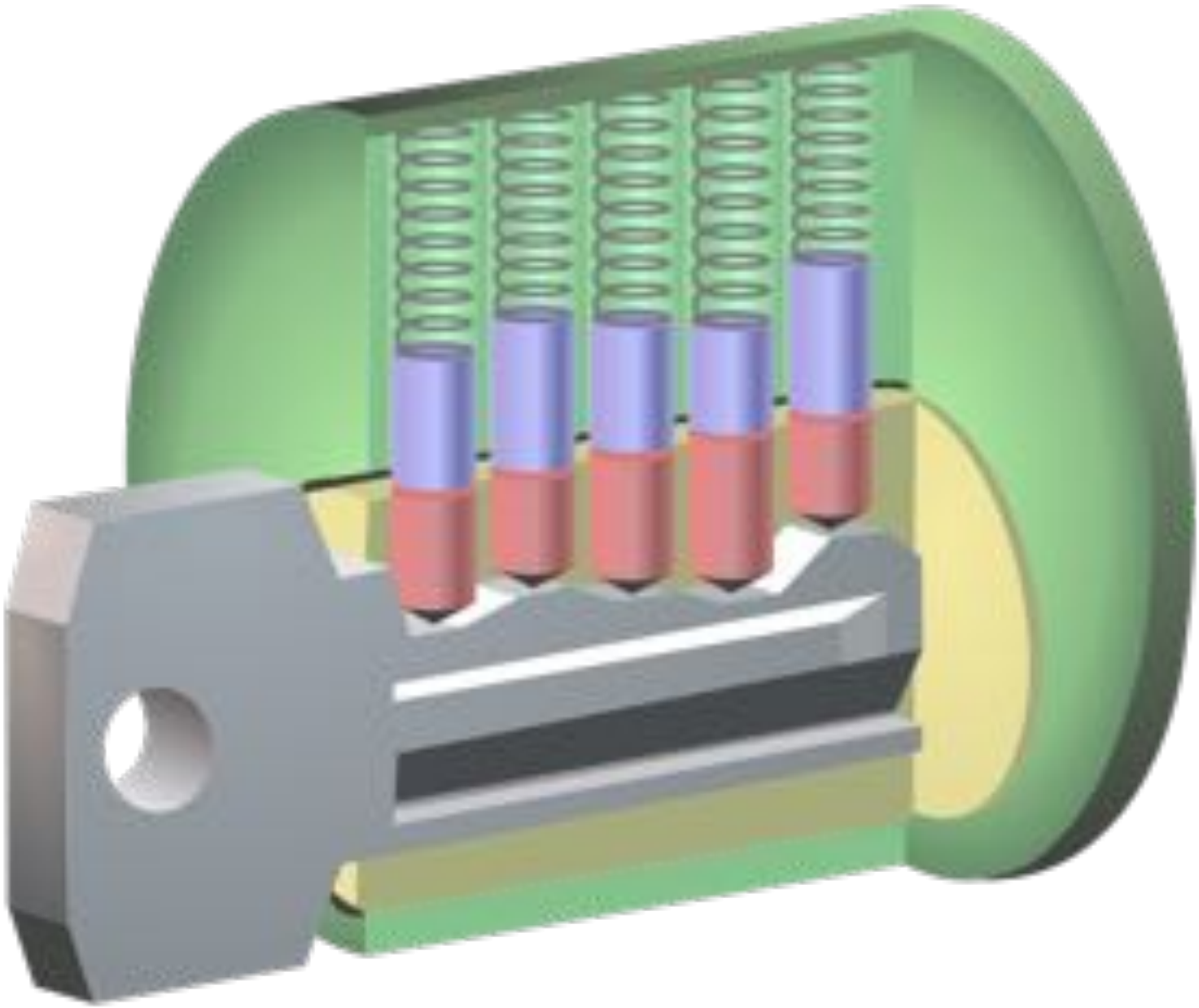
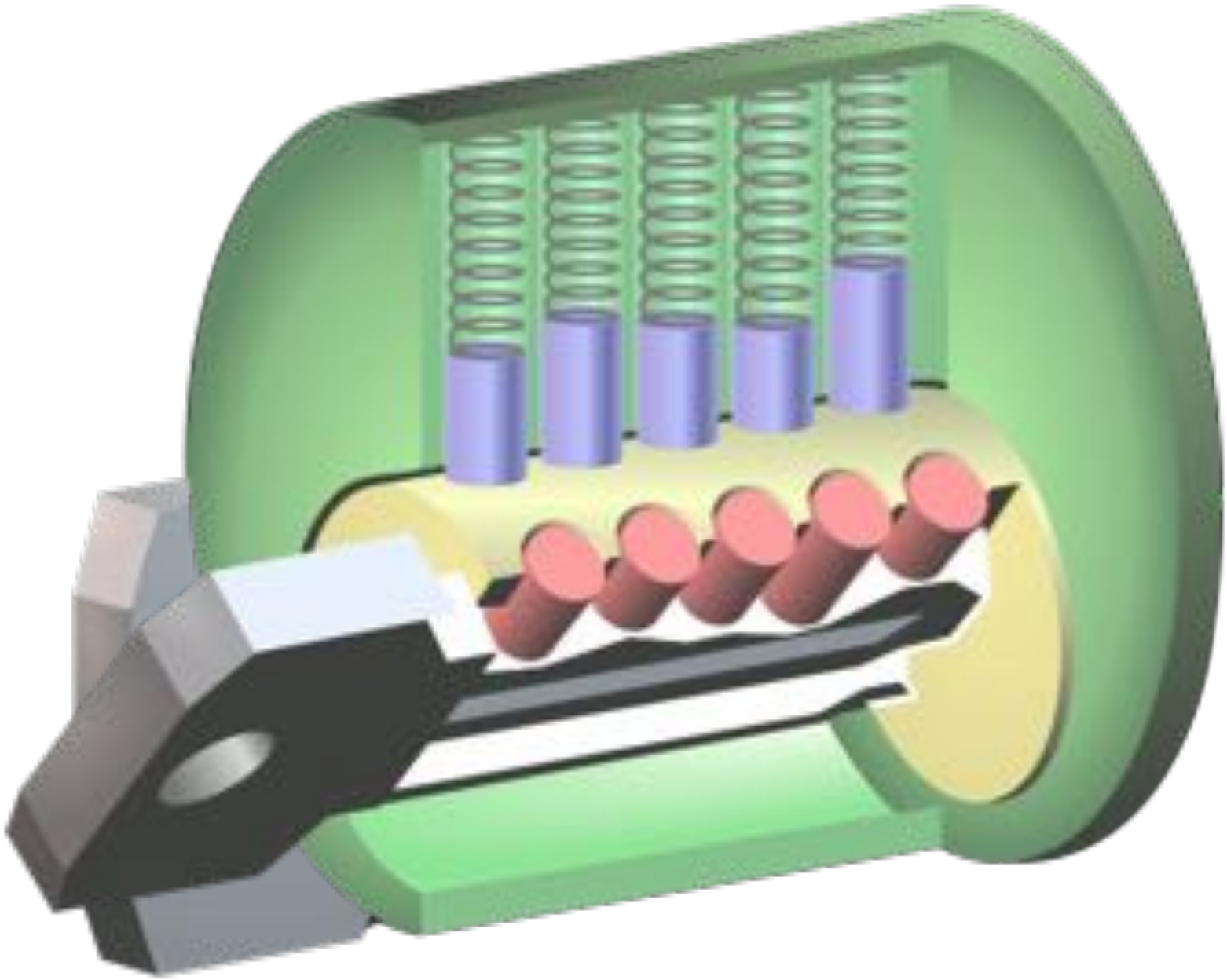
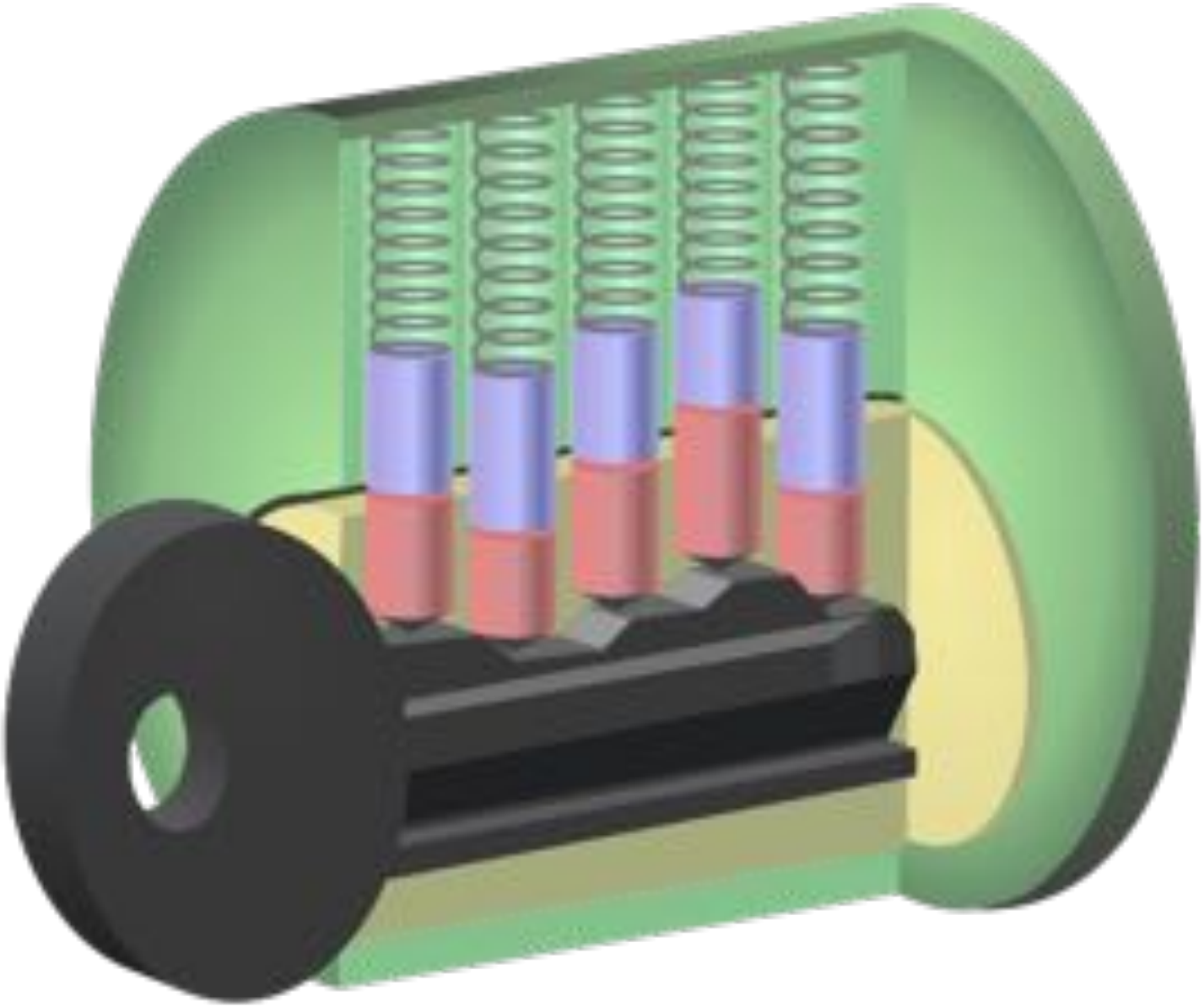
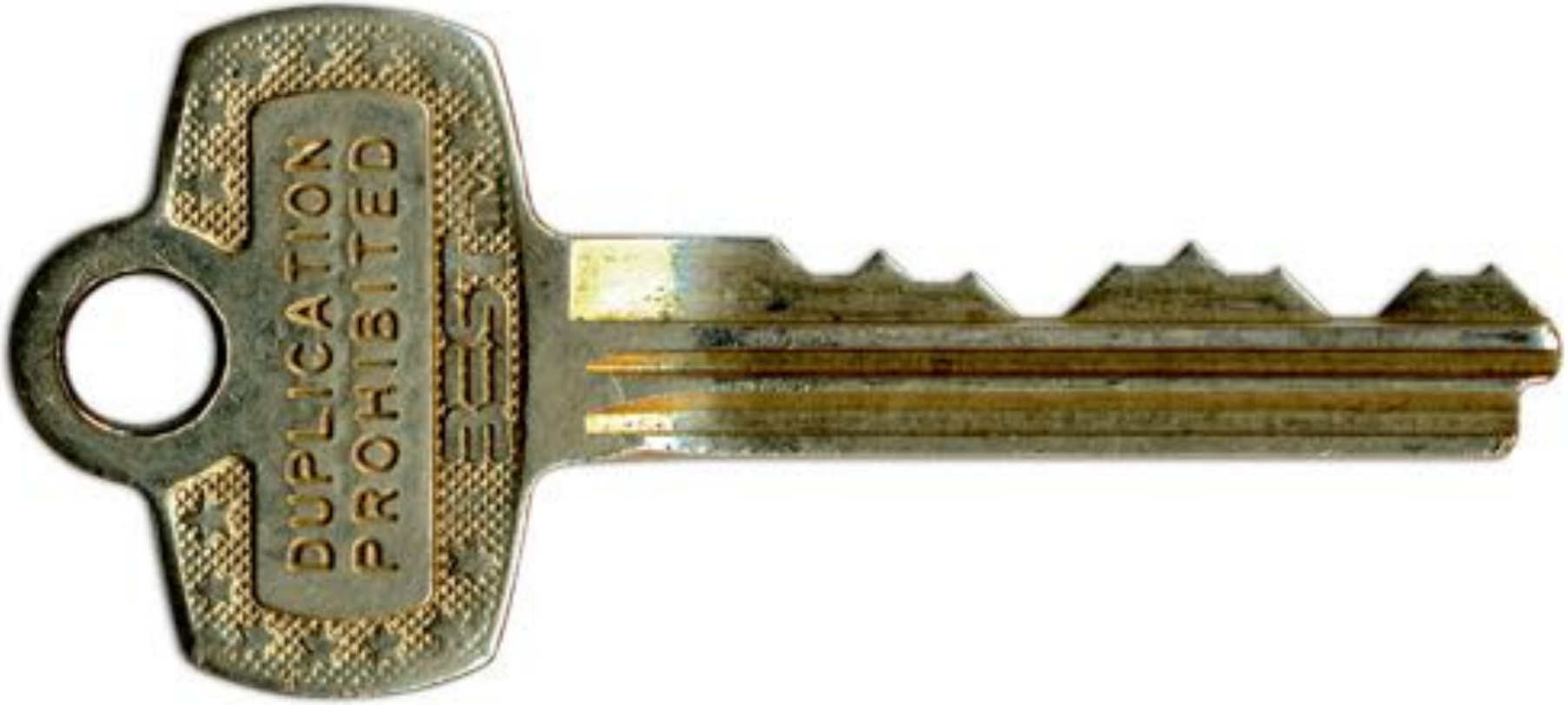
Pin Tumbler Lock











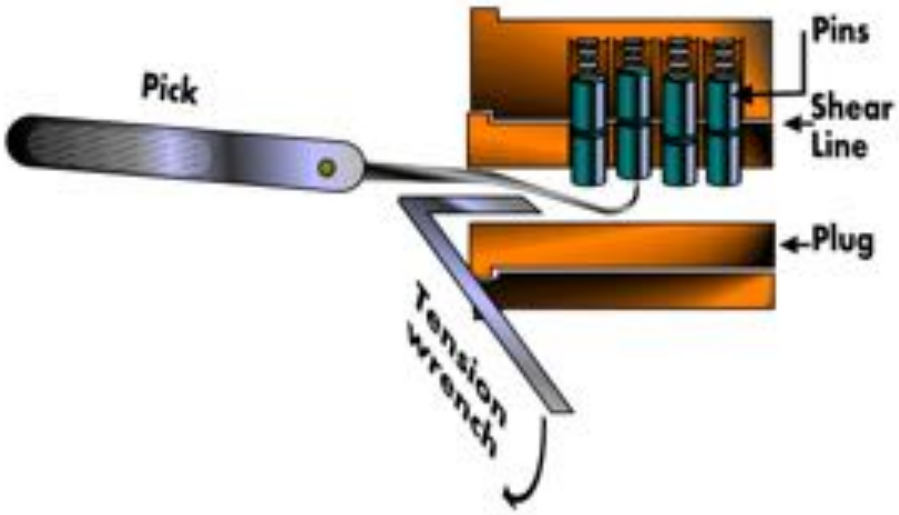
$8^7 = 2{,}097{,}152$

Compromising Locks

- For centuries, the lock has been one of the cornerstones of physical security
  - We rely on dozens of them every day to protect people and assets
- The trust most people place in locks is unwarranted
  - Most locks can be easily compromised with nondestructive methods
  - Sometimes within seconds and with readily available tools
- **“Locks keep honest people honest”**

Feeler Picking

- Apply light tension
- Lift one pin at a time
  - Identify binding pin
- Lift binding pin until it reaches the shear line
- Setting the binding pin will rotate the lock slightly
- Find next pin and repeat the process



Scrubbing / Raking

- Apply light tension
- Work over pins back to front in a circular motion
  - attempting to pop them into the shear line with the combination of tension
- Good for beginners
- Usually employ snake pick or half diamond

Photo by Jennie Rogers included with permission.

Bump Keys

- Driver pins “jump” higher than the cylinder just for an instant
- If a light rotational force is applied, the cylinder will turn
- Lock bumping is a very fast method for opening the lock
- The lock is not damaged
- Defense: different weighted pins

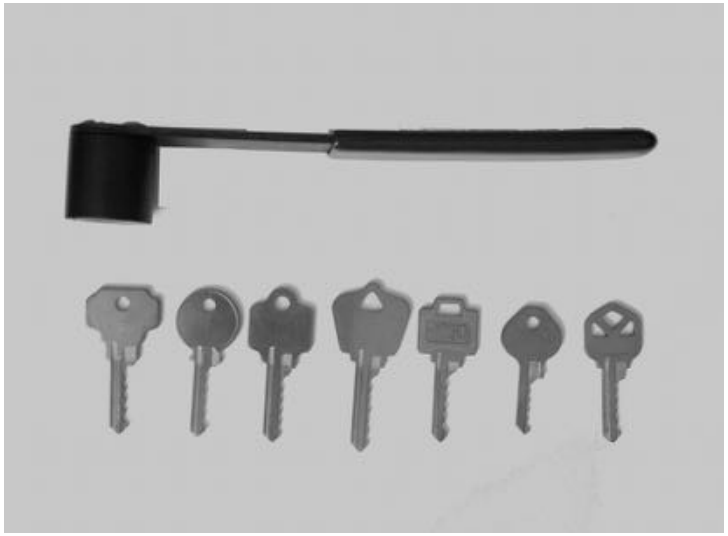
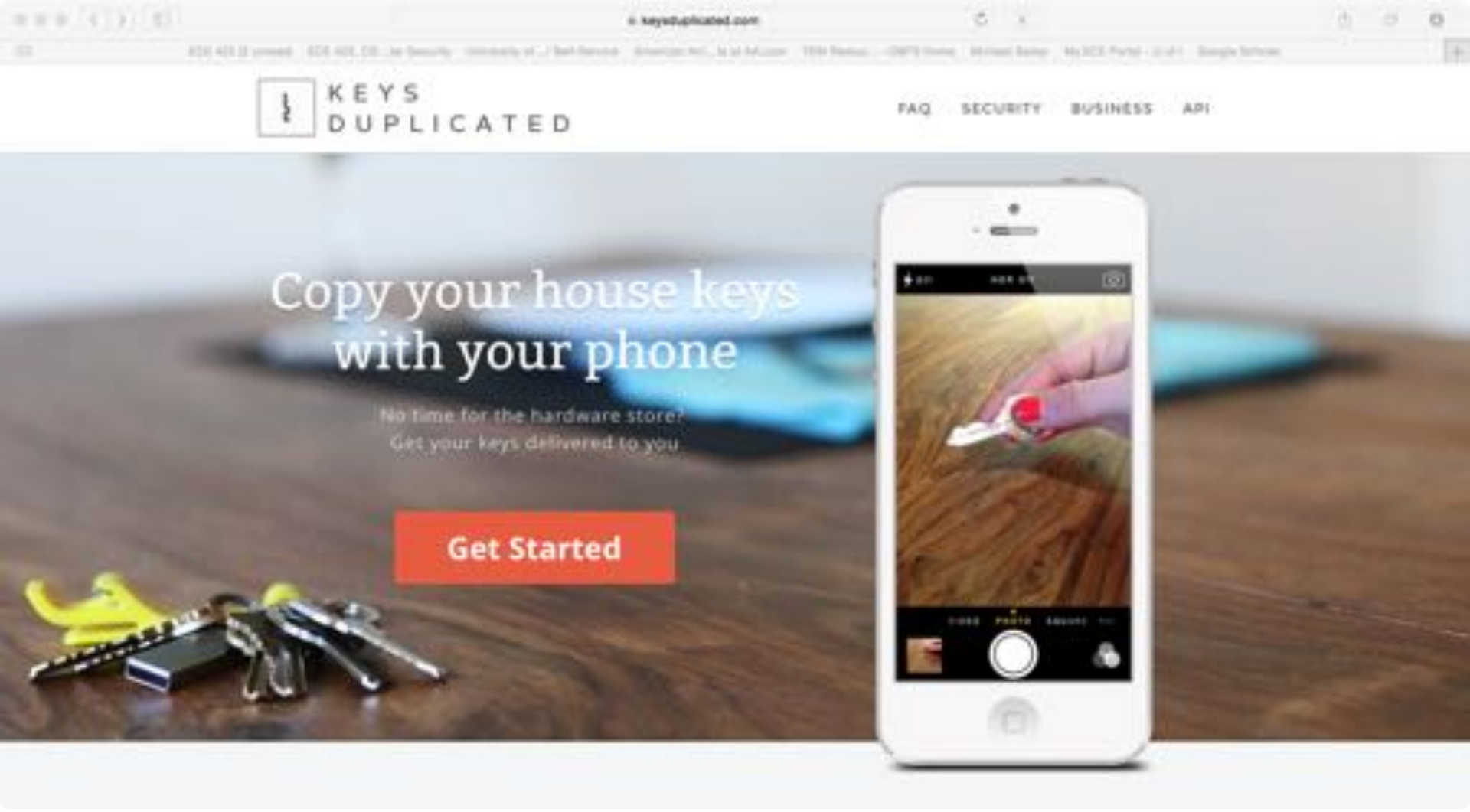


Photo by Jennie Rogers included with permission.

How many of you have your keys sitting out?


Speedy
Rewards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- DIMS-NeT/Voter Registration
- Voting Booths & Ballot Boxes

ACCUVOTE-TS

The votes are in and Diebold supplies take the lead for accuracy and simplicity of use with this dependable touch-screen technology. //

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- 2 keys that allow easy service access to the Tally Printer and replacement battery compartment

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Why is physical security an IT concern?

physical access == total access?


Throwing Star LAN Tap


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What about Encryption?

Proximity

Signal Emissions

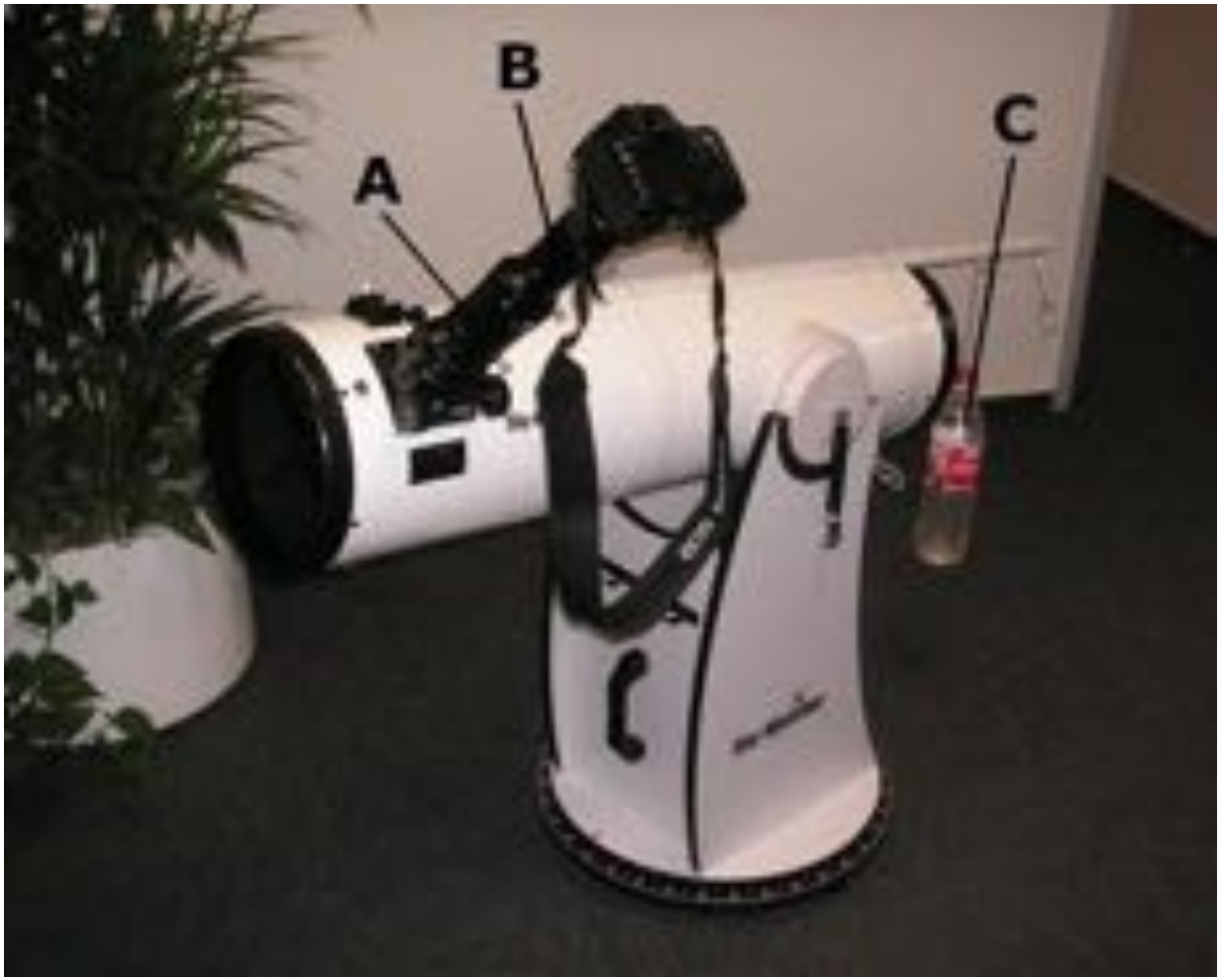
- Computer screens emit **radio frequencies** that can be used to detect what is being displayed.
- **Visible light** reflections can also be used to reconstruct a display from its reflection on a wall, coffee mug, or eyeglasses.
- Both of these require the attacker to have a receiver close enough to detect the signal.

Faraday Cages

- To block electromagnetic emanations in the air, we can surround sensitive equipment with metallic conductive shielding or a mesh of such material, where the holes in the mesh are smaller than the wavelengths of the electromagnetic radiation we wish to block.
- Such an enclosure is known as a **Faraday cage.**

Acoustic Emissions

- Dmitri Asonov and Rakesh Agrawal published a paper in 2004 detailing how an attacker could use an audio recording of a user typing on a keyboard to reconstruct what was typed.


A
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Electromagnetic Radiation from Video Display Units: An Eavesdropping Risk?

Wim van Eck
PTT Dr. Neher Laboratories, St. Paulusstraat 4, Dln XI
Leidschendam, The Netherlands

This paper describes the results of research into the possibility of "eavesdropping" on video display units, by picking up and decoding the electromagnetic emissions produced by this type of equipment. During the research project, which started in 1983, it became more and more clear that this type of [illegible]

1. Introduction

[illegible]


High speed video
(actual video playing here)