



OPENING LOCKS IN FIVE SECONDS OR LESS:

Is it a real threat to security?

Bumping as a method of covert entry

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LOCKS PROVIDE SECURITY

- ◆ Protect doors, safes and barriers from being opened
- ◆ They control movement of barriers to entry
- ◆ Relied upon as first level of security
- ◆ Most popular: pin tumbler designs



TYPES OF LOCKS

- ◆ WARDED
- ◆ LEVER
- ◆ WAFER AND DISK TUMBLER
- ◆ PIN TUMBLER
- ◆ HYBRID: COMBINED TECHNOLOGIES
- ◆ COMBINATION MOST OFTEN UTILIZED
- ◆ LEVER (Europe)
- ◆ PIN TUMBLER

PIN TUMBLER LOCK

- ◆ 4000 year old Egyptian design
- ◆ Re-invented by Linus Yale in 1860
- ◆ Modern pin tumbler: split pins
- ◆ 95% of locks
- ◆ Low to high security applications
- ◆ All based upon Yale design
 - Billions of locks
 - Many different configurations





OPENING LOCKS: Covert Methods of Entry

- ◆ PICKING
- ◆ IMPRESSIONING
- ◆ DECODING
- ◆ EXTRAPOLATION OF TMK
- ◆ BUMPING
 - Move all pins to shear line together or separately
 - Allow plug to turn without obstruction



CMOE AND SECURITY RATING

- ◆ SPECIAL TOOLS
- ◆ TRAINING AND EXPERTISE
- ◆ TIME REQUIRED
- ◆ RELIABILITY AND REPEATABILITY OF RESULTS
- ◆ DAMAGE TO LOCKS
- ◆ FORENSIC TRACE



WHAT IS SECURITY IN A LOCK

- ◆ Perfect world: cannot open without correct key or code;
- ◆ Reality: Levels of difficulty or resistance to forced and covert entry techniques
 - Type of mechanism
 - Secondary locking systems
 - Security enhancements



BUMPING: A METHOD OF COVERT ENTRY

- METHOD TO OPEN LOCKS IN SECONDS
- FASTEST AND EASIEST WAY TO OPEN
- VIRTUALLY NO SKILL REQUIRED
- EASY TO LEARN
- NO SPECIAL TOOLS
- 95% OF LOCKS CAN BE BYPASSED
- OPEN SOME HIGH SECURITY LOCKS
- USUALLY NO TRACE OR DAMAGE
- RELIABILITY OF RESULTS
- REPEATABILITY OF THE PROCESS

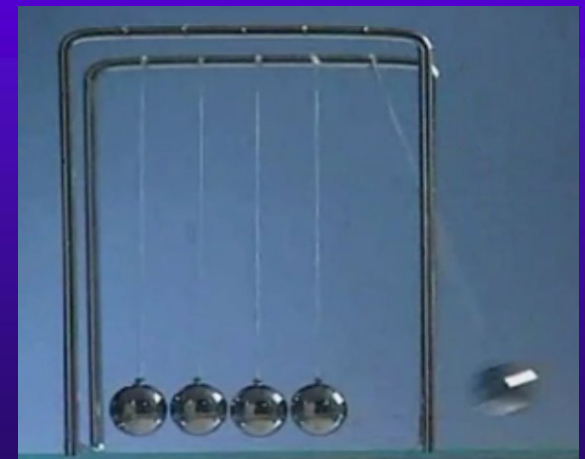
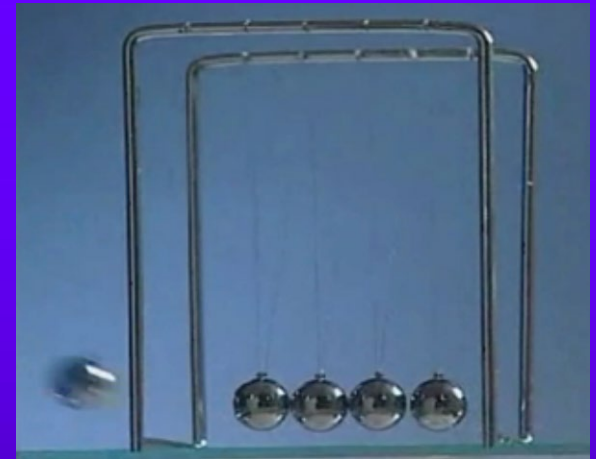


YALE + NEWTON = BUMPING

- ◆ VIRTUALLY ALL TRADITIONAL YALE LOCKS CAN BE OPENED BY BUMPING
- ◆ RELIABLE
- ◆ REPEATABLE
- ◆ SIMPLE TO LEARN

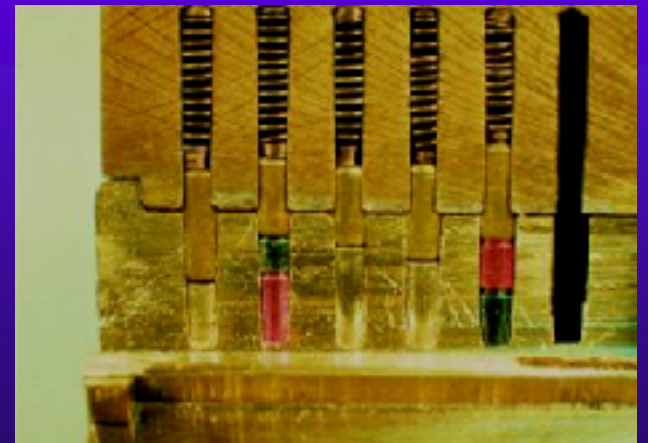
THE PHYSICS OF BUMPING: SIR ISAAC NEWTON: 1650

- ◆ THE FATHER OF BUMPING OF LOCKS
- ◆ THIRD LAW OF MOTION:
 - “For every action, there is an equal and opposite reaction”



1860: YALE PIN TUMBLER LOCK

- ◆ Modernized the Egyptian single pin design
- ◆ Utilized two pins for locking
- ◆ Double-detainer theory of locking
- ◆ Created shear line



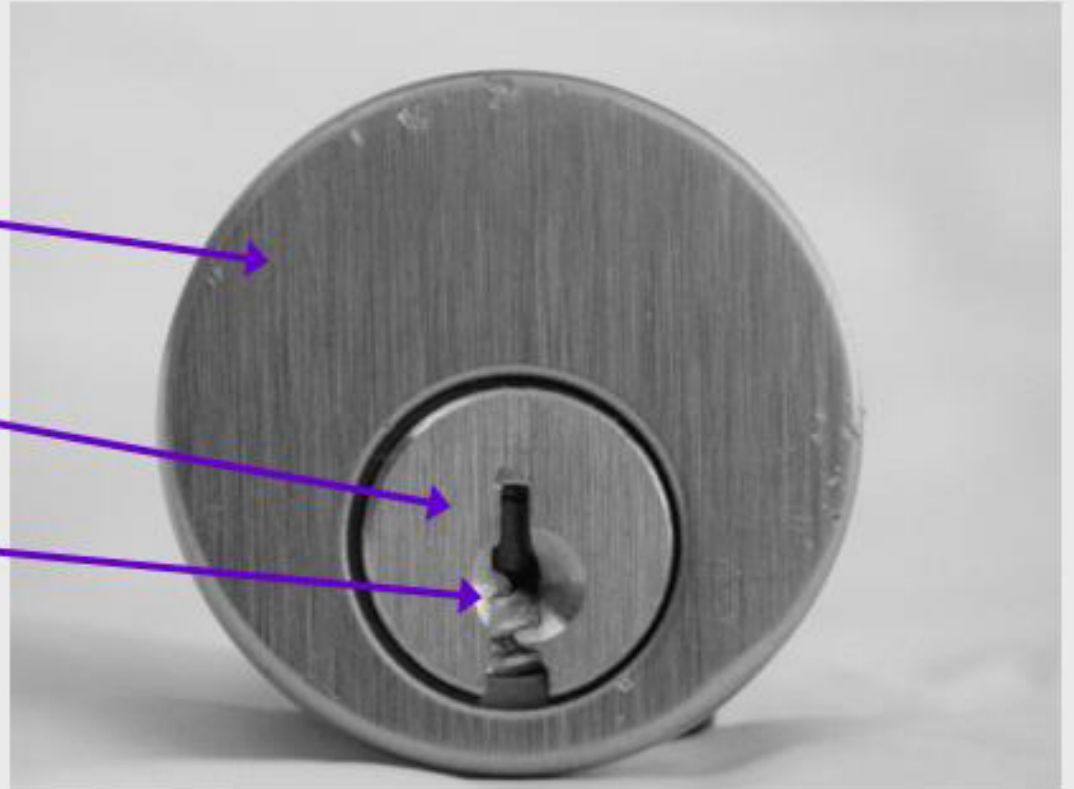
MODERN PIN TUMBLER LOCK



Shell

Plug

Keyway slot





BUMPING: BACKGROUND

- ◆ DENMARK, 25 YEARS AGO
- ◆ 999, CODE 12, PERCUSSION KEY
- ◆ DEVELOPED BY LOCKSMITHS TO RAP OPEN A CYLINDER
- ◆ ORIGINAL TECHNIQUE HAS BEEN IMPROVED UPON TO MAKE BUMPING A SIGNIFICANT THREAT



BUMPING: SIX CRITICAL ELEMENTS

1. KEY WITH CORRECT KEYWAY
2. CUT TO ALL “9” DEPTHS
3. BUMPING TECHNIQUE
4. METHOD TO APPLY ENERGY TO PINS
5. TORQUE AND TIMING
6. TRAINING



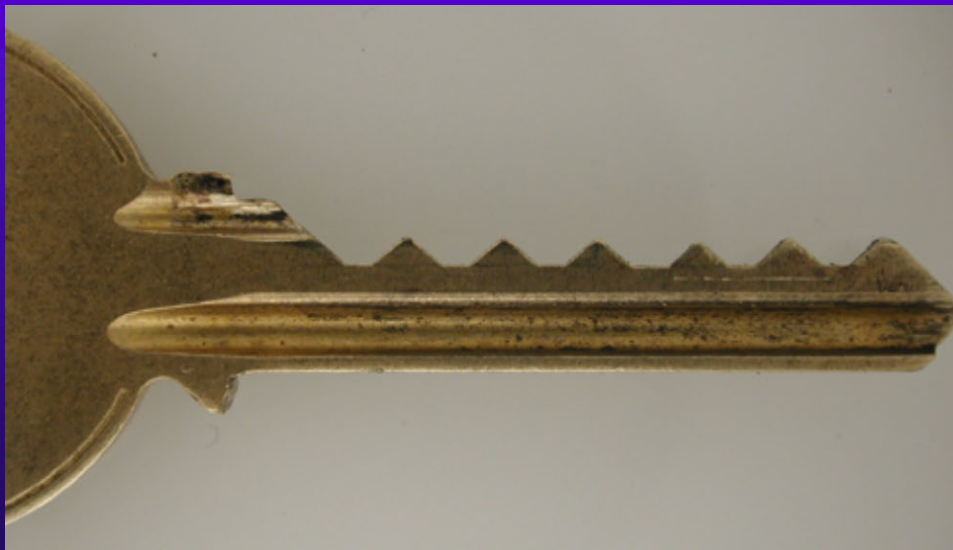
1: KEY WITH CORRECT KEYWAY

◆ SOURCES

- COMMERCIAL STORES
- LOCKSMITHS
- INTERNET
- KEY TO ANY LOCK IN A FACILITY
- MODIFIED KEY: MILLED BLANK

2: CUT TO ALL "9" DEPTHS

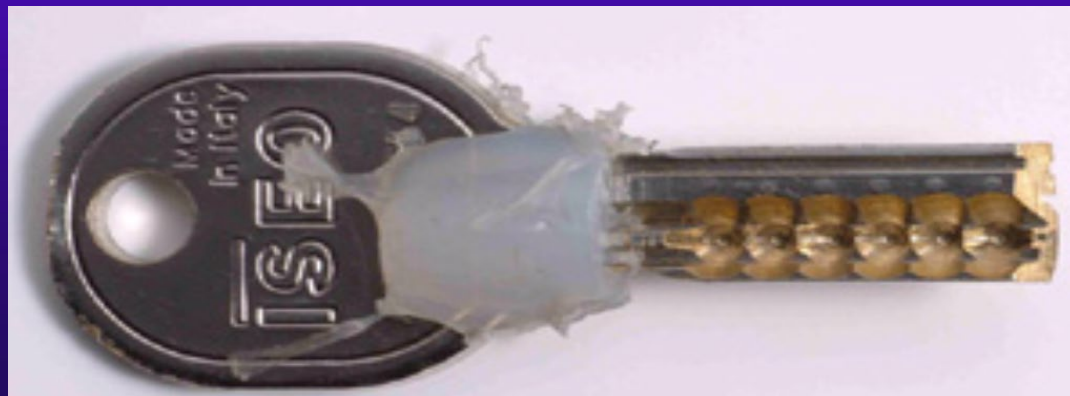
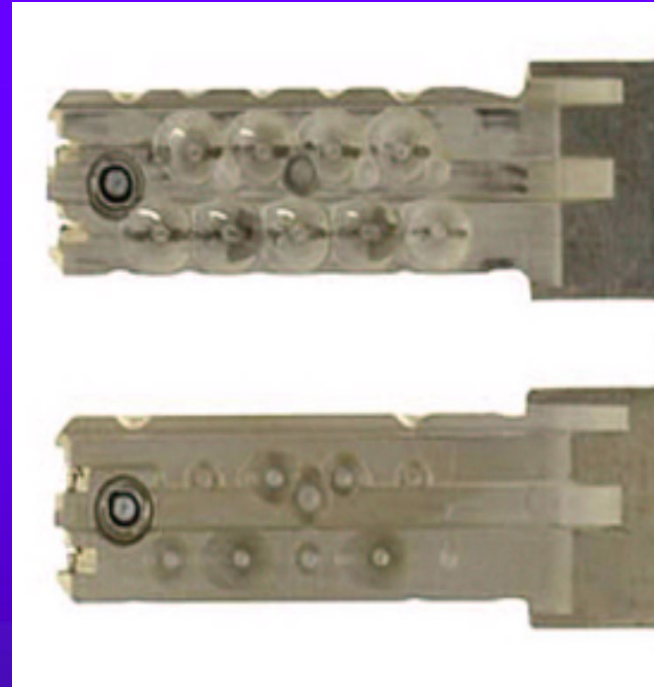
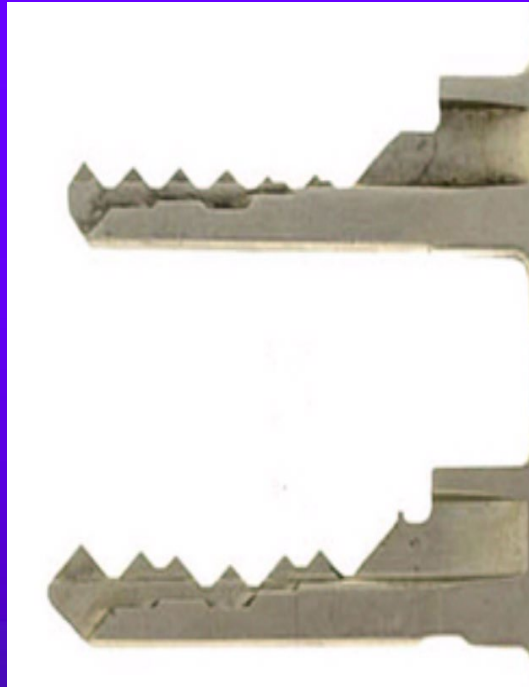
- ◆ HAND-CUT WITH FILE
- ◆ CODE CUT WITH PUNCH OR MACHINE
- ◆ INTERNET SITES
 - ALL KEYS OF SAME KEYWAY CAN BE MADE TO WORK



NEGATIVE SHOULDER



BUMP KEYS



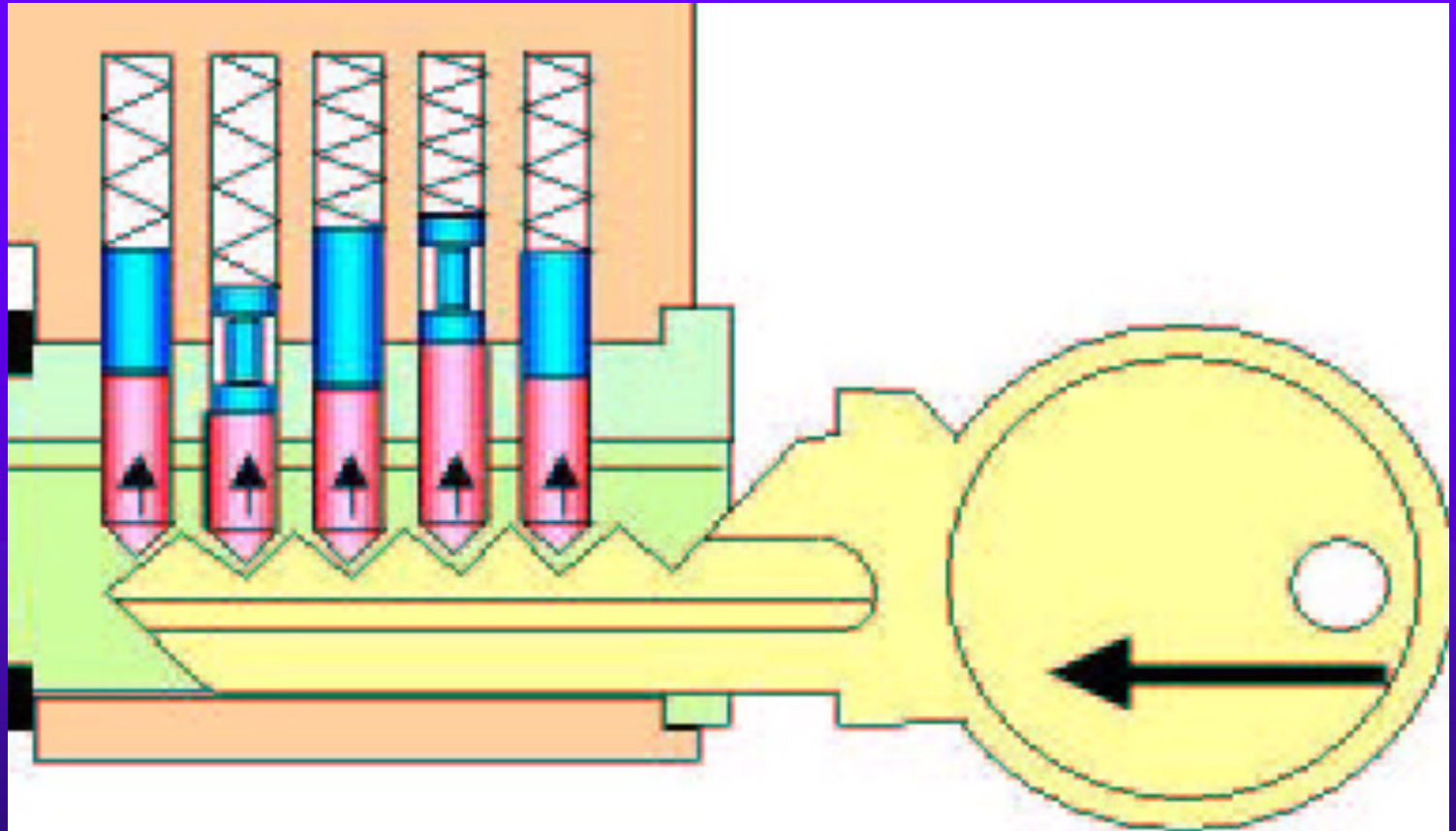


3: BUMPING TECHNIQUE

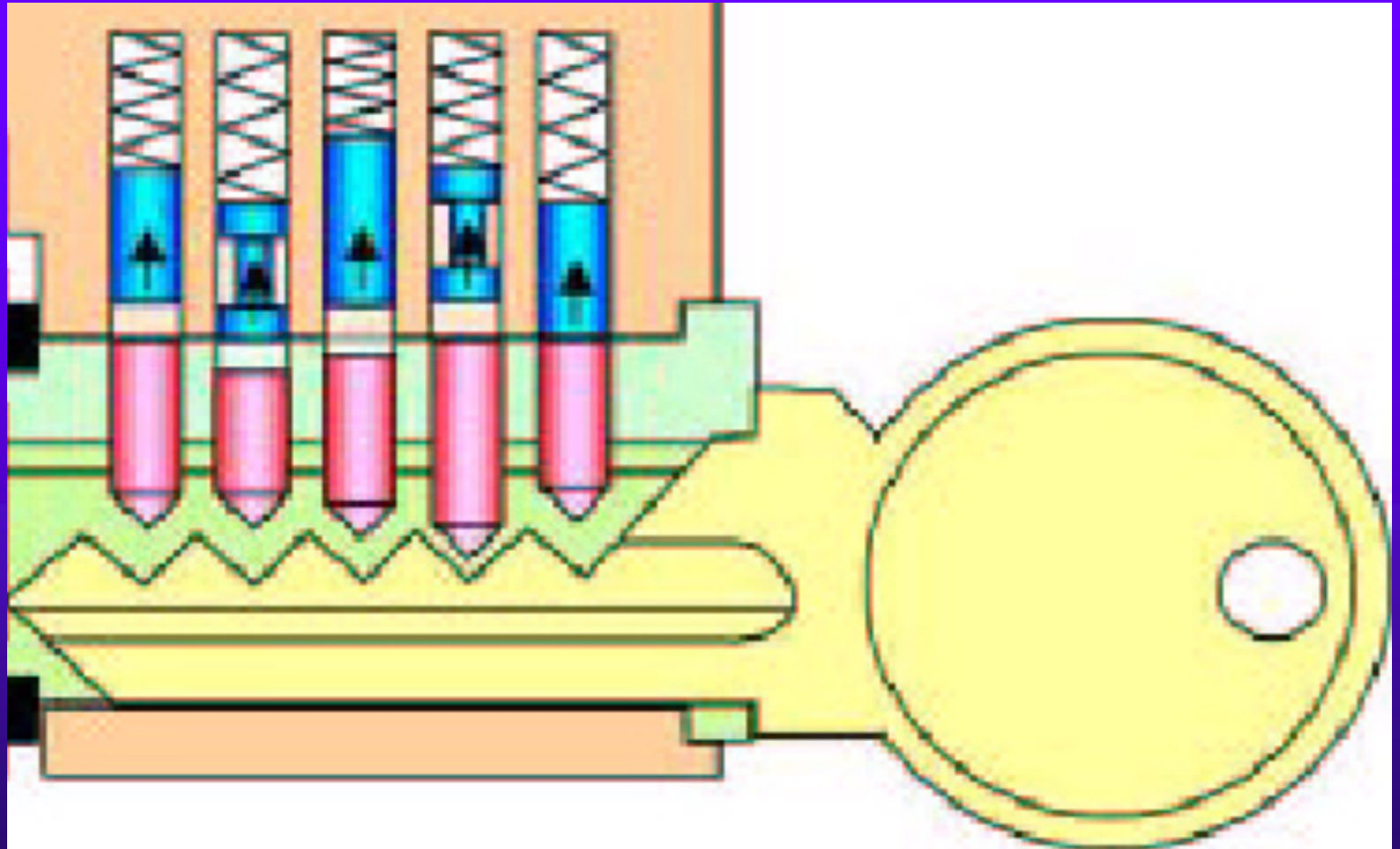
- ◆ TWO TECHNIQUES FOR BUMPING
 - WITHDRAW KEY ONE POSITION
 - NO MODIFICATION REQUIRED
 - NEGATIVE SHOULDER METHOD
 - REDUCE SHOULDER BY .25 mm

- ◆ DESIGN OF KEY DEPENDS UPON TECHNIQUE OF BUMPING

BUMPING: INSERT THE KEY

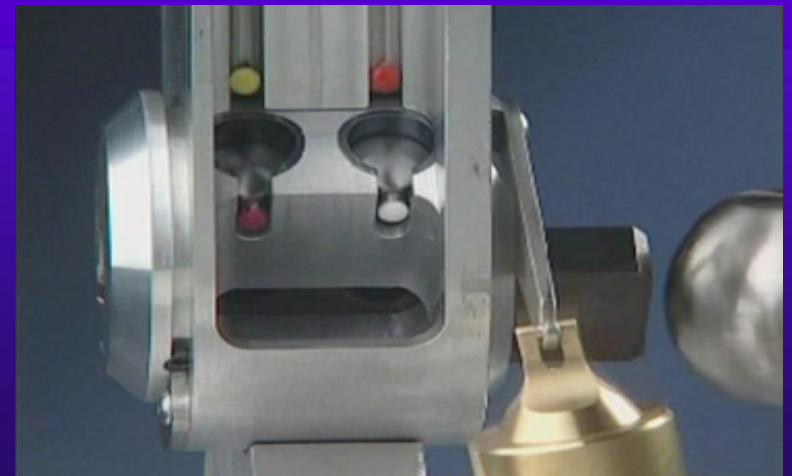
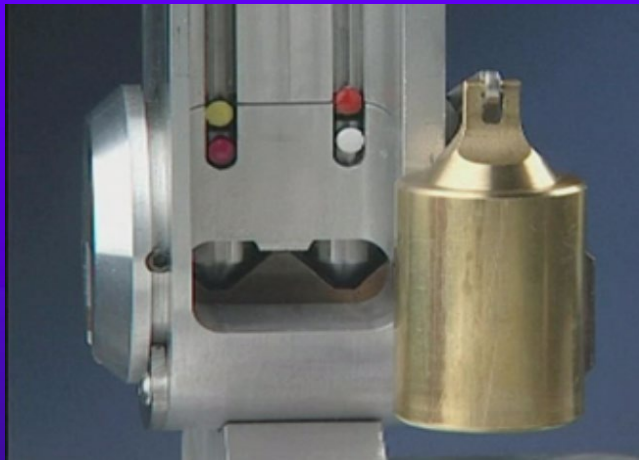


BUMPING: APPLY ENERGY



HOW BUMPING WORKS

◆ DOLEV MODEL



4: METHOD TO APPLY ENERGY

◆ STRIKE HEAD OF KEY

- “TOMAHAWK”
- SCREWDRIVER HANDLE
- WOODEN OR PLASTIC MALLET
- WOODEN STICK
- OTHER TOOLS



5: TORQUE + TIMING

- ◆ TWO METHODS TO APPLY TORQUE
- ◆ REQUIRED TO TURN THE PLUG AT THE RIGHT MOMENT
 - TORQUE + ENERGY TO KEY
 - ENERGY TO KEY THEN TORQUE





6: TRAINING

- ◆ EASY TO LEARN
- ◆ LESS THAN ONE HOUR
- ◆ NETHERLANDS TESTS
- ◆ KELO-TV REPORTER, TEN SECONDS



BUMPING DEMONSTRATION

◆ INSERT BUMP KEY

– TWO METHODS OF BUMPING

- Withdraw one position and strike
- Negative shoulder method

◆ APPLY TORQUE

◆ APPLY ENERGY TO HEAD OF KEY

◆ BOUNCE PINS

◆ TURN THE PLUG

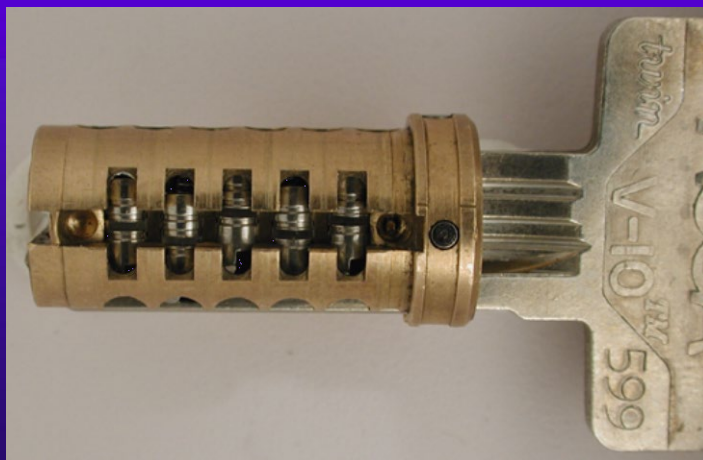
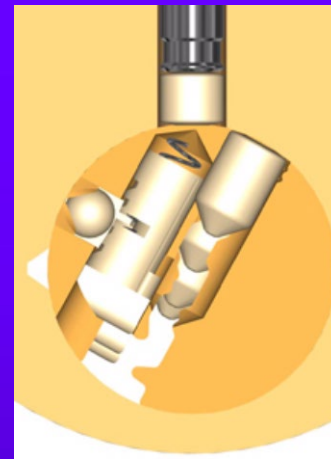
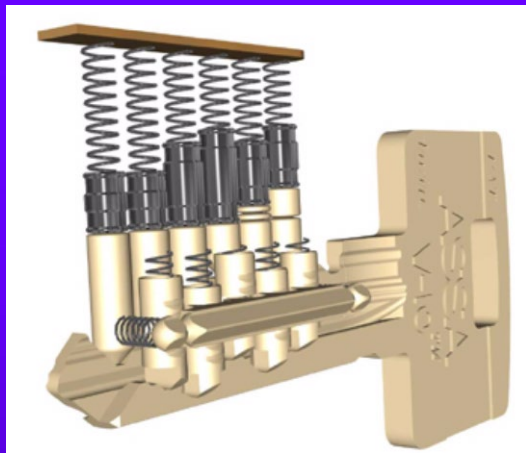
PIN TUMBLER LOCKS THAT CANNOT BE BUMPED???

◆ SIDEBAR LOCKS

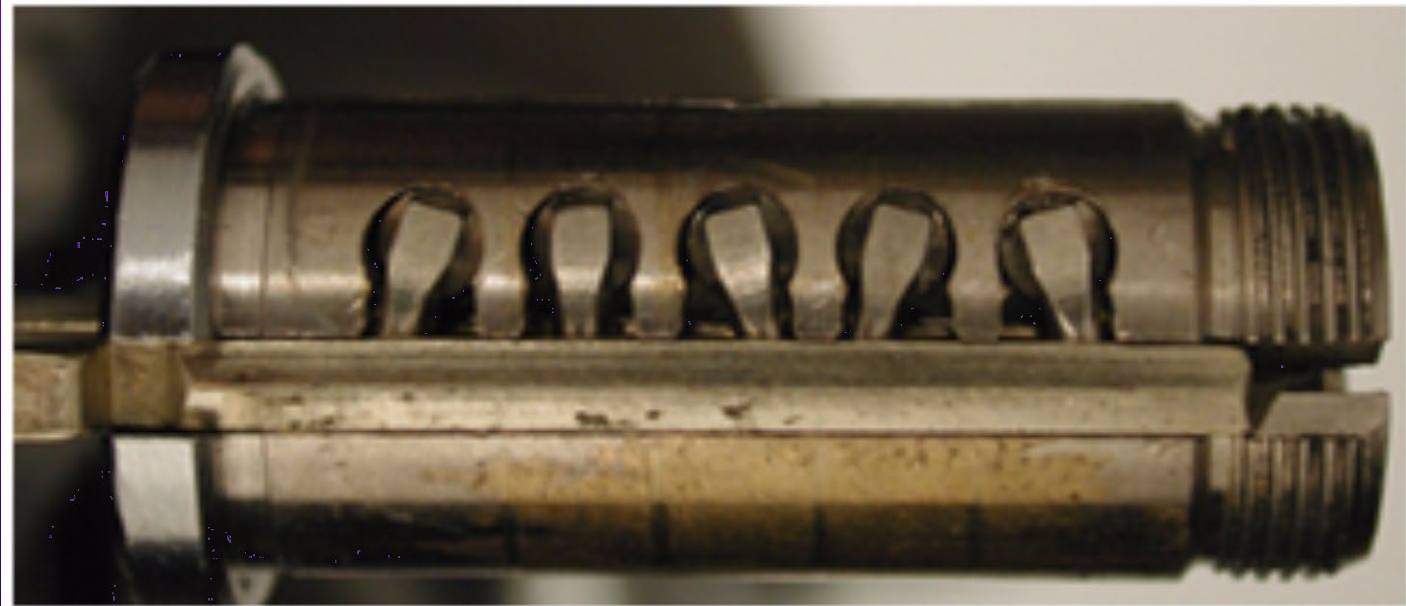
- SCHLAGE PRIMUS
- ASSA
- MEDECO
- OTHER SIDEBAR DESIGNS



SIDEBAR LOCKS - ASSA



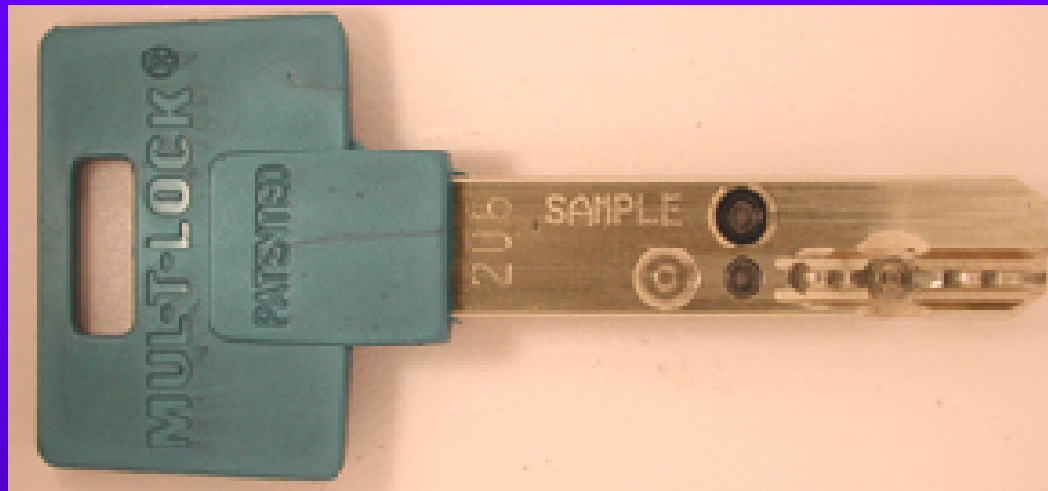
SIDEBAR LOCKS - PRIMUS



EVVA 3KS SLIDER



MUL-T-LOCK INTERACTIVE

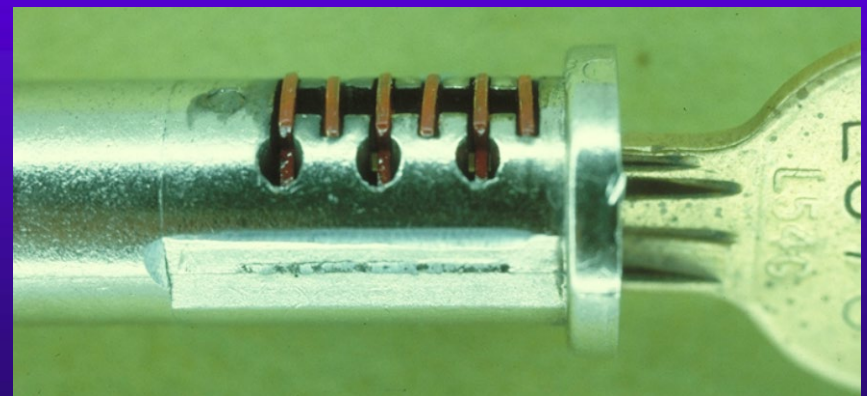
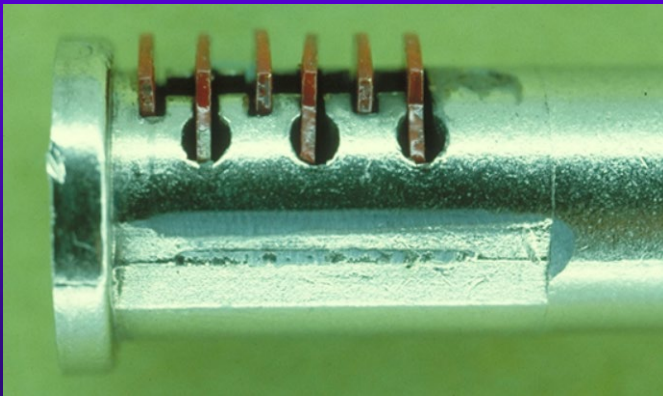
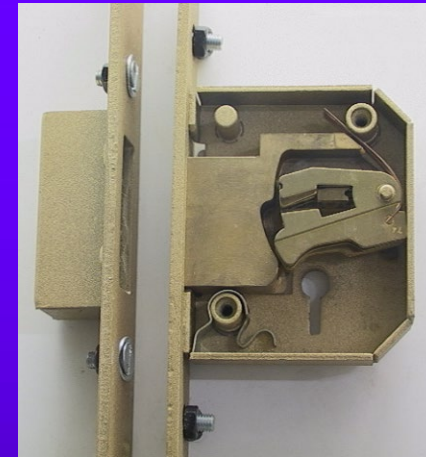
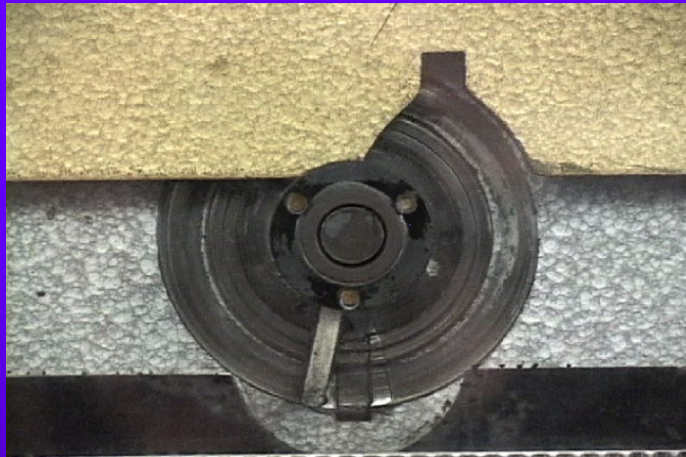


GENERIC LOCKS THAT CANNOT BE BUMPED OPEN

- ◆ WARDED
- ◆ LEVER
- ◆ WAFER AND DISK WAFER
- ◆ COMBINATION



WARDDED, LEVER, WAFER





COMPLICATING FACTORS

- ◆ SECONDARY LOCKING MECHANISM
 - SIDEBARS
 - INTERACTIVE COMPONENTS
- ◆ DIRT AND DEBRIS
- ◆ SPECIAL PINS
- ◆ BROKEN SPRINGS
- ◆ PIN STACK LENGTH
- ◆ RESTRICTED BLANKS
- ◆ REQUIRES MORE THAN ONE MINUTE



INVESTIGATION: SUSPECT BUMPING

- ◆ NO EXTERNAL EVIDENCE OF ENTRY
- ◆ PIN TUMBLER LOCKS (95% CHANCE)
- ◆ NO SIDEBAR (Not Exclusive)
- ◆ ANY PIN TUMBLER CONFIGURATION (door, cabinet, alarm, padlock)
- ◆ COMMON KEYWAY
- ◆ BLANKS OR LOCKS READILY AVAILABLE
– RETAIL
- ◆ AFTER EXAMINATION, TEST THE LOCK



NO AFFECT ON BUMPING

- ◆ SECURITY PINS
- ◆ NUMBER OF PINS
- ◆ REMOVABLE CORE
 - TIP STOP MAY SHOW DAMAGE
- ◆ SIDEBARS, MAYBE. CONSIDER MULTIPLE SIDEBAR CODES: MEDECO



WAS THE LOCK BUMPED?

◆ DEFINITELY NOT IF:

- MAGNETIC
- WARDED
- WAFER
- LEVER TUMBLER
- DISC
- SLIDER
- MEDECO M3, SCHLAGE PRIMUS, ASSA V10



FORENSICS

- ◆ METHOD OF BUMPING WILL AFFECT
 - Pull back method
 - Negative shoulder method



FORENSICS

- ◆ MAY BE TRACES OF BUMPING
- ◆ MANY FACTORS
 - Pins
 - Number of strikes
 - Lock condition
 - How the key was cut



TOOL MARKS AND TRACES

- ◆ FACE OF LOCK AND SHOULDER
- ◆ KEY TIP TO CLOSED CAM
- ◆ SIDE OF KEYWAY
- ◆ PINS: SOMETIMES
- ◆ METAL TRANSFER: DOUBTFUL
- ◆ FILINGS TO FILES OR MACHINE
- ◆ MATCH CUTTER TO KEY
- ◆ HEAD OF KEY TO MALLET



CRITICAL LEGAL ISSUES

- ◆ CORRECT KEYWAY FOR BLANK
 - BLANK NUMBER
 - MILLING OF BLANK
 - FITS THE LOCK
 - KEY HEAD NOT RELEVANT
 - SIDEBAR CODE CORRECT



OTHER LEGAL ISSUES

- ◆ NOT NECESSARILY ALL “9” CUTS TO WORK; POST OFFICE = “7”
- ◆ BUMP KEY THAT DOES NOT FIT THE TARGET LOCK
- ◆ ORIGINAL KEY BY CODE, MODIFIED BY HAND CUTTING = INDICIA
- ◆ CODE ON KEY DOES NOT MATCH
- ◆ MAY USE A 6 PIN KEY FOR 5 PIN LOCK



LEGAL AND EVIDENTIARY ISSUES

- ◆ BUMP KEYS = BURGLARY TOOL
 - BUMP KEY = LOCK PICK
 - TOMAHAWK = TORQUE WRENCH
- ◆ WHY? NEVER USE 999 AS VALID CODE
- ◆ DISTINGUISH FROM NORMAL KEY
- ◆ CIRCUMSTANCES
 - KINETIC OBJECT + KEY
 - LOCATION



LEGAL ISSUES

- ◆ B&E STATUTES APPLY IF INSERT KEY INTO THE LOCK
- ◆ REGULAR KEY CAN BE BUMP KEY IF ALL CUTS ABOVE COMBINATION
- ◆ ALL CUTS HIGHER THAN PIN STACKS DOES NOT BAR PROSECUTION



DEFENSES

- ◆ LOCK IS KEYED TO BUMP KEY
- ◆ KEY IS “8” “9” “0” CUTS
- ◆ SPECIAL CODE REQUIREMENTS SUCH AS USPS



FEDERAL STATUTES

- ◆ POSTAL REGULATIONS AND 18 USC
 - PROHIBIT SENDING IN INTERSTATE COMMERCE BYPASS TOOLS
 - EXCEPTIONS: BONA FIDE LOCKSMITH AND OTHERS
 - BUMP KEYS ARE EXEMPT



REAL WORLD: USPS & UPS

- ◆ POST OFFICE AND MBE RENTAL BOXES WORLDWIDE
- ◆ MILLIONS OF USERS AT RISK
- ◆ INTEGRITY AND SECURITY OF MAIL
 - ID THEFT
 - SURVEILLANCE OF MAIL
 - INTERCEPTION
 - EXPLOSIVES AND DANGEROUS CHEMICALS

USPS: 38,000 LOCATIONS



5,000,000 USPS RENTED BOXES





POSTAL LOCK SECURITY

- ◆ RESTRICTED BLANKS BY FEDERAL STATUTE
- ◆ FIVE PIN TUMBLER LOCKS
- ◆ INSIDE OF POST OFFICE OR UPS
 - BLANKS AND LOCKS ON EBAY
 - ONE DOLLAR LOCKS
 - EVERY KEY CAN BE A BUMP KEY
 - NO INTERNAL SECURITY



U.S. LAWS

- ◆ 60 YEAR OLD FEDERAL STATUTE CONTROLS “NON-MAILABLE MATTER”
- ◆ BUMP KEYS EXEMPTED
- ◆ INTERNET SITES SELLING PRE-CUT BUMP KEYS AND “TOMAHAWK”

THE THREAT FROM BUMP KEYS

- ◆ IF CAN OBTAIN A KEY THAT FITS THE LOCK THAT HAS ALREADY BEEN CUT
 - EASY TO LEARN BUMPING
 - ANYONE CAN OPEN A LOCK





PREVENTING BUMPING

- ◆ SPECIAL PINS (DOLEV AND OTHERS)
- ◆ SECONDARY SECURITY: SIDEBARS
- ◆ SPRING BIAS DIFFERENCE
- ◆ SHORTER BORES
- ◆ EMPLOY CERTAIN HIGH SECURITY LOCKS



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ADDITIONAL REFERENCE MATERIAL

www.security.org

- **OPENING LOCKS BY BUMPING IN FIVE SECONDS OR LESS: IS IT REALLY A THREAT TO PHYSICAL SECURITY?**

- www.security.org/bumping_040206.pdf

- **BUMPING OF LOCKS: LEGAL ISSUES IN THE U.S.**

- www.security.org/bumping_legal_mwt.pdf

- ◆ *Locks, Safes and Security: An International Police Reference*, Marc Weber Tobias, 2001

- ◆ *LSS+ The Multimedia Edition*, 2006

www.toool.nl