LOCKS AND HIGH INSECURITY:
PROTECTING CRITICAL INFRASTRUCTURE

SECURITY VULNERABILITIES FOR MECHANICAL AND ELECTRONIC LOCKING SYSTEMS THAT ARE USED FOR PROTECTING CRITICAL ASSETS

CRITICAL FACILITIES

- TRANSPORTATION
  - AIRPORTS AND AIRPLANES
- FINANCIAL AND BANKING
- COMPUTRE SERVER CENTERS
- POWER GENERATION
- COMMUNICATIONS
- DEFENSE
- PUBLIC SAFETY

HIGH SECURITY FACILITIES: HIGHER THREAT LEVEL

- INTRUSION
- SABOTAGE and VANDALISM
- THEFT OF CRITICAL AND HIGH-VALUE ASSETS
- TERRORISM
- ACCESS TO INFORMATION
- IDENTITY THEFT
- INTERRUPTION OF CRITICAL ESSENTIAL SERVICES

LEGAL REQUIREMENTS:
STATE, FEDERAL, REGULATORY

- FEDERAL STATUTES AND REGULATIONS
- STANDARDS COMPLIANCE
- COMMERCIAL AND INSURANCE
- DEFENSE DEPARTMENT
- DEPARTMENT OF ENERGY
- BANKING AND TREASURY

LOCKS: FIRST LINE OF DEFENSE

CONVENTIONAL AND HIGH SECURITY

- LOCKING SYSTEM: CATEGORIES
  - MECHANICAL
  - ELECTRO-MECHANICAL
  - ELECTRONIC
- TREND: PHYSICAL SECURITY + I-T
- RELIANCE ON STANDARDS BY MOST FACILITIES TO SELECT WHICH LOCKS ARE SECURE ENOJUGH

STANDARDS: THE PROBLEM

- WHAT DO THEY MEASURE?
- WHY WE NEED STANDARDS
- NOT “REAL WORLD”
- LIMITED PROTOCOL, FEW TESTS
- MECHANICAL BYPASS
- SPECIAL ATTACK TECHNIQUES FOR CERTIFIED LOCKS
- LOCK BUMPING
- KNOWLEDGEABLE ATTACKS

LOCKS: SECURITY CRITERIA

- **STANDARDS DEFINE CONVENTIONAL AND HIGH SECURITY**
- THREAT CRITERIA
  - FORCED ENTRY
  - COVERT ENTRY
  - KEY CONTROL
- STANDARDS ARE BASED UPON:
  - TIME, TOOLS, TRAINING

FORCED ENTRY PROTECTION: UL 437 and BHMA 156.30 Standards

- LOCKS ARE SECURE AGAINST FORCED METHODS OF ATTACK
- MINIMUM TIMES SPECIFIED IN UL 437 and BHMA/ANSI 156.30
  - ATTACK RESISTANCE: 5 MINUTES
- DOES NOT INCLUDE MANY METHODS OF ATTACK

COVERT ENTRY PROTECTION: The Theory

- MINIMUM SECURITY CRITERIA IN UL 437 and BHMA/ANSI 156.30
- PROTECT AGAINST CERTAIN FORMS OF COVERT ENTRY
- ASSURE MINIMUM RESISTANCE TIMES TO OPEN: 10-15 Minutes
  - Picking, Decoding
  - Bumping (not covered)
  - Decoding and Master Key attacks

STANDARDS: KEY CONTROL v. KEY SECURITY

- STANDARDS = LIMITED SECURITY
- ORGANIZATIONAL PROTECTION
  - DUPLICATION OF KEYS
  - KEYS BY CODE ON ORDER
- LEGAL PROTECTION
  - AVAILABILITY OF BLANKS
- NOT ADDRESS TECHNICAL SECURITY OF KEYS

CATEGORIES OF LOCKS

- CONVENTIONAL MECHANICAL LOCKS
- HIGH SECURITY MECHANICAL LOCKS
- ELECTRONIC CREDENTIALS
  - ELECTRO-MECHANICAL LOCKS
  - ELECTRONIC LOCKS
  - WIRED, WIRELESS, DATA ON CARD

LOCKS AND SECURITY: CRITICAL QUESTIONS

- WHAT IS SECURITY RE LOCKS
- IS IT SECURE ENOUGH
- WHAT DOES A HIGH SECURITY RATING MEAN
- CONCEPT OF KEY CONTROL , KEY SECURITY, AND WHY IMPORTANT
- CAN THE LOCK BE COMPROMISED AND HOW DIFFICULT
- REAL WORLD THREATS
- METHODS TO COMPROMISE AND BREAK

CONVENTIONAL v. HIGH SECURITY LOCKS

- CONVENTIONAL CYLINDERS
  - Easy to pick and bump open
  - No key control
  - Limited forced entry resistance
- HIGH SECURITY CYLINDERS
  - UL and BHMA/ANSI Standards
    - UL 437 and BHMA/ANSI 156.30
  - Higher quality and tolerances
  - Resistance to Forced and Covert Entry
  - Key control

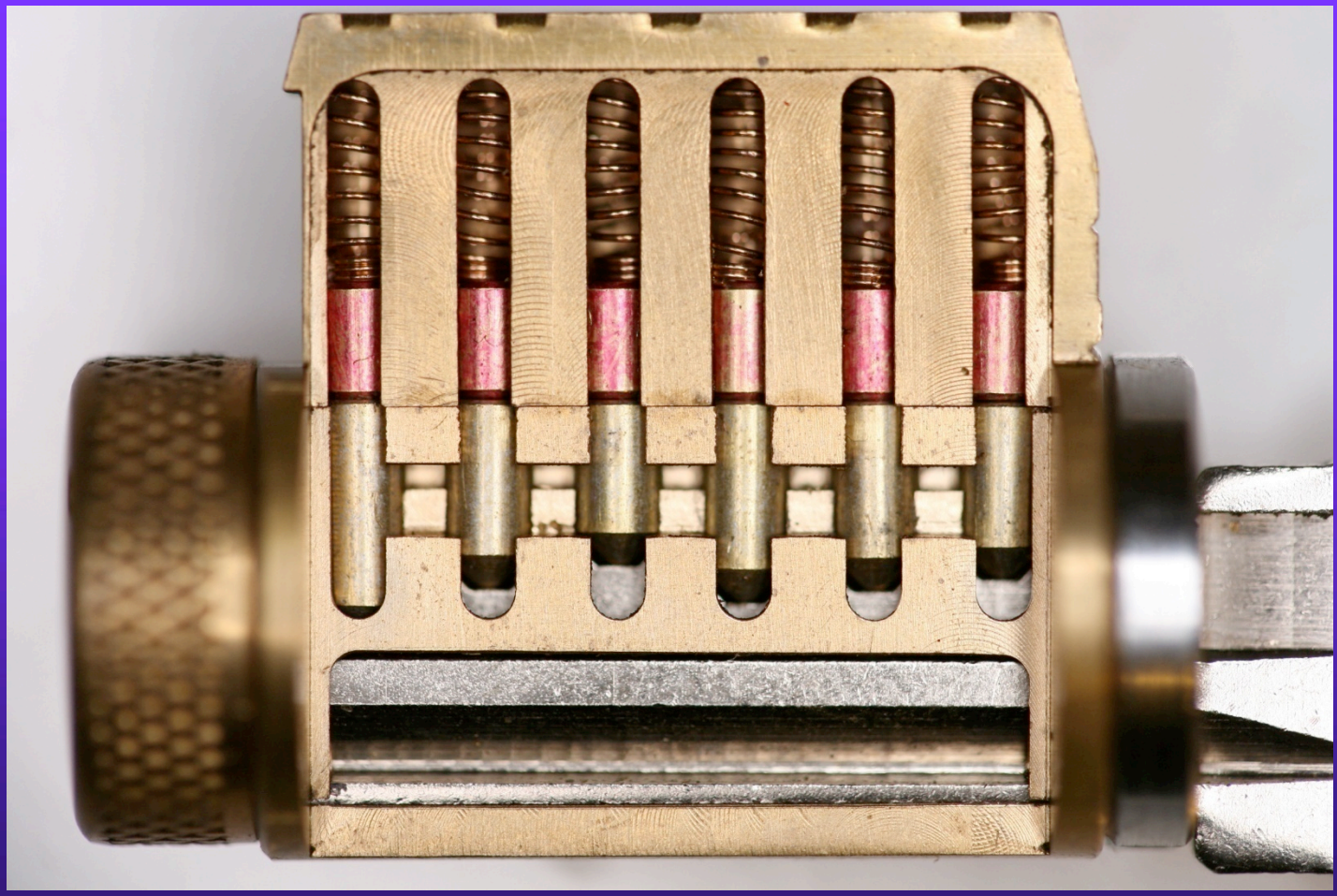
ALL MECHANICAL LOCKS: DESIGN LIMITATIONS

- GOOD FOR ONE PERSON, ONE KEY
- DON'T NEED TRACKING
- ADDING AND DELETING KEYS TO SYSTEM NOT AN ISSUE
- LOST, STOLEN OR COPIED KEYS, NO SECURITY
- MANIPULAITON OF KEYS: MUL-T-LOCK AND KEY INTERCHANGE

CONVENTIONAL LOCKS: THEIR FUNCTION

- RESTRICT WHO CAN ENTER
- PREVENT OR DELAY UNAUTHORIZED ACCESS
  - LOW TO MEDIUM SECURITY
  - NOT CERTIFIED
  - COVERT ENTRY OFTEN EASY

CONVENTIONAL LOCK: MODERN PIN TUMBLER



CONVENTIONAL LOCKS: VULNERABILITIES

- PICKING, BUMPING, DECODING
- IMPRESSIONING
- MASTER KEY EXTRAPOLATION
- MECHANICAL BYPASS
- FAILURE OF KEY CONTROL
  - DUPLICATION OF KEYS
  - SIMULATION OF KEYS
  - REPLICATION OF KEYS

CONVENTIONAL LOCKS: WHY THEY ARE NOT ADEQUATE

- NO TRACKING OF ACCESS, ATTEMPTS, HOW OFTEN, WHEN
- ADD AND DELTE KEYS
- KEY SECURITY
- MASTER KEY SYSTEM INSECURITY
- NO EVIDENCE OF BREACH
- NO INTELLIGENCE IN LOCK OR KEY

HIGH SECURITY LOCKS: INCREASED PROTECTION?

- Protect high value targets
- Stringent security requirements
- High security Standards: UL, BHMA
- Threat level is higher
- Minimum security criteria
  - Attack times and resistance
  - More difficult to compromise
  - Higher key control

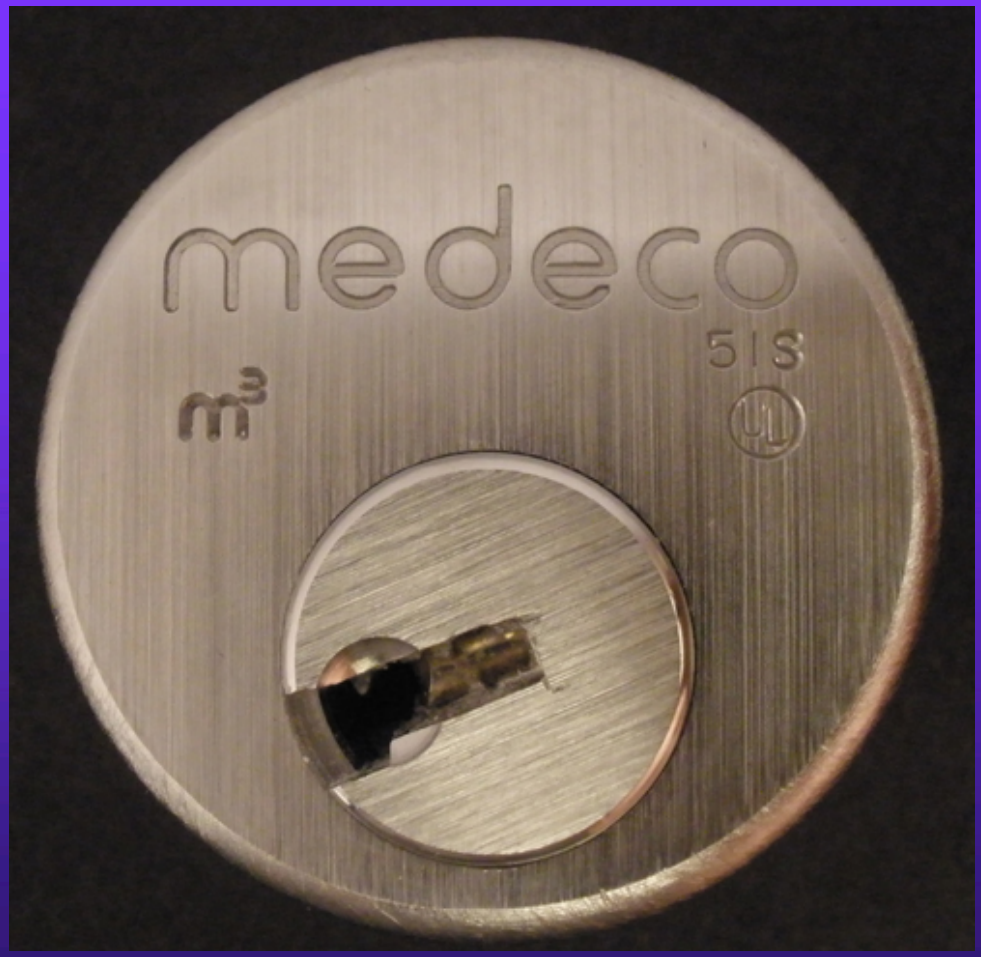
HIGH SECURITY MECHANICAL LOCKS: PRIMARY FUNCTIONS

- RESTRICT ACCESS
- ADDED RESISTANCE TO FORCED, COVERT ENTRY, AND KEY CONTROL
- NO ABILITY TO:
  - TRACK PEOPLE AND THEIR ACCESS
  - TRACK ENTRY AND ATTEMPTS
  - CONTROL ACCESS BY TIME, DATE, USER GROUP

HIGH SECURITY LOCKS: Critical Design Differences

- Multiple security layers
- More than one point of failure
- Each security layer is independent
- Security layers operate in parallel
- Difficult to bypass each layer
- Difficult to derive intelligence about a layer
- Difficult to simulate the action of the key

MEDECO: THE U.S. MODEL FOR HIGH SECURITY



MEDECO: WHO ARE THEY and WHY IMPORTANT?

- Dominant high security lock maker in U.S.
- Owns 70+ Percent of U.S. high security market for commercial and government
- Major government contracts
- In UK, France, Europe, South America
- Relied upon for highest security everywhere
- Considered almost invincible by experts
- Not easily compromised for 40 years

MEDECO HIGH SECURITY: What it means

- UL, BHMA/ANSI, Vd.S Certified
- High level of protection against attack
- Picking: 10-15 minute resistance
- No bumping
- Forced Entry: 5 minutes, minimum
- Key control
  - Protect restricted and proprietary keyways
  - Stop duplication, replication, simulation of keys
  - If keys can be replicated: no security

WHY THE MEDECO CASE STUDY IS IMPORTANT

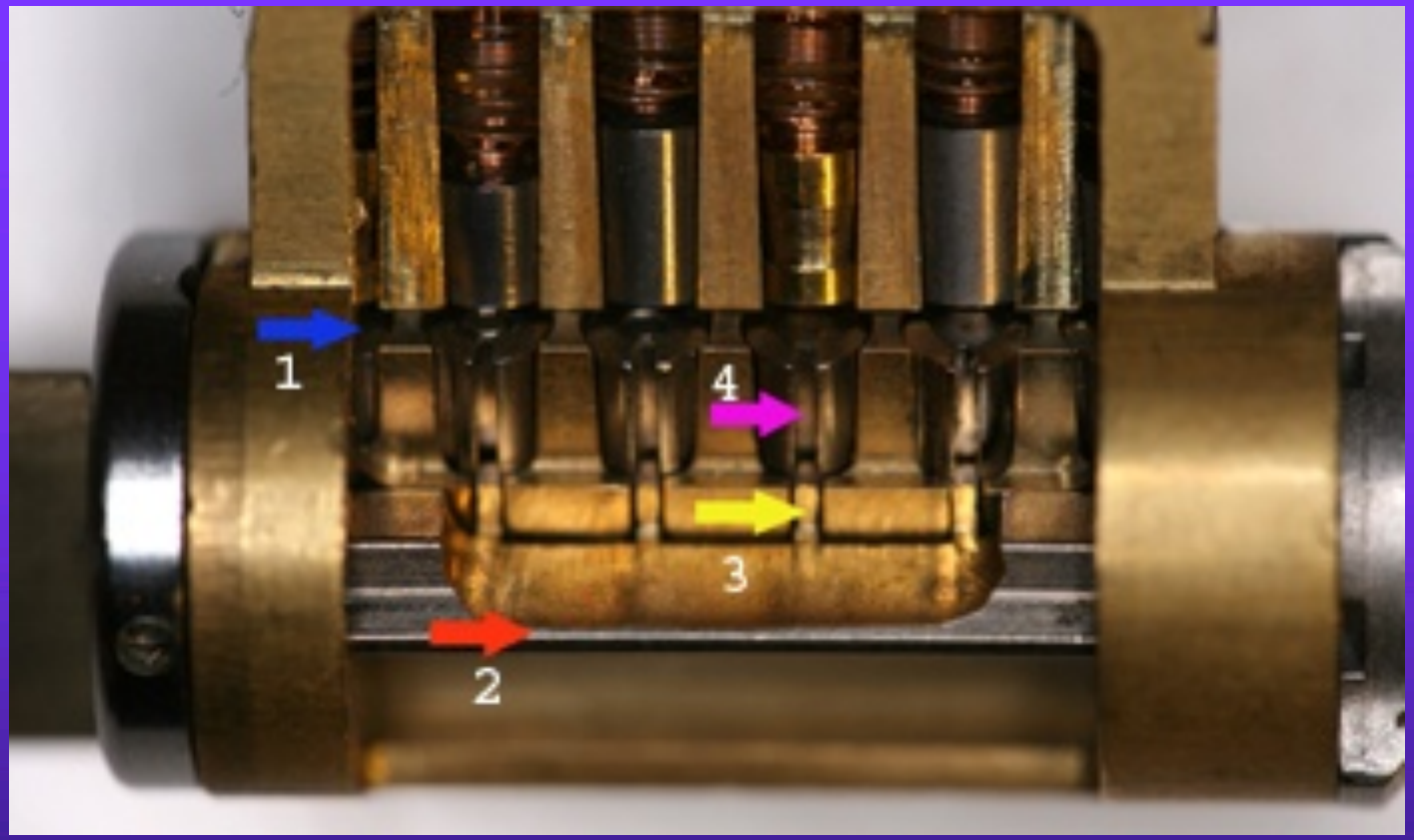
- Insight into design of high security locks
- Patents are no assurance of security
- Appearance of security v. Real World
- Undue reliance on Standards
- Manufacturer knowledge and Representations
- Methodology of attack
- More secure lock designs

MEDECO LOCKS:
3 Independent Security Layers

- Layer 1: PIN TUMBLERS to shear line
- Layer 2: SIDEBAR: 3 angles x 2 positions
- Layer 3: SLIDER – 26 positions
- TO OPEN:
  - Lift the pins to shear line
  - Rotate each pin individually
  - Move the slider to correct position

MEDECO TWISTING PINS:
3 Angles + 2 Positions

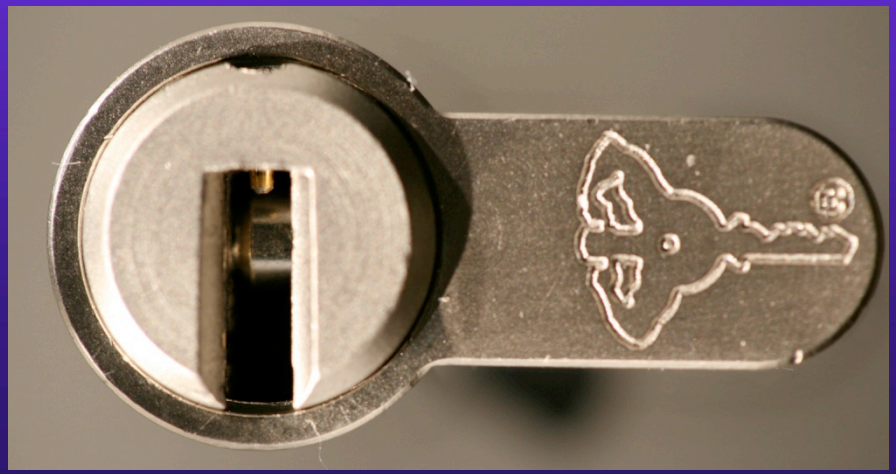
MEDECO BIAXIAL (1985-2003)



PLUG AND SIDEBAR:
All pins aligned

PLUG AND SIDEBAR: Locked

ELECTRONIC LOCKS: CLIQ TECHNOLOGY



ELECTRO-MECHANICAL SELF-CONTAINED LOCKS

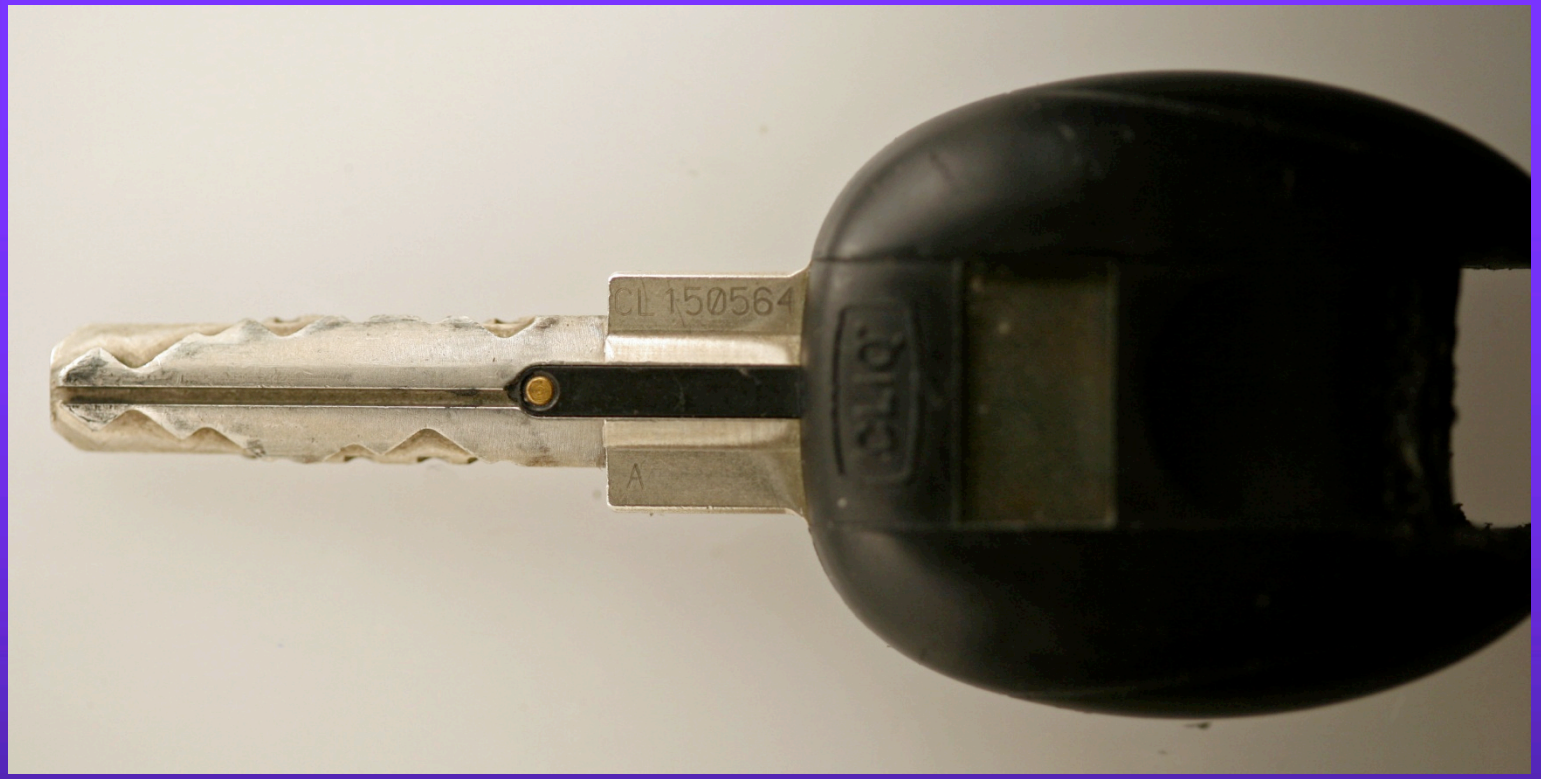
- MECHANICAL LOCKS +
- ELECTRONIC CREDENTIALS
  - STILL MECHANICAL LOCKS
- TWO PARALLEL LOCKING SYSTEMS
  - MECHANICALLY KEYED ALIKE
  - MECHANICALLY MASTER KEYED
  - KEY BITTING ASSIGNED TO EACH CUSTOMER

ELECTRONIC ACCESS CONTROL SYSTEMS

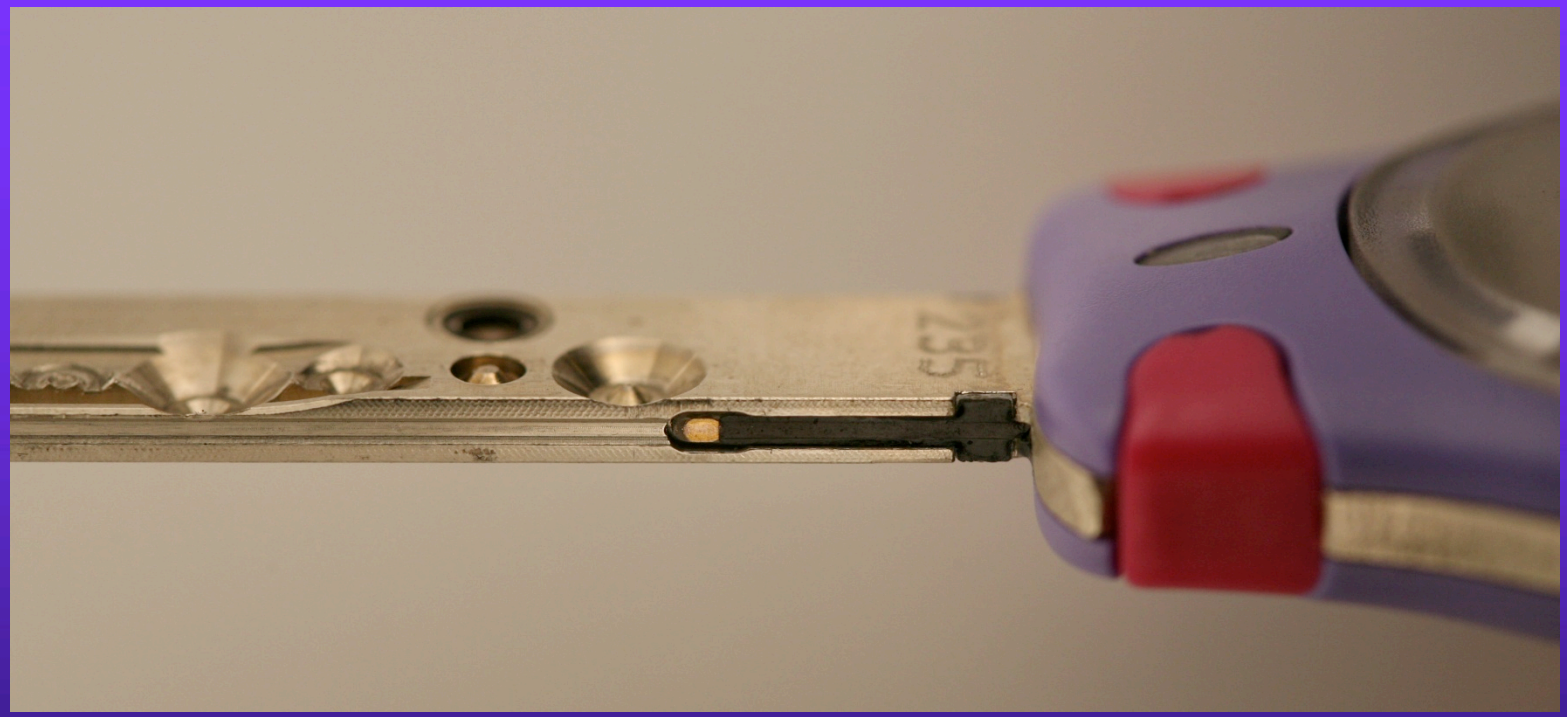
- MECHANICAL LOCK DESIGNS
- ELECTRONIC CREDENTIALS
  - I-BUTTON, RFID, SMART CARD
  - MANY DIFFERENT PROTOCOLS
- SECURITY
  - PROTOCOL
  - MECHANICAL LOCKING SYSTEM
  - AUDIT FUNCTIONS
  - KEY SECURITY

MEDECO LOGIC CYLINDER: CLIQ TECHNOLOGY

MEDECO LOGIC KEYS



MUL-T-LOCK CLIQ



SALTO SYSTEMS and EVVA

SALTO SYSTEMS

- ELECTRONIC ONLY
- ELECTRONIC + MECHANICAL LOCKS FOR EMERGENCY BYPASS
  - STAND ALONE SYSTEMS
  - WIRED SYSTEMS
  - DATA ON CARD SYSTEMS

WIRED ACCESS CONTROL: NEGATIVE SYSTEM ISSUES

- WIRED SYSTEMS WITH CARDS, BIOMETRICS, CENTRAL CONTROL
- EXPENSE TO INSTALL
- POWER AND NETWORK LINES
- MODIFICATION TO DOOR, FRAME
- BIOMETRIC: FALSE POSITIVES MAY RESTRICT PROPER ACCESS

EAC: CRITICAL APPLICATIONS

- AVIATION
- CARGO
- POWER
- COMPUTER SERVERS AND DATA PROTECTION

CRITICAL INFRASTRUCTURE: AIRPORTS AND AIRCRAFT

CRITICAL INFRASTRUCTURE: AIRCRAFT

AVIATION SECURITY

- U.S. AVIATION TRANSPORTATION SECURITY ACT (2001)
- SECURITY OF AIRPORTS, HIGHWAYS, BUSSES, PORTS, MASS TRANSIT
  - CONTROL PHYSICAL ACCESS TO 450 AIRPORTS
  - CONTROL, TRACK, ANALYZE INDIVIDUAL ACCESS AND ATTEMPTS TO SECURE AREAS

AIRPORT SECURITY

- SECTION 106: AIRPORT PERIMITER PROTECTION
- SECURITY TECHNOLOGY TO MANAGE ACCESS CONTROL
- POSTIVIELY VERIFY THE IDENTIFY OF EACH EMPLOYEE AND LAW ENFORCEMENT OFFICER
- TEST AND ASSURE COMPLIANCE

AIRPORT SECURITY

- LAYERED SECURITY APPROACH
- ACCESS CONTROL
- PHYSICAL SECURITY OF FIXED ASSETS
- BREACHES: TRACE TO LOCKS AND USER VIOLAITONS
- COPYING OF KEYS

CONVENTIONAL LOCKS NOT SECURE FOR AIRPORT PROTECTION

- DUPLICATION OF KEYS OR CREDENTIALS
- NO AUDIT INFORMATION
- NO SECHEDULING OF PERSONNEL
- MASTER KEY SYSTEMS: NO IDENTIFICATION OF EMPLOYEE, NOR ABILITY TO TEST SYSTEM

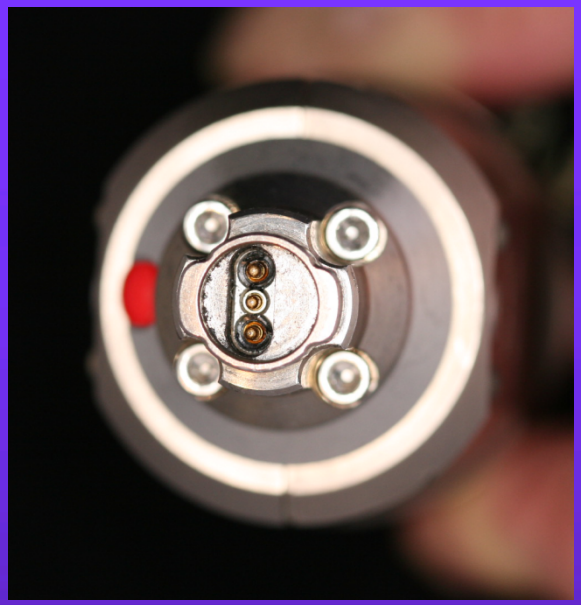
PRIVATE AIRCRAFT: MEDECO CAM LOCKS

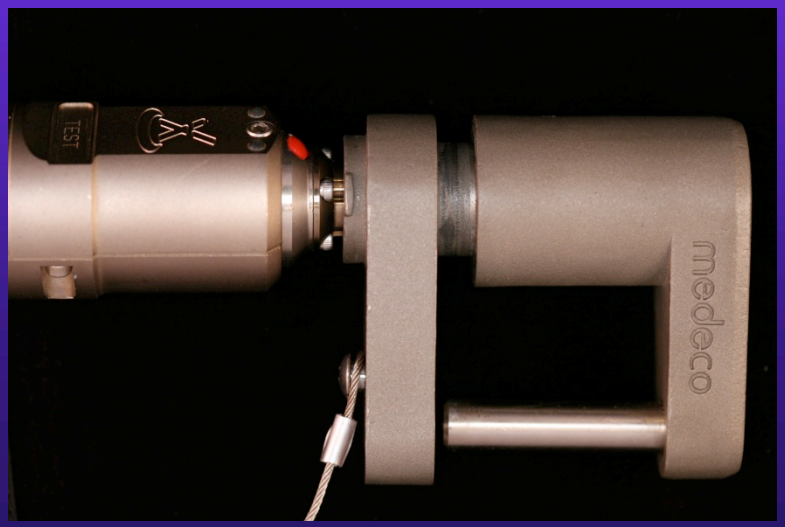
CRITICAL INFRASTRUCTURE: CARGO AREAS / CONTAINERS

CARGO ACCESS

- ELECTRONIC ACCESS CONTROL SYSTEMS
- ELECTRONIC PADLOCKS WITH AUDIT CONTROL
  - DETERMINE TAMPERING
  - TERRORIST ACTS
  - CONTRABAND

MEDECO NEXGEN





CRITICAL INFRASTRUCTURE: POWER GENERATION

POWER PLANTS: SECURITY ISSUES

- ELECTRICITY, GAS, OIL, POWER GRID
- FERC: FEDERAL ENERGY REGULATORY COMMISSION
- (NERC) NORTH AMERICAN ELECTRIC RELIABILITY CORPORATION
- RELIABILITY OF ELECTRICITY
  - SECURITY OF PHYSICAL ASSETS
  - SECURITY OF ELECTRONIC DATA

SECURITY REQUREMENTS

- PREVENT ATTACKS, PHYSICAL AND ELECTRONIC
- ACCESS TO DATA AND EQUIPMENT
  - HARD ASSETS: GENERATING PLANTS, EQUIPMENT, TRANSMISSION, NETWORKS
- PHYSICAL ACCESS AND ATTEMPTS

CRITICAL INFRASTRUCTURE PROTECTION

- CIP-006-1: PHYSICAL SECURITY PLAN MUST…"CONTAIN PROCEDURES FOR IDENTIFYING, CONTROLLING, AND MONITORING ALL ACCESS POINTS AND AUTHORIZATION REQUESTS. THE STANDARD ALSO REQUIRES THE LOGGING OF PHYSICAL ACCESS, WHICH MUST OCCUR AT ALL TIMES, AND THE INFORMATION LOGGED MUST BE SUFFICIENT TO UNIQUELY IDENTIFY INDIVIDUALS."

ACCESS REQUIREMENTS

- CLASSIFIED MATERIALS: CLEARANCE LEVEL AND NEED
- ADMITTANCE ONLY DURING TIME OF NEED.
  - "When a staff member no longer requires access to classified information or material… their clearance will be withdrawn."

PREVENT UNAUTHORIZED ACCESS

- TERRORISTS, DISGRUNTLED FORMER EMPLOYEES, TEENAGERS
- DISRUPTION OF LOCAL OR NATIONAL POWER AND TRANSMISSION
- REMOTE ACCESS AND SABOTAGE
- PROBLEM: LOCAL OR REMOTE ACCESS

RAMIFICATIONS: UNAUTHORIZED ACCESS

- GAIN UNAUTHORIZED PHYSICAL ACCESS TO FACILITIES
- TAMPER OR DESTROY EQUIPMENT
- THEFT OF COPPER WIRE
- SHUT DOWN POWER GRID

FERC SECURITY REQUIREMENTS

- PHYSICAL ACCESS METHODS
- CARD KEYS, SPECIAL LOCKS
- LOGGING TO UNIQUELY IDENTIFY INDIVIDUALS AND TIME OF ACCESS
- COMPLETE AUDIT TRAIL

CRITICAL INFRASTRUCTURE: COMPUTER SERVER ROOMS

FINANCIAL REPORTING: U.S. AND EUROPEAN LAWS

- SERVER SECURITY IS CRITICAL: DATA IS MOST VALUABLE ASSET
- SECURITY SYSTEM REQUIREMENTS
- INTERNAL CONTROLS
- TRADITIONAL ACCESS SECURITY IS NOT SUFFICIENT
- DATA SECURITY RISKS AND LIABILITY

SERVER SECURITY AND MECHANICAL LOCKS

- MECHANICAL LOCKS: WILL NOT PROTECT ELECTRONIC DATA
- NOT ENOUGH SECURITY TO ALLOW MANAGEMENT TO "ASSESS AND EVALUATE" INTERNAL CONTROLS
- REQUIRES A SYSTEM
  - RESTRICT ACCESS
  - TRACK PEOPLE ACCESS
  - ENTRY AND ATTEMPTS

PROTECTION OF FINANCIAL DATA: SPECIAL NEEDS

- SARBANES-OXLEY ACT (2002)
  - FINANCIAL REPORTING FOR PUBLIC CORPORATIONS
  - QUALITY OF FINANCIAL REPORTING
  - INTERNAL CONTROLS
  - SERVER ROOM ACCESS SECURITY
- SECURITY
  - FOR CORPORATION
  - FOR COMPLIANCE
  - FOR PUBLIC

FINANCIAL DATA INTEGRITY AND SECURITY

- CONTROL AND SAFEGUARD DATA
- VALIDITY OF FINANCIAL REPORTS
- PHYSICAL CONTROL OF ACCESS TO INFORMATION THAT IS CONTAINED IN REPORTS
  - DATA THEFT AND PROTECTION
  - THEFT
  - MANIPULATION, EXPLOITATION
  - UNAUTHORIZED ACCESS

SERVER SECURITY

- MUST CONTROL ACCESS TO SERVERS TO PROTECT INFO
  - IN 30 MINUTES, YOU OWN DATA IF PHYSICAL ACCESS, THEN VIRTUAL SECURITY IS MEANINGLESS
- ELECTRONIC PROTECTION
  - *FIREWALLS, PASSWORDS, ENCRYPTION*

SERVER SECURITY: PHYSICAL ACCESS

- PHYSICAL SECURITY IS VITAL
- EQUIPMENT AND INFORMATION
- PREVENT SERVER THEFT
- MECHANICAL LOCKS NOT SUFFICIENT

- KEY CONTROL AND KEY SECURITY
- LOG ACCESS
- **SERVER ROOM SECURITY BEGINS WITH CONTROLLING ACCESS TO FACILITY**

FAILURE TO PROTECT SERVERS AND DATA

- THEFT OF PERSONAL DATA
- THEFT OF SERVERS AND COMPUTERS
- SIGNIFICANT LIABILITY TO ACCOUSNT HOLDERS

TRADITIONAL SECURITY SYSTEMS ARE INADEQUATE

- LOCKED SERVER ROOMS
- AUTHENTICATION FOR ADMIN
- MONITOR SENSITIVE SYSTEMS
- OFTEN USE HIGH SECURITY LOCKS WITH PATENTED KEYS

REAL WORLD THREATS: PROTECTION

- HIGH SECURITY LOCKS
- ELECTRONIC ACCESS CONTROL SYSTEMS
  - COMPROMISE
  - FALSE SENSE OF SECURITY
  - LIABILITY

FAILURE OF SECURITY: POSSIBLE RESULTS

- INTERRUPTION OF SERVICES
- SABOTAGE, UNAUTHORIZED ACCESS
- LOSS OF LIFE
- COMPROMISE OF CRITICAL DATA
- DESTRUCTION OF FACILITIES AND EVIDENCE
- TERROR ATTCKS
- EXTENSIVE LIABILITY
- CRIMINAL ACTIVITY, THEFT, COLLUSION

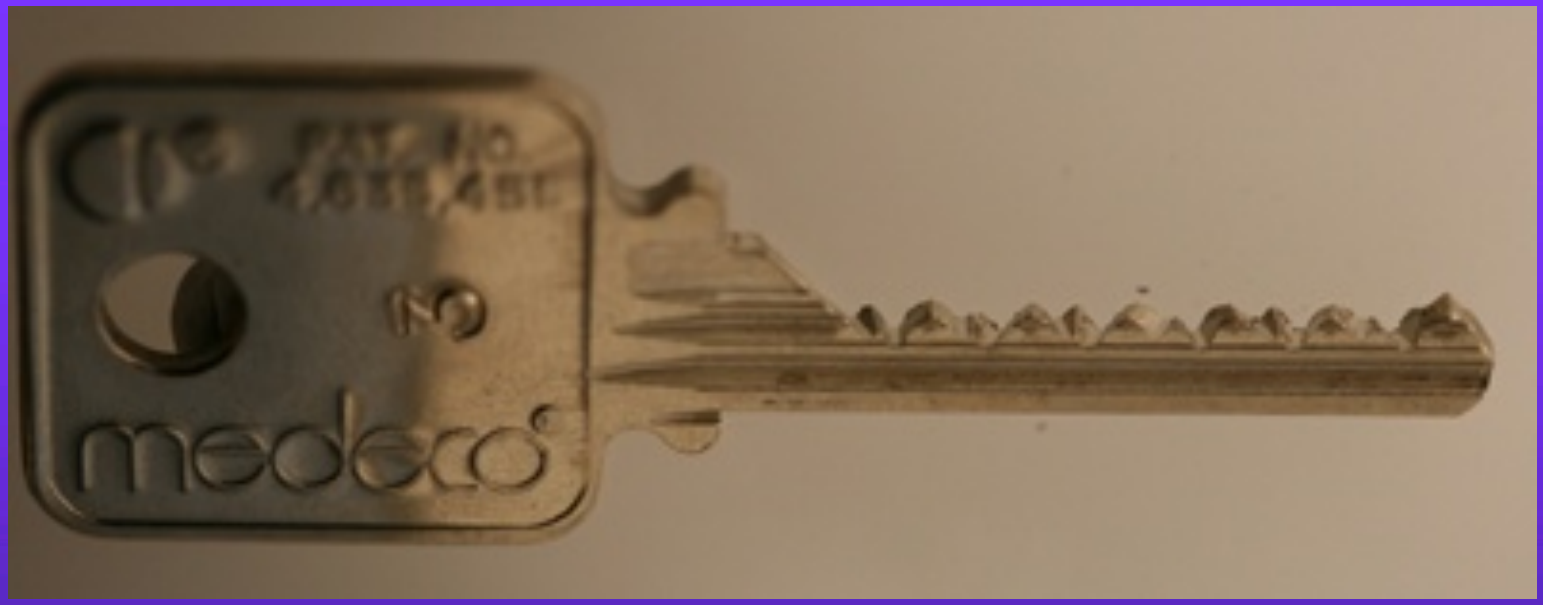
METHODS OF ATTACK: High Security Locks

- Picking and manipulation of components
- Impressioning
- *Bumping
- *Vibration and shock
- *Shim wire decoding (Bluzmanis and Falle)
- *Borescope and Otoscope decoding
- *Direct or indirect measurement of critical locking components
- *Mechanical bypass
  - * Not covered by UL or BHMA standards

MEDECO INSECURITY: Real World Threats - Covert

- PICKING AND BUMPING
  - With correct blank and sidebar code
  - With simulated blank
  - With or without ARX pins
- INSIDE ATTACKS
  - Change key picking
  - Keymail
- MASTER KEY ATTACKS
- VISUAL DECODING

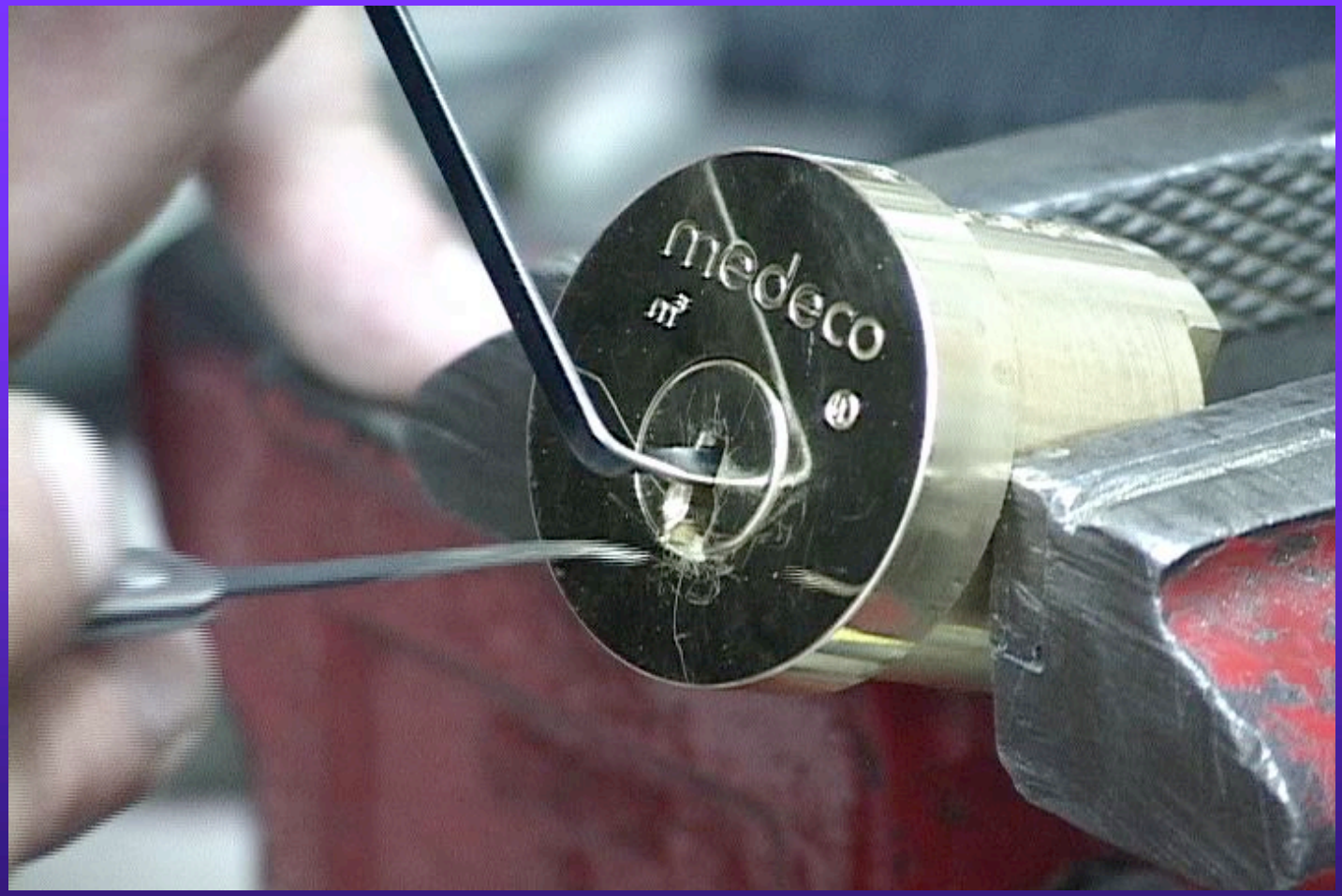
MEDECO BUMP KEY



REAL WORLD ATTACK: Bumping a Medeco Lock

FEBRUARY, 2009: WIRED MAGAZINE BUMPING TEST

PICKING A MEDECO LOCK



MEDECO PICKING: OPEN IN 23 SECONDS

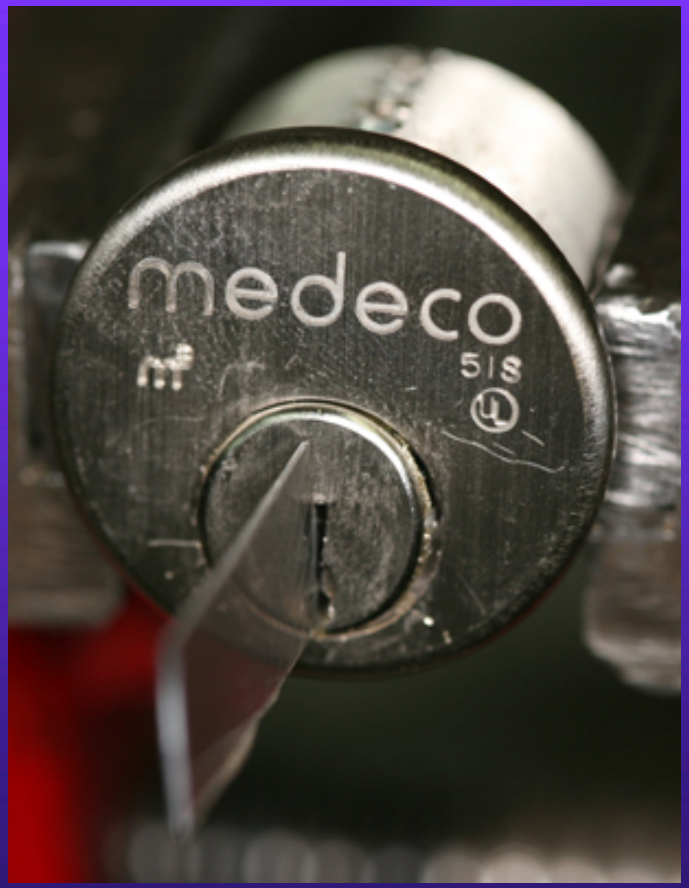
MEDECO INSECURITY: Real World Threats – Forced

- DEADBOLT Pre-12/2007
  - Thirty seconds
  - Complete circumvention of security
  - Simple tools, easy to accomplish
- DEADBOLT 2008
  - Reverse picking attack
- MORTISE, RIM, ICORE
  - Hybrid attack, compromise of key control

DEADBOLT ATTACK

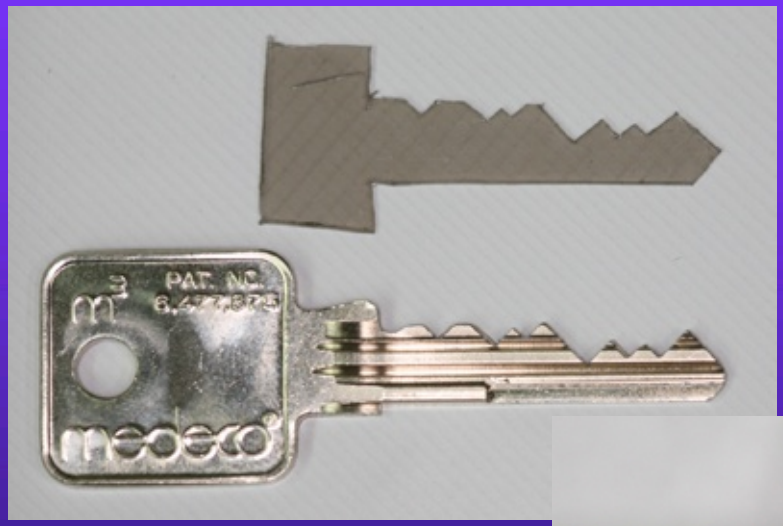
MORTISE CYLINDER

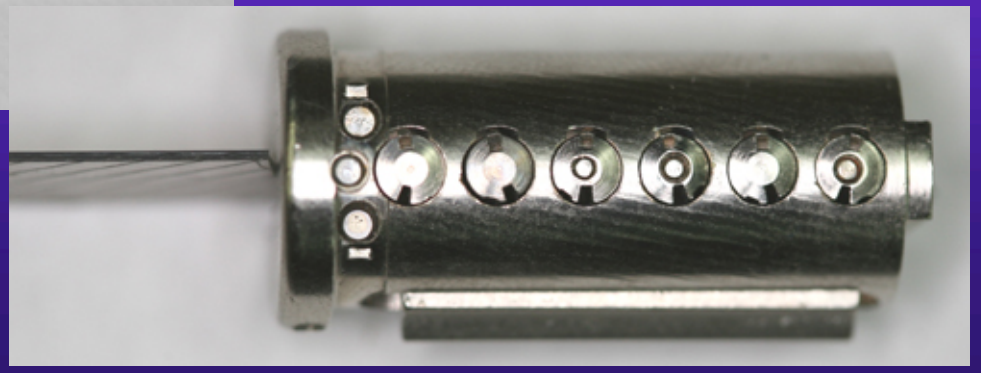
SET THE SHEAR LINE: OPEN THE LOCK



SET THE SHEAR LINE

- PLASTIC KEY SETS SHEAR LINE
- SIDEBAR IS IRRELEVANT

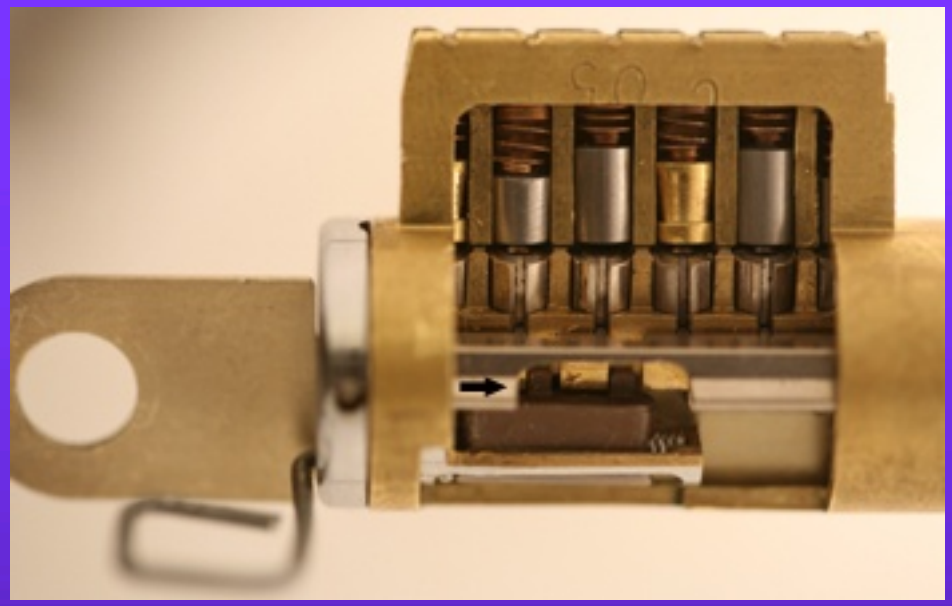


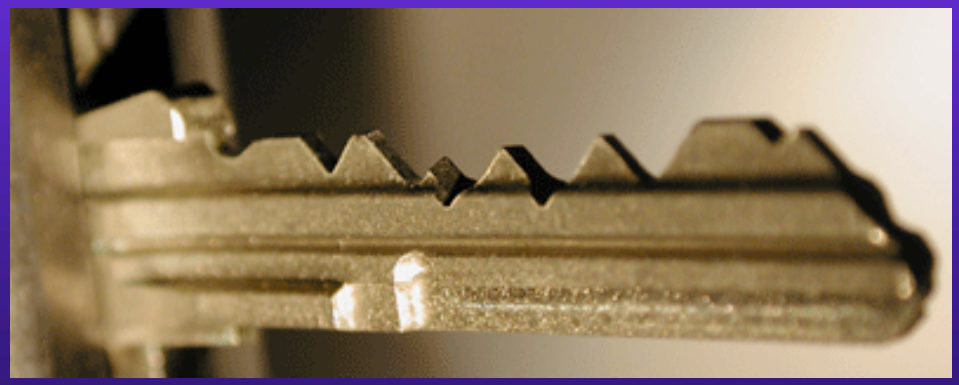


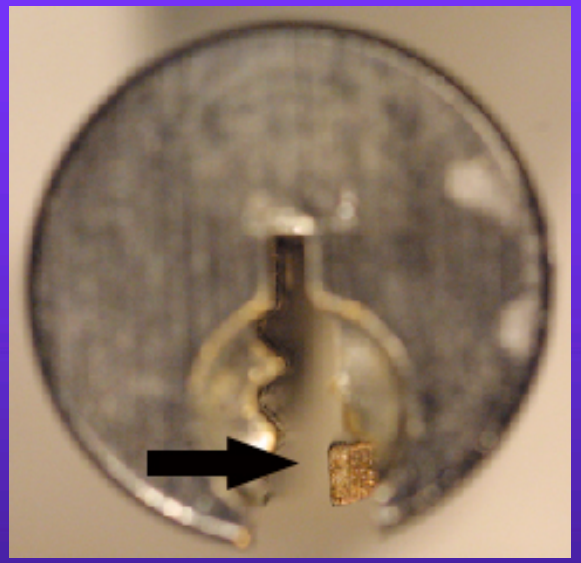
MORTISE ATTACK

MEDECO MORTISE ATTACK: INSIDER KEY COMPROMISE

MEDECO m3: The Slider (2003)







M3 SLIDER: (Not secure) Bypass with a Paper clip

MEDECO INSECURITY: Real World Threats - Keys

- VIOLATION OF KEY CONTROL and KEY SECURITY
  - Compromise of entire facility
  - Improper generation of keys
  - Use to open locks
  - Decode Top Level Master Key
  - Forced and covert entry techniques

KEYS and KEY CONTROL

- KEYS ARE THE EASIEST WAY TO OPEN LOCKS
  - Change key or master key
  - Duplicate correct bitting
  - Bump keys
  - Rights amplification: modify keys

KEY CONTROL: Why Most Keys are Vulnerable

- CONVENTIONAL LOCKS: Single Layer
  - KEYWAY = KEY CONTROL
- LEGAL PROTECTION DOES NOT PREVENT REAL WORLD ATTACKS
  - KEYS = BITTING HEIGHT + KEYWAY
  - Bypass the keyway
  - Raise pins to shear line

"KEYMAIL": Security Threat from Within

- NEW AND DANGEROUS THREAT
- THE NEW MULTI-FUNCTION COPIER
  - It scans, copies, prints, and allows the production of keys
- DUPLICATE COMPETE KEY
  - Open the lock
- DUPLICATE BITTING
  - Hybrid attack

KEYMAIL: How It Works

- ACCESS TO THE TARGET KEY
- CAPTURE AN IMAGE
- PRINT THE IMAGE
- PRODUCE A KEY
- OPEN THE LOCK

ACCESS TO TARGET KEY

- BORROW BRIEFLY
- AUTHORIZED POSSESSION
- AUTHORIZED USE
- COLLUSION WITH EMPLOYEE WHO HAS ACCESS TO A KEY
- PARKING VALET

CAPTURE AN IMAGE

- COPIER
- TRACE THE KEY
- CELL PHONE CAMERA
- SCANNER

OBTAIN DATA - COPIER

OBTAIN DATA

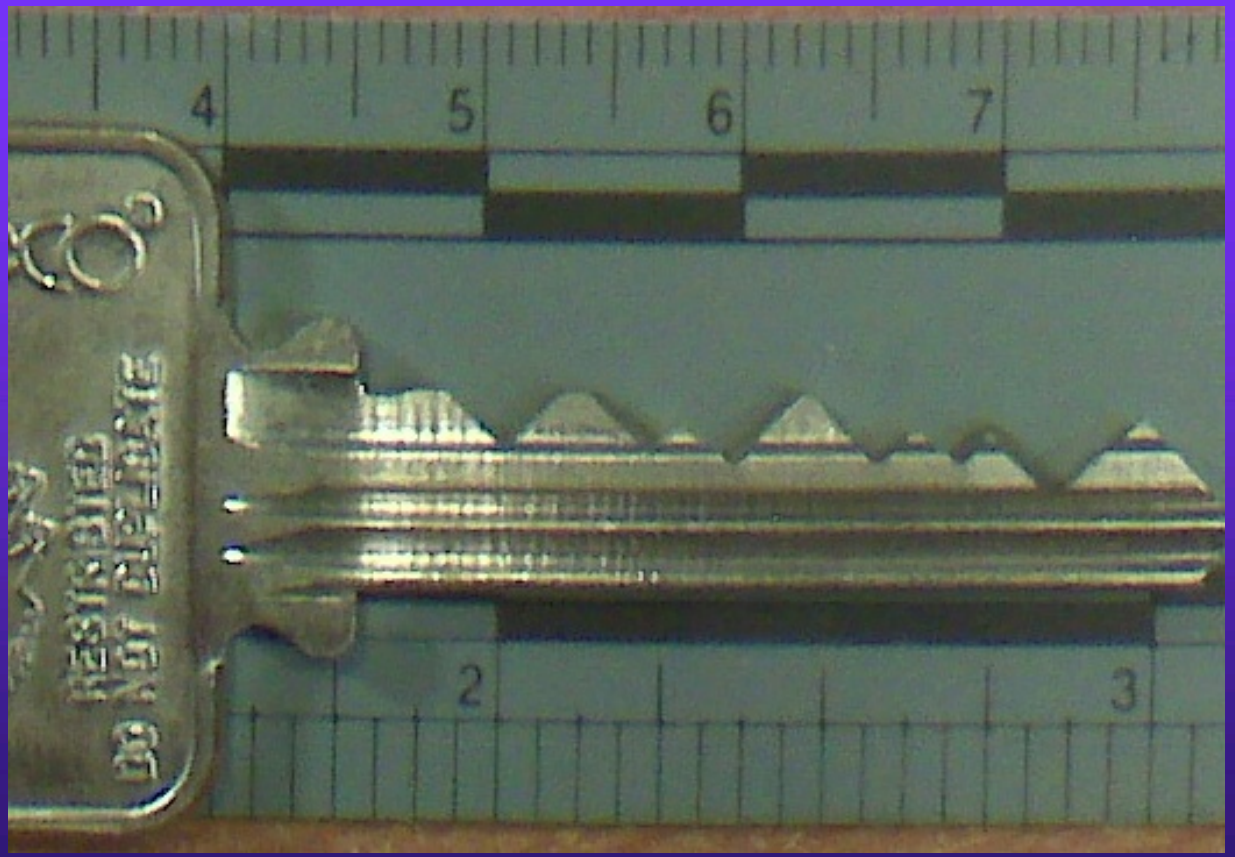
- SCANNER

OBTAIN DATA

- CELL PHONE

BLACKBERRY CAMERA

- CAPTURED IMAGE

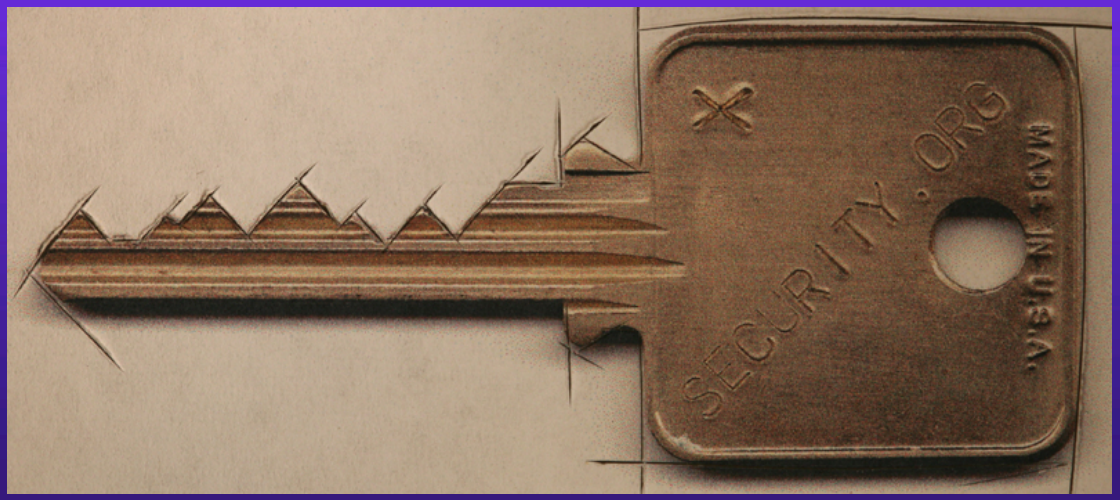


RESULTING IMAGE

- REPRODUCE THE IMAGE
  - On Paper
  - On plastic sheet
  - On Adhesive Labels
  - On Shrinky dinks® plastic
  - On a piece of copper wire
  - On a simulated metal key
  - On plastic credit card

CUT A FACSIMILE OF KEY

- KEY REQUIREMENTS
  - Vertical bitting only
  - No sidebar data
  - No slider data



HIGH SECURITY FACILITIES: CONVENTIONAL LOCKS

- CONVENTIONAL MECHANICAL LOCKS ARE NOT SUFFICIENT

OPEN THE LOCK:
Replicate the Key in Plastic

- MEDECO TAKES PLASTIC!

MEDECO SIMULATED KEYS: Replicate in metal

FAILURE OF KEY CONTROL: MEDECO TAKES PLASTIC

MECHANICAL LOCKS: NOT ENOUGH PROTECTION

- LIMITATIONS
  - GOOD FOR ONE PERSON, ONE KEY
  - WHERE DON'T NEED TRACKING
  - ADD DELETE KEYS NOT AN ISSUE
  - LOST KEYS
  - COPIED OR STOLEN KEYS

ELECTRONIC ACCESS CONTROL: HIGHER SECURITY SOLUTION?

- THE ANSWER TO MECHANICAL LOCKS?
- CURRENT SYSTEMS
  - MECHANICAL + ELECTRONIC
  - ALL ELECTRONIC
    - WIRED
    - DATA ON CARD
    - WIRELESS

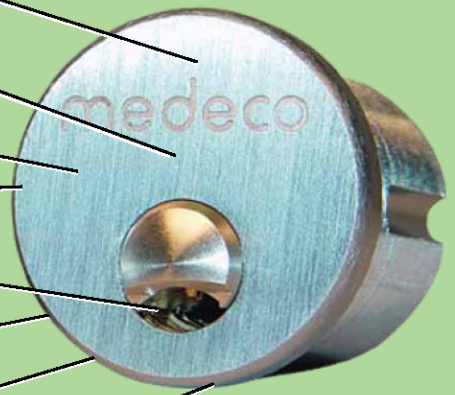
STAND-ALONE EAC: ASSA ABLOY CLIQ TECHNOLOGY

- MUL-T-LOCK, IKON, ASSA, MEDECO LOGIC = SAME TECHNOLOGY
- SYSTEM DESIGN
- ELECTROMECHANICAL STAND ALONE CYLINDERS
- MECHANICAL LOCKING + AUDIT
- ENHANCED CONTROL OPTIONS
- USED THROUGHOUT THE WORLD

LOGIC ATTRIBUTES

Logic Digital Cylinder

- Program Permissions/Schedules To Either Key Or Cylinder
- Program 1,000 Authorized Keys/Groups Per Cylinder*
- Up To 750 Audit Events
- No Wiring Required
- Combines Mechanical and Electronic Security
- Fits Narrow Stile Doors
- No Additional Door Hardware Required
- No Door Hardware Modifications Required
- Easy To Maintain Power Free Cylinders
- Optional Hardened Steel Nose
- Installs In Minutes
- Available In Most Standard Finishes
- KIK, Rim, and Mortise Styles

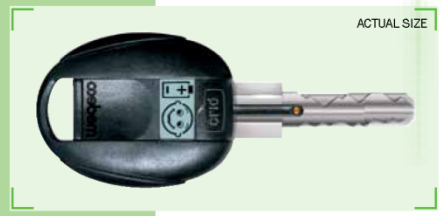


CLIQ AND LOGIC

- KEY POWERS THE LOCK
- MECHANICAL BITTING + CREDENTIALS
- EASY RETROFIT TO EXISTING LOCKS
- ADD-DELETE KEYS
- WIDE RANGE OF ACCESS CONTROLS: TIME, DATE, DOOR CONTROL

LOGIC AND CLIQ KEY

Logic Digital Key



- Mechanical and Electronic Security
- Patented Key Control
- Program Permissions/Schedules To Either Key Or Cylinder
- Up To 1,000 Audit Events
- Compact Size
- Reversible Key (Face-Up or Face-Down)
- Rated For -22F to 122F
- Easy To Read Status Screen
- Water Resistant
- 2 year or 20,000 Cycle Battery
- Quick and Low Cost Battery Replacement

EAC LOCKS: SERIOUS SECURITY ISSUES

- FALSE SENSE OF SECURITY
- FALSE BLAME OF EMPLOYEES
- NO EVIDENCE OF ENTRY FOR SECRET INFORMATION
- SECRETS COMPROMISED
- FALSE SENSE OF SECURITY
- EVIDENCE: CHAIN OF CUSTODY

POTENTIAL SECURITY VULNERABILITIES?

- BYPASS OF MECHANICAL OR ELECTRONIC SYSTEM
- AUDIT TRAIL DEPENDS ON READING THE KEY
- WHAT IF ONE LAYER IS BYPASSED
- RF-BASED SYSTEMS: BYPASS
- LOSS OF KEYS

MAGNETIC ATTACK: UHLMANN and ZACHER

Uhlmann & Zacher
Security Issue

Product mainly distributed by:
Häfele, Dorma, Primion
and others...

CLIQ AND LOGIC SECURITY ISSUES: KEYS

- MECHANICAL KEYS
- WAFER OR PIN TUMBLER SYSTEM
- OFTEN KEYED ALIKE SYSTEMS
  - KEYS ONLY CUT AT FACTORY
  - ELECTRONIC TECHNOLOGY IN KEY
- RESULTS IF KEYED ALIKE OR CAN DUPLICATE KEYS (MUL-T-LOCK)

CLIQ AND LOGIC SECURITY: SIMULATE CREDENTIALS

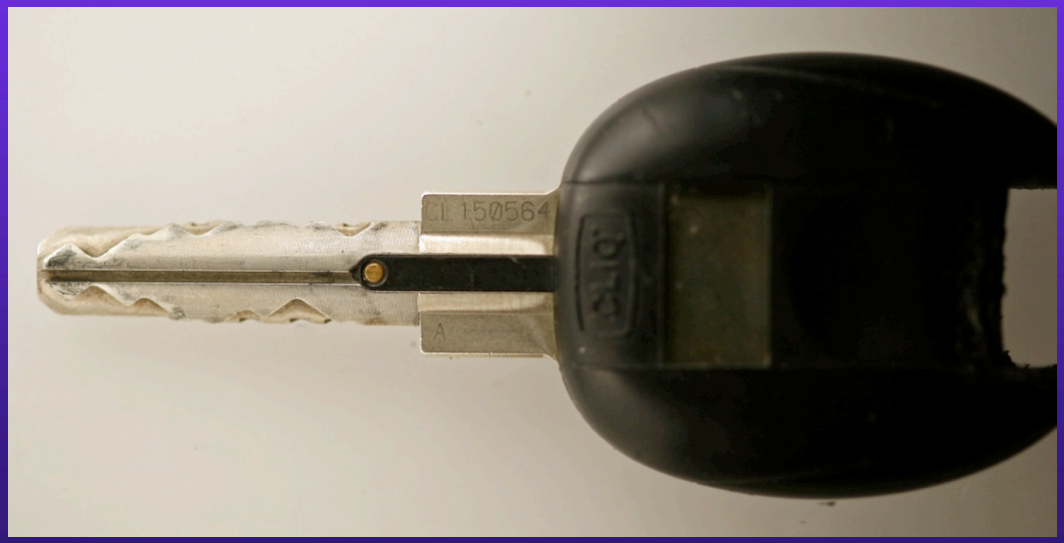
- SECURITY OF SYSTEM: MECHANICAL KEYS + ELECTRONIC CREDENTIALS
- QUESTION: POSSESS KEY AND SIMULATE OR BYPASS CREDENTIALS
- ONE LOST KEY: COMPROMISE ENTIRE SYSTEM

SECURITY AND AUDIT TRAILS

- BYPASS AUDIT TRAIL: AUDIT TRAIL IS DEPENDENT UPON READING THE KEY OR LOCK
- IF THERE IS NO AUDIT TRAIL:
- FALSE BLAME
- FALSE SENSE OF SECURITY
- UNKNOWN COMPROMISE
- NO EVIDENCE OF ENTRY

CLIQ AND LOGIC SECURITY

- MEDECO: “UNAUTHORIZED KEY COPYING IS REMOVED FROM THE EQUATION” “SUPERIOR PROTECTION AGAINST UNAUTHORIZED KEY COPYING”



CLIQ, LOGIC, NEXGEN POTENTIAL ISSUES

- PRELIMINARY RESEARCH
  - ONE KEY LOST, STOLEN, DELETED MAY COMPRIMSE ENTIRE SYSTEM
  - SIMULATE CREDENTIALS
  - OPEN IN 30 SECONDS OR LESS
  - NO AUDIT TRAIL
  - SIMULATION OF KEYS

LOGIC COMPROMISE: SIMULATE ELECTRONICS

CLIQ TECHNOLOGY: SERIOUS ISSUES

EAC:
CRITICAL ASSESSMENT

- MECHANICAL LOCKING SYSTEM
- MECHANICAL BYPASS
- KEYING SCHEMES
- BYPASS OF ELECTRONICS
- SIMULATE CREDENTIALS

OPEN IN THIRTY SECONDS: Cracking one of the most secure locks in America

www.security.org

mwtobias@security.org