Elements of Physical Security Systems II: Intrusion Detection, Alarm Communication and Assessment, Delay, and Response

International Biological Threat Reduction Department
Sandia National Laboratories
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Physical Security for Bioscience Laboratories
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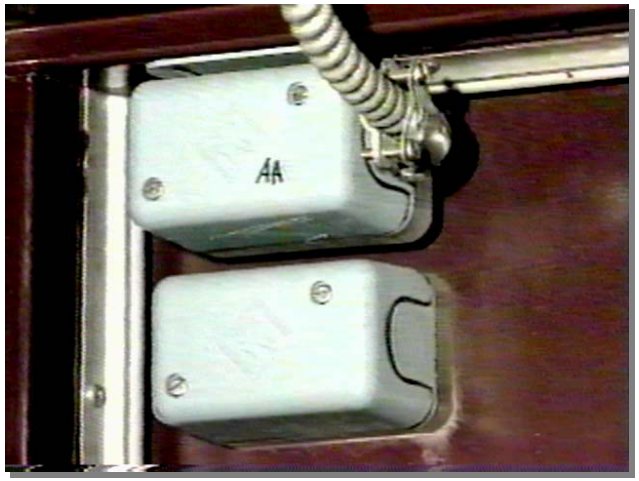
Intrusion Detection

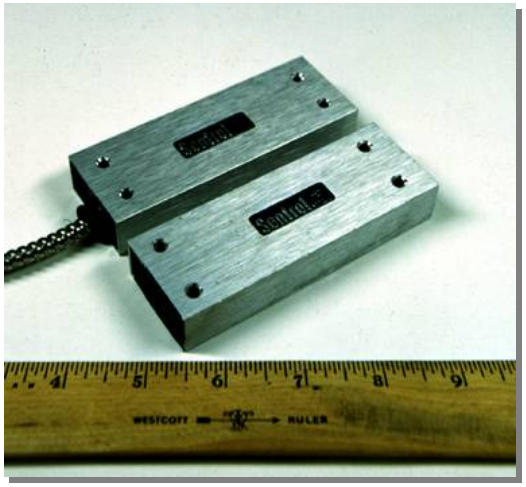
- **Objective: Detect unauthorized access**

- **Many types of intrusion detection**
  - **Personnel notice unauthorized access attempt**
    - **Training**
  - **Boundary sensors most applicable for bioscience facilities**
    - **Magnetic switches on doors**
    - **Glass break sensors on windows**
  - **Volumetric sensors may be appropriate for low-use areas of high risk (e.g. culture collection storage rooms)**
    - **Microwave**
    - **Passive infrared**

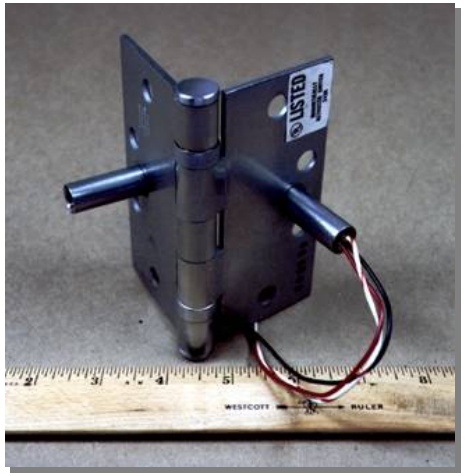
Magnetic Switches



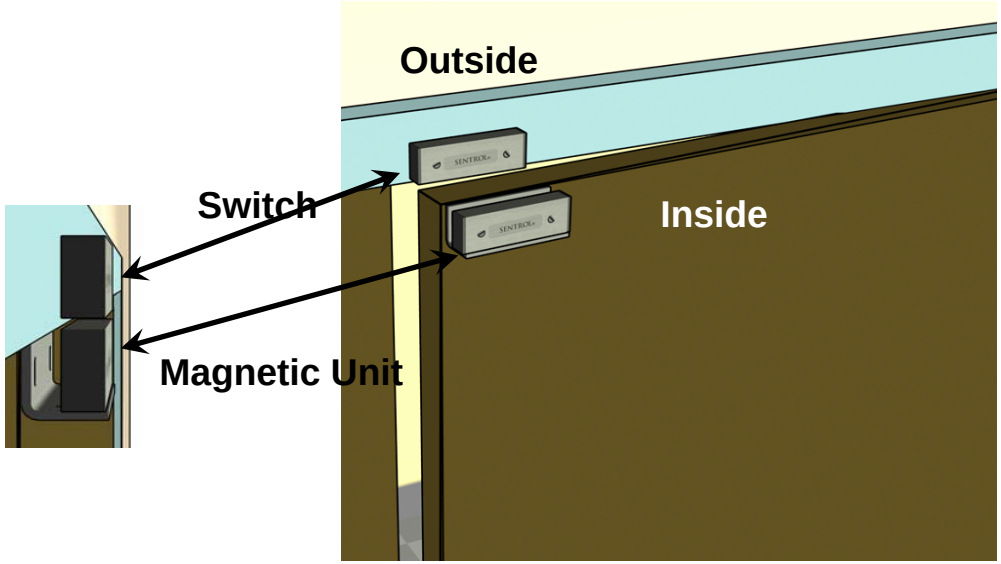
Balanced magnetic switch



Complex balanced magnetic switch



Covert magnetic switch



Balanced Magnetic Switches

- An internal magnet and reed switches are usually mounted on the door/window frame and a balancing (or external) magnet is mounted on the moveable door/window.

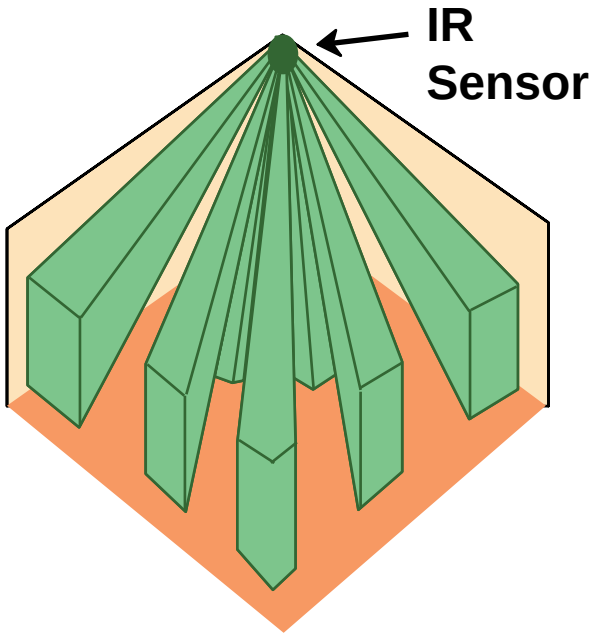
- An alarm condition occurs when a change in the magnetic field between the parts is detected.

- Major Causes for Nuisance Alarms:
  - Poorly fit doors or windows
  - Improper installation
  - Extreme weather conditions which cause excessive movement of the door or window.

Volumetric Sensors

- **Microwave**
  - **Most sensitive to movement toward or away from sensor**
  - **Nuisance alarms include: movement of metallic objects, fluorescent lighting, insects, movement outside of room**
- **Passive infrared**
  - **Most sensitive across field of view**
  - **Nuisance alarms include: heaters, thermal gradients, animals, sunlight, vibrations**
- **Limited applications in bioscience facilities:**
  - **Most appropriate for low use, high risk areas**
    - **E.g. Storage area for culture collection with very high risk pathogens**

Microwave sensor



Alarm Communication and Assessment

Sensor Activated → Alarm Signal Initiated → Alarm Reported → Alarm Assessed

- **Designer must decide:**
  - **What information should be presented to the operator?**
  - **How should the information be presented?**
  - **How does the operator interact with the system?**
  - **How should the equipment be arranged at the operator's workstation?**

- **Alarms must be communicated and displayed**

- **Alarms must be assessed before response is dispatched**
  - **Can be direct (guards) or remote (video)**
  - **Determine cause of each sensor alarm**
    - **Valid or nuisance alarm**
  - **Requires adequate lighting**
    - **Deters opportunistic adversaries**

BONG! BONG! BONG!
WHAAAAAAAAAA

Alarm Assessment

Direct observation by guards

- Can be campus police or other on-site security
- Takes time and can put guard in danger
- Can provide immediate response
- Can only tolerate low rate of nuisance alarms
- Labor intensive

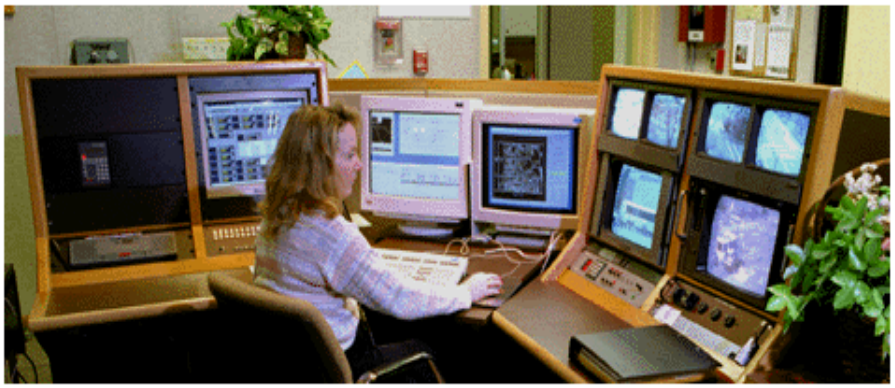
Remote assessment by video

- Video is immediate and focused
- Video is displayed to an alarm station operator for assessment
- Assessment of an alarm can occur almost immediately
  - Pre-event and post-event recording possible
- Later audit and review
- Efficient use of people
- Requires video infrastructure
- Can have high initial expense
- Maintenance can be expensive

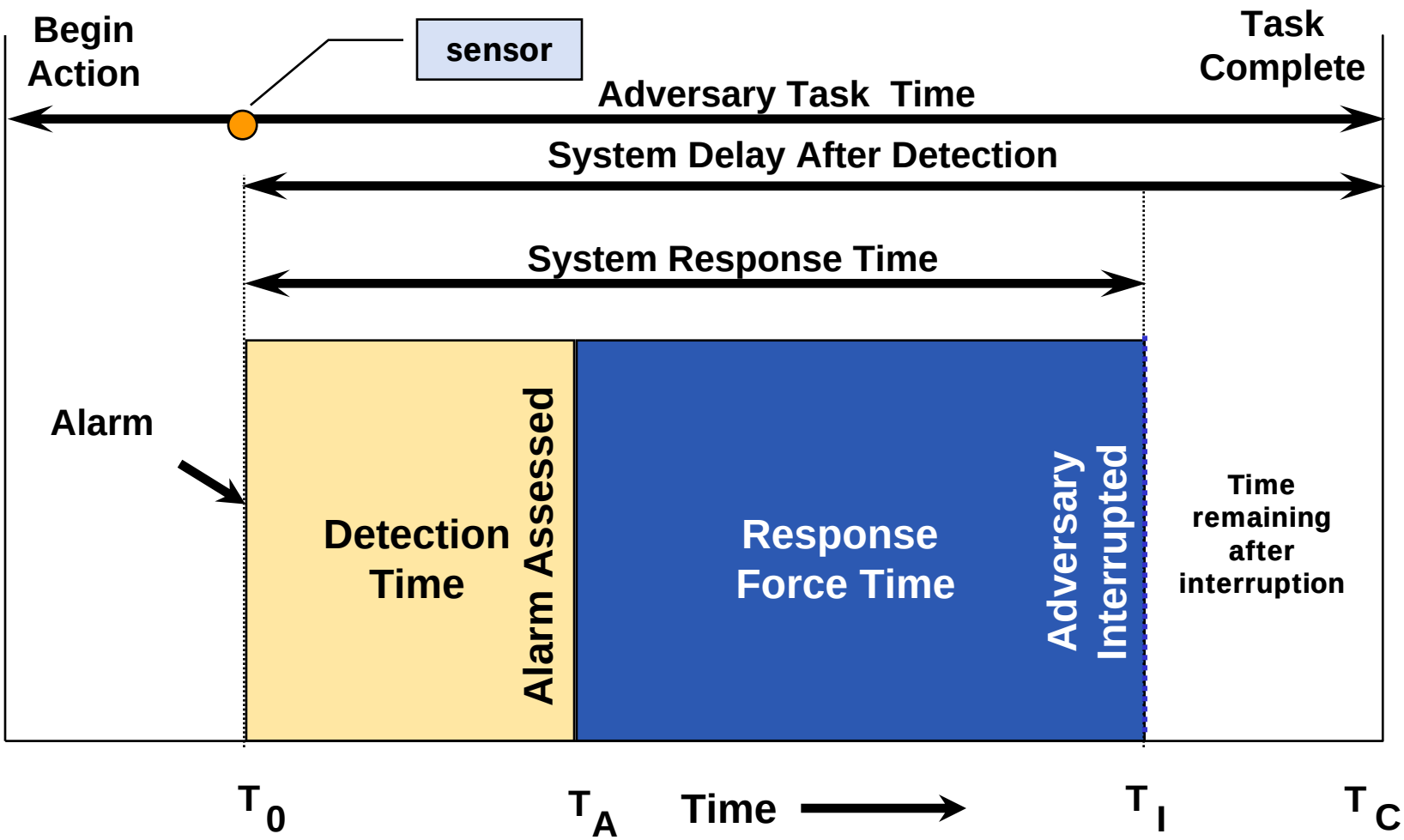
Video Assessment vs. Video Surveillance

- **Assessment**
  - **Alarm information triggered by sensor activation and directed to a human to determine if unauthorized access has occurred in a sensored area**
  - **Cameras located at sensor locations – e.g. pointed at doors**

- **Surveillance**
  - **Continuous use of a human as a intrusion detector to monitor several restricted areas that are NOT sensored by intrusion technologies**
  - **Systems often have many cameras**
  - **Someone must watch all video screens all the time**
    - **Personnel can only watch a few screens for a limited amount of time before fatigue**



Adversary Time vs. Response Time



Response Force Options

- **On-site guard force**
  - **Can serve intrusion detection and alarm assessment roles in mechanically-based physical security systems**
  - **Supports electronic systems:**
    - **Monitors Alarm Communication & Display (AC&D) system**
    - **Assesses electronic alarms at alarm console or at alarm location**
  - **Patrols perimeter and buildings**
  - **Summons and directs local law enforcement**

- **Local law enforcement (police)**
  - **Reinforces on-site guard force**
    - **Responds according to plan when summoned**
    - **Equipped and authorized to confront adversary**

Response Force Requirements

- **Qualification and training**
  - **Enforcement responsibilities and skills**
  - **Equipment familiarity and training**
  - **Familiarity with facility features and operations**
  - **Knowledge of restricted area access and biosafety**

- **Guard Force Post Orders**
  - **List specific duties and limits of authority**
  - **Procedures for response to specific alarm conditions**
  - **Emergency response procedures**
  - **Notification list**

- **Memorandum of understanding with local law enforcement**
  - **Specific instructions and agreements**
  - **On-site training and orientation**

Security Considerations

- Administrators have full control
  - The ultimate insider
- Protect the system using procedures
  - Two person control
  - Configuration management
  - Password control
- Restrict operator privileges
- Provide physical protection for equipment
- Backup equipment and procedures must be provided to maintain security
- Emergency power and uninterruptible power supply required for computers

Conclusions

- **Physical security systems will vary based on:**
  - **Resources**
  - **Choice of technology**
  - **Security system strategy**
    - **Physical security is more substantive for deny or contain than deter**
  - **Risk Assessment!**

- **Physical security systems should be performance based**
  - **Low and higher technology options**

- **Must consider unique aspects and requirements of bioscience laboratories**