

Recognition and Identification of Energetic Materials

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FDNY HazMat Operations



Madrid Train Bombing

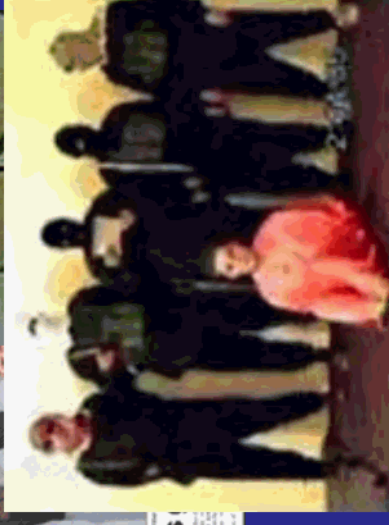
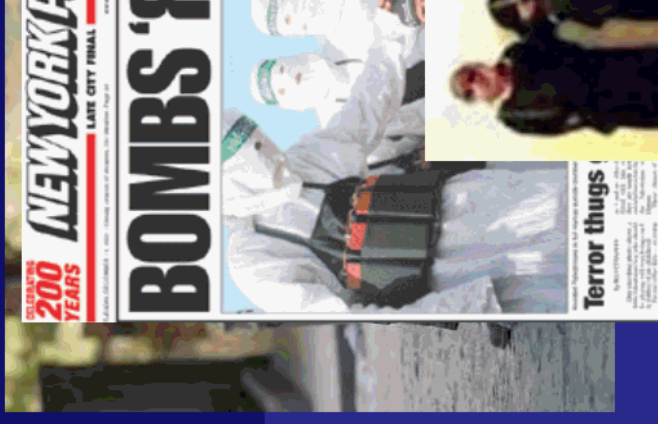
March 11, 2004

- Rush Hour
- Four Commuter Rail Trains
- 10 Bombs were detonated in 15 minutes
- Each backpacks contained approx 33 lbs of dynamite
- 3 other unexploded devices were found
- 198 Dead and 1,463 wounded
- Goals Accomplished:
 - Kill as many people as possible
 - Changed election results (*get left wing in office*)
 - Get out alive



Explosives

- Bombing is the “tactic of choice”
- Draws Attention & Dramatic
- Few skills needed
- Components readily available
- Low cost
- Can be executed remotely
- Intentional Psychological warfare
- Can be used to disperse chemical, biological & radiological agents

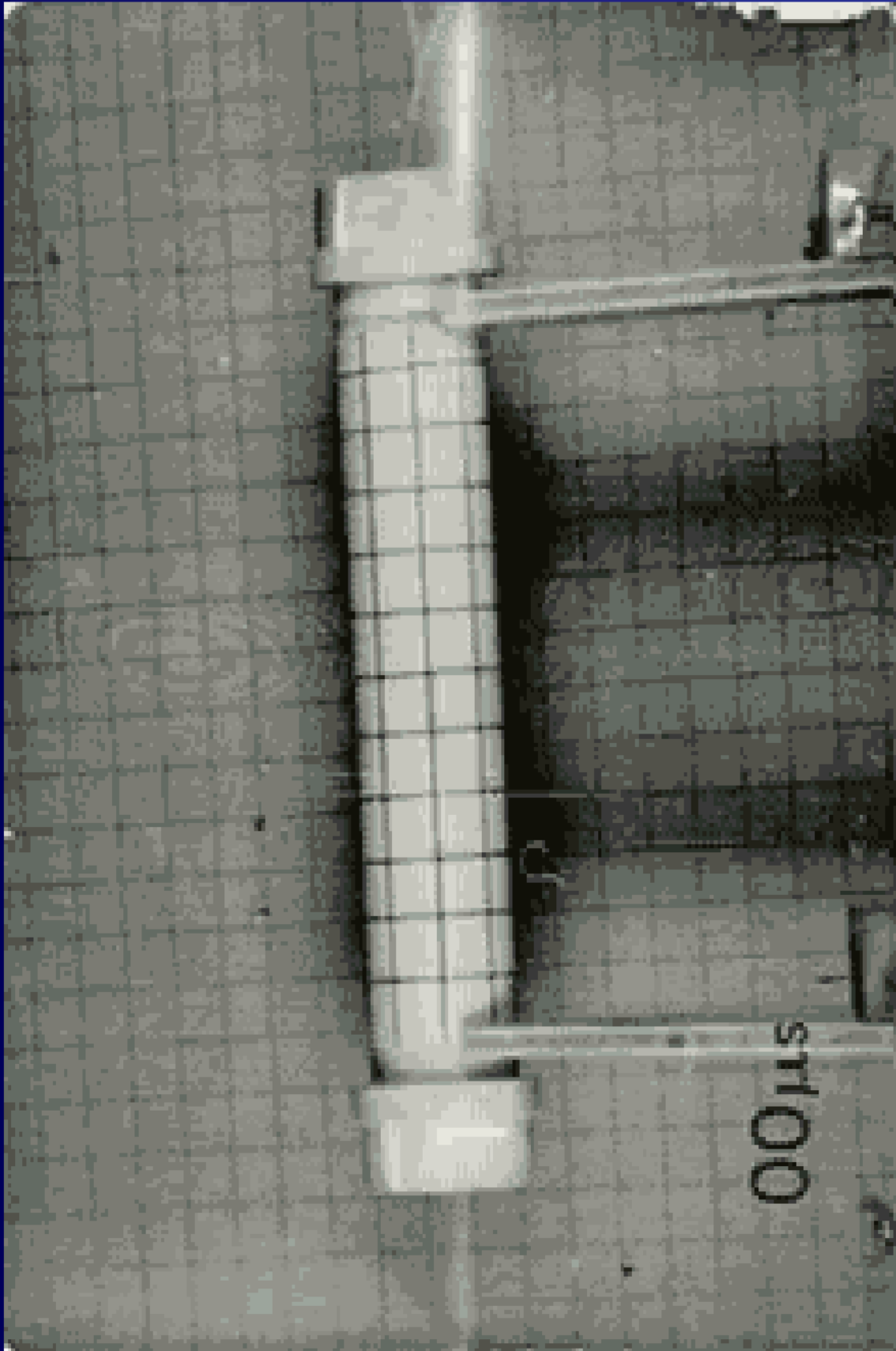


Energetic Material

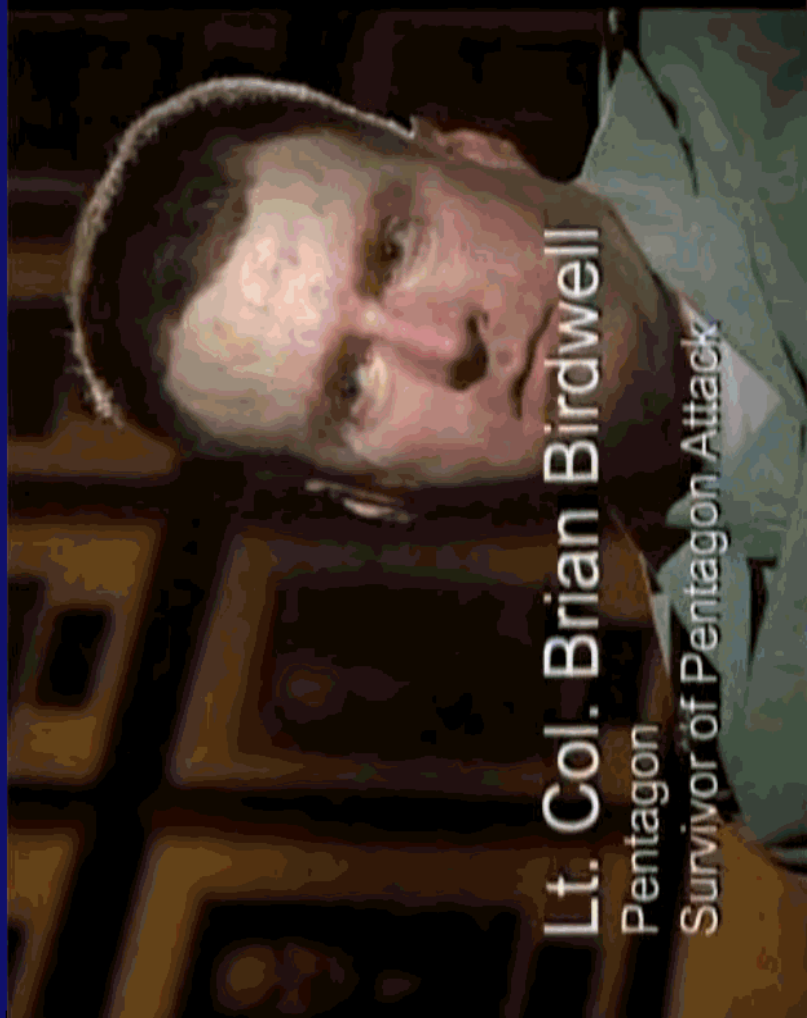
Material that can undergo an exothermic chemical reaction, rapidly releasing a large amount of energy.

- occurs in a fraction of a second
- solids and liquids transformed into superheated gases almost instantaneously





Blast Survivor



Lt. Col. Brian Birdwell
Pentagon
Survivor of Pentagon Attack



Received 80% burns to his body

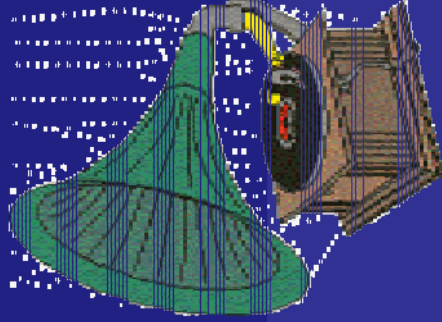
Forms of Energy Released



Heat



Light

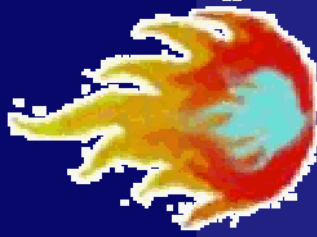


Sound

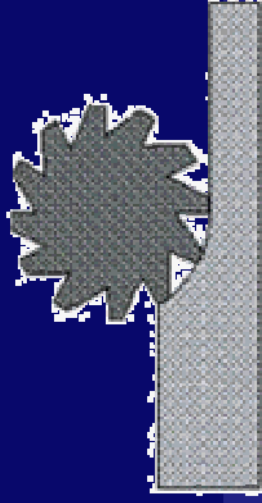


Stimuli

- Five forms of insults
- All create initiation through different mechanisms
- All impart energy in the form of **heat**



Heat



Friction



Impact



Electrostatic Discharge



Shock



Explosive Classification

- **Low Explosive** (*LT 3300 ft per sec*)
 - NOT less dangerous, less to ignite
 - Initiated by flame, ESD or Impact
 - e.g. Black powder, Smokeless powder
- **High Explosive** (*MT 3300 ft per sec*)
 - Initiated by shock from detonator or blasting cap



FYI: Gun 1100 fps - Rifle 2200 fps



High Explosives Classifications

- Primary- Detonated by small impetus (spark, flame, impact)
 - Lead styphnate, sodium azide
- Secondary- Requires larger impetus than primaries
 - PETN, TNT, RDX, HMX
- Tertiary- Requires huge impetus to detonate
 - ANFO (ammonia nitrate - fuel oil)



Explosive Effects

- Thermal Effects
- Blast Pressure
- Shock Wave
- Fragmentation



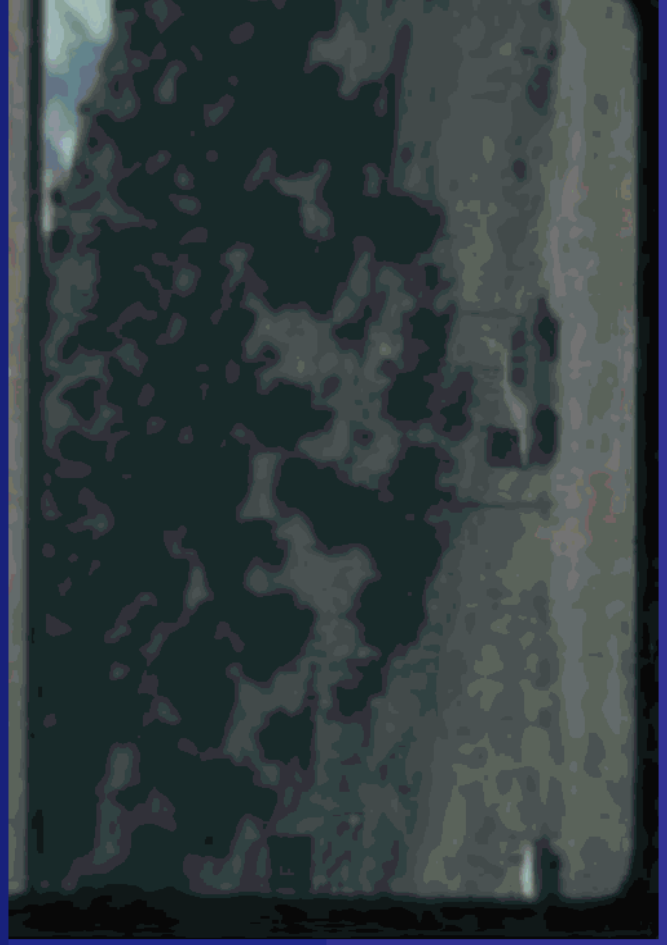
Blast Pressure

- Compresses air
- Pushes 360 degrees
- Under tremendous pressure
- When a shock front strikes a solid object
 - can reflect 2 to 9 times greater in force



Negative Pressure

- Ambient pressure is less than atmospheric
- Essentially a vacuum
- Follows immediately after Blast Pressure
- Lasts about 10 times longer



Fragmentation



Flooring Nails
Sandy Springs
Bombing



Axle from Ryder rental truck
used in vehicle bomb in
Oklahoma City
(2 blocks away)



Blast Injuries

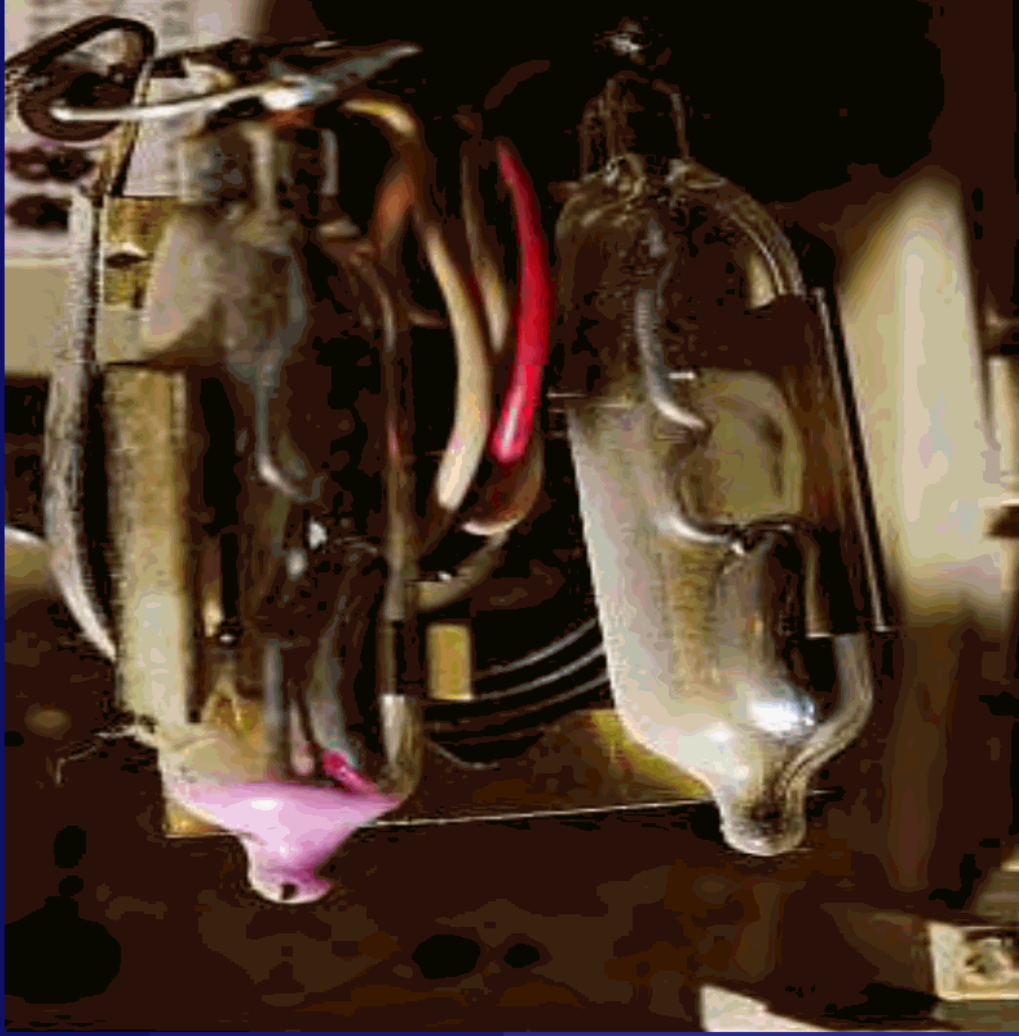
- Primary Blast Injury
 - Incendiary materials causing burns
 - Caused by blast wave
 - Change in positive pressure
- Secondary Injury
 - Caused by shrapnel
- Tertiary Injury
 - Caused by YOU becoming a projectile
- Type IV Injury
 - Inhalation of incendiary chemicals & smoke
- Miscellaneous



Improvised Explosive Devices (IEDs)



Components of IED



- Power Supply
- Initiator
- Explosives
- Switch

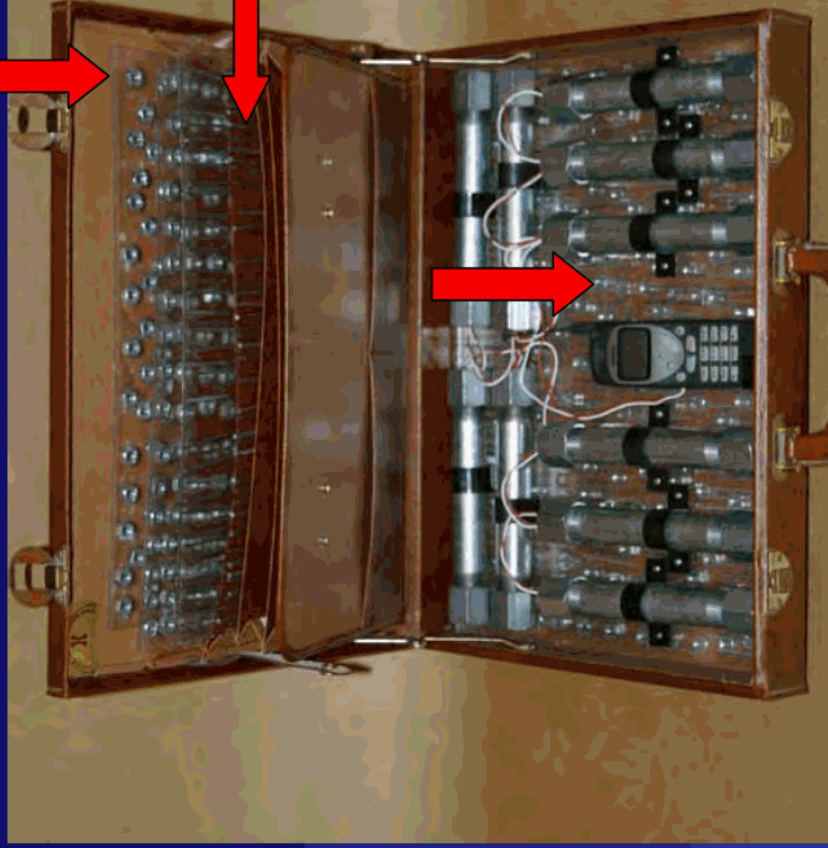
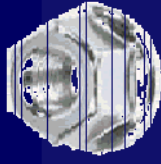


Improvised Explosive Devices

- Type I—inside a bag, box, or other object
- Type II—worn under or as part of clothing
- Type III—concealed in a vehicle



Type I IED



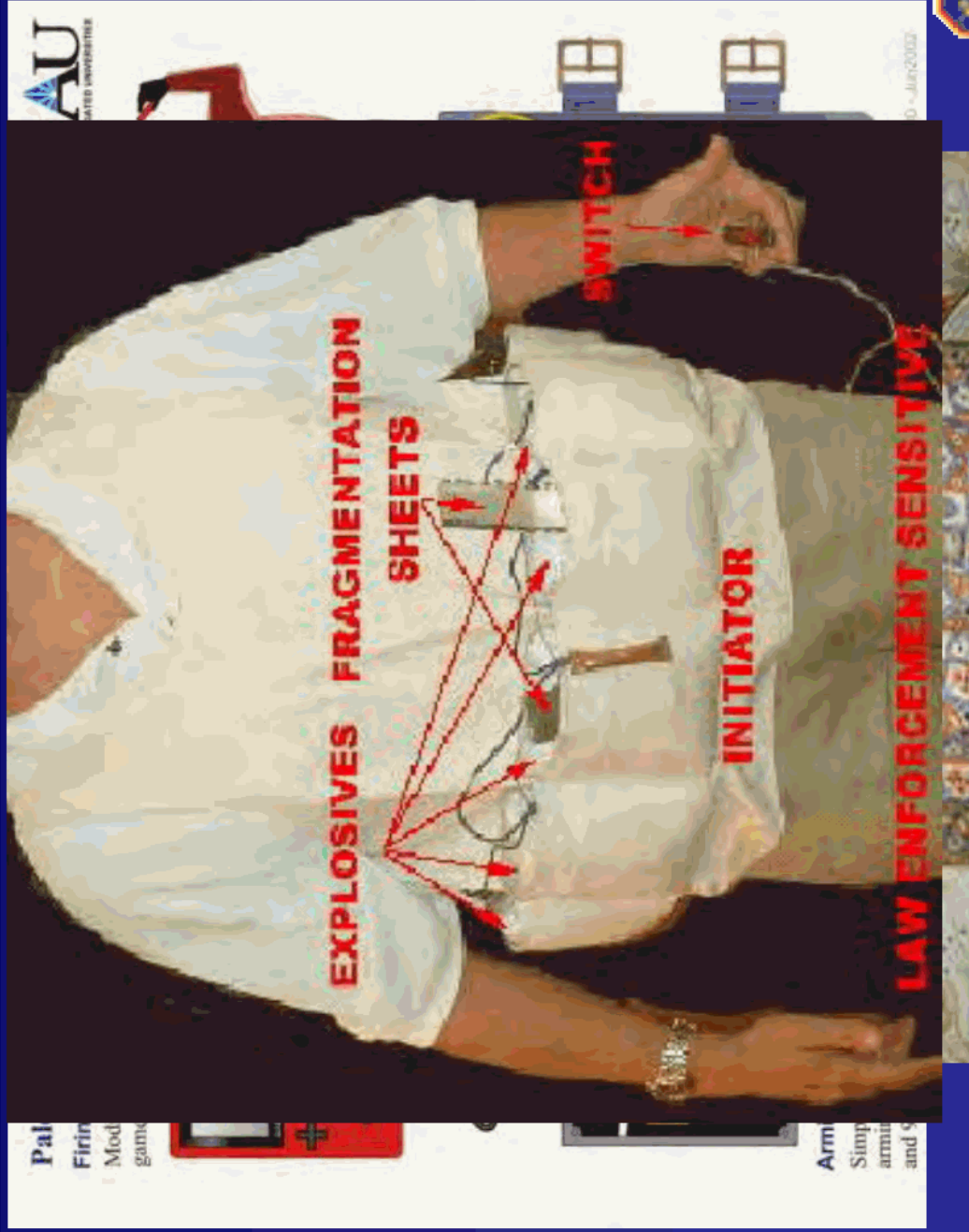
- Pipe bomb
- Satchel device
- Letter bomb
- Briefcase bomb

*Created according to specifications of
bombs used in Israel*



Type II IED

- Belts
- Vests
- Shoes
- Coats



Suicide Bomber Imminent Attack Phase

- Alone, nervous, profuse perspiration
- Loose or bulky clothing
- Concealed or tightened hands (holding detonation device)
- Rigid mid-section (explosive device or weapon)
- Exposed wires (possibly through sleeve)



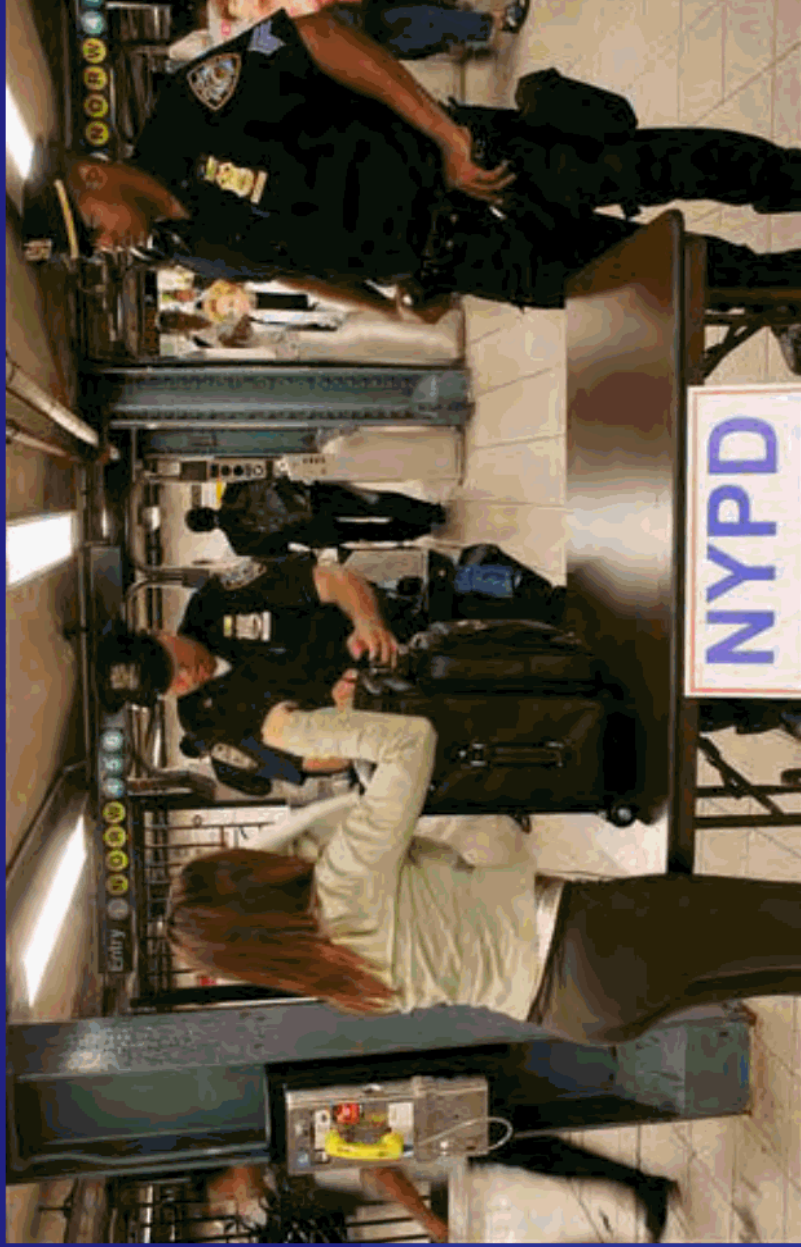
Suspicious Behavior

- Walking slowly while glancing right and left
- Running in a suspicious manner
- Repeated attempts to steer clear of security
- Repeated nervous feeling for something under clothing
- Nervous, hesitant
- Drug-induced state
 - (given drugs to calm down)



Suspicious Equipment

- A suitcase, backpack, or handbag
- Electric wires, switches or electronic devices sticking out of bag or pocket



Immediate Action Considerations

- Stay alert, especially in crowded places
- Situational
 - Consider indicators & total environment
- Report situation
 - Get as many details as possible about vehicle or person
- Take immediate actions
- Don't approach
- Don't close reactionary gaps
- Take cover
- Eliminate immediate threats to your life and public's
- Rescue operations conducted only under law enforcement protection

■ Stopped by police at checkpoint, she sets off explosives that kill officers, wound 16 others despite tight security for Jewish High Holy Days

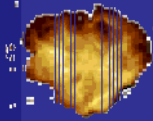


Phases of a Suicide Bomber

- Identify Bomber
- Recruit Bomber
- Train Bomber
- Target Selection/Recon
- Purchase Items
- Construct Device
- Final Preparation
- Move to target
- Device Detonation

Best Chance of Stopping

Interdiction
without casualties
unlikely or impossible



Best Chance of Stopping

- During Building Inspection
- Observations made during emergency responses



Fertilizer

Chemicals

BBs

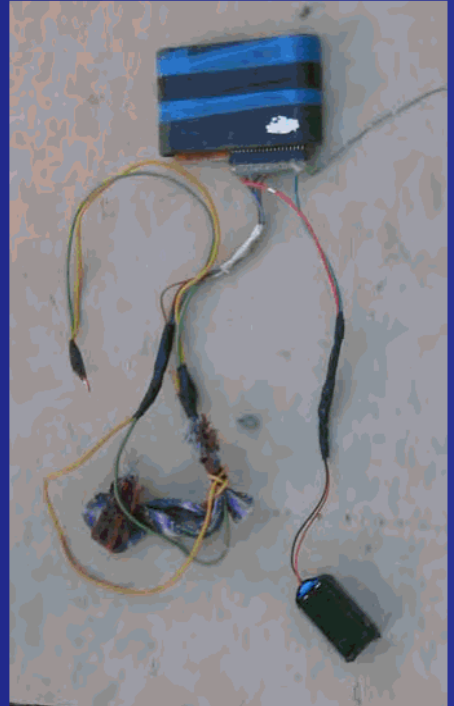
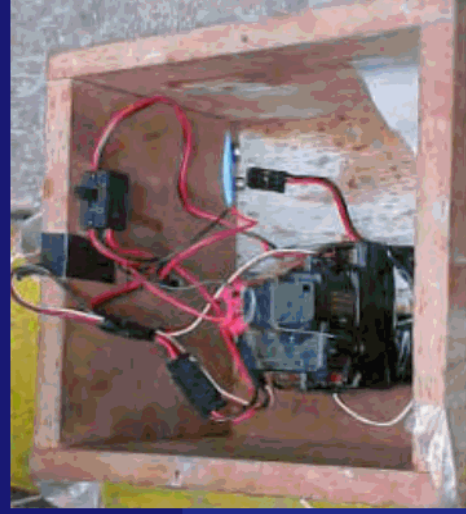
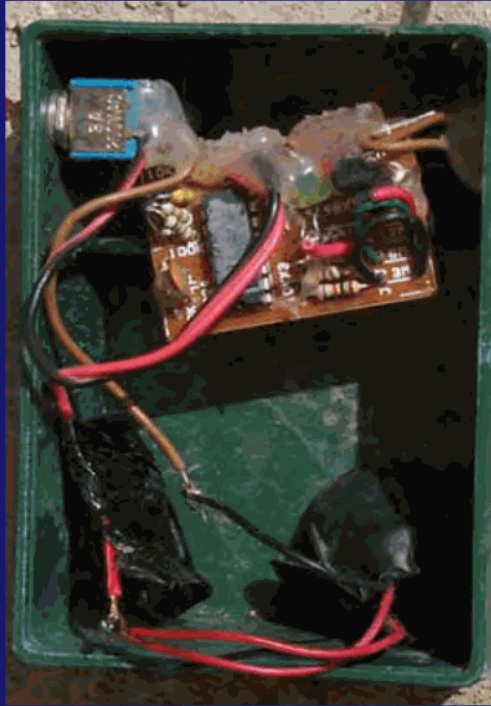
Nuts

Pipes



Indicators

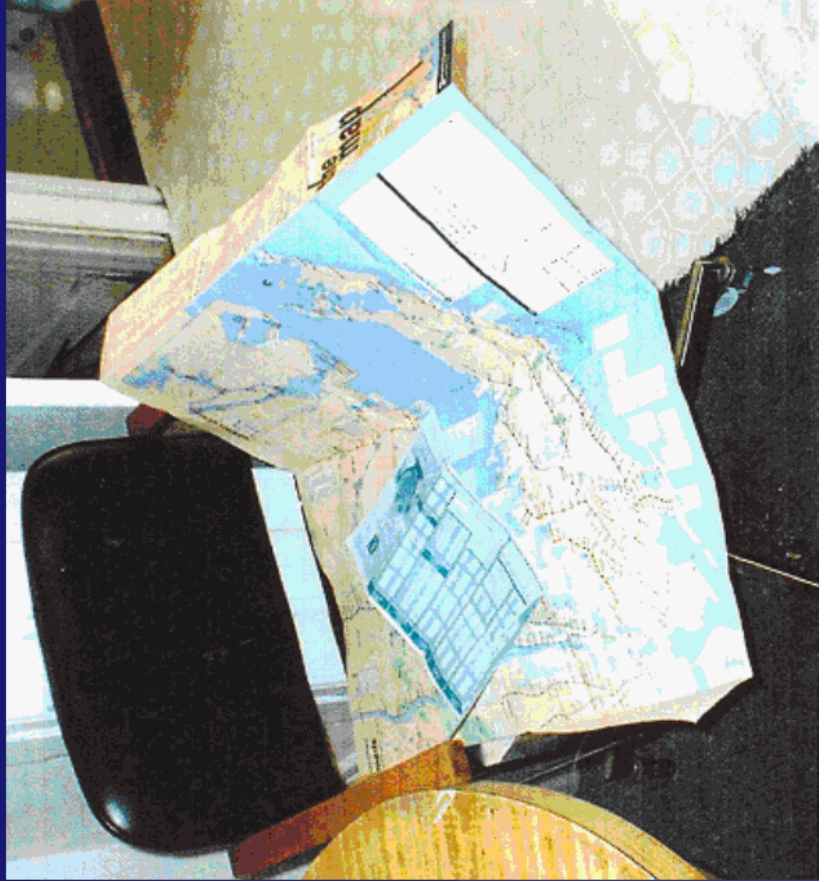
- Receivers from RC garage door openers, electronic boards, switches and relays





Indicators

- Urine boiled down to obtain the urea nitrate
- Maps / Facility blueprints
- Train schedules





Purification & Martyrdom video

- Presence of Video recording equipment/tapes
- Suicide Bombers offend record themselves making political messages



Suspicious Vehicle

- Mismatched or missing license plates
- Parked suspiciously for a prolonged time in a
 - central place
 - in a no parking area
- Vehicle's rear sags noticeably (loaded down)



Vehicle-Borne IED Type III

- Car Truck - 1500 lbs.
- Stretch limo - 3000 lbs.
- Ambulance - 4800 lbs.
- Corvette - 450 lbs



Military Type Explosives

15 lbs C-4

- White solid, malleable
- 1.25 and 2.50 pound blocks



If you receive a suspicious letter or package:

No Return Address
Restrictive Markings

PERSONAL!

CHIEF EXECUTIVE OFFICER
222 N. HARVIE ST.
PHILADELPHIA, PA 20565

Possibly mailed from
a foreign country
Excessive postage

Misspelled words
Addressed to title only
Incorrect title
Badly typed or written

Lopsided or uneven

Strange odor

Rigid or bulky

Excessive tape or string

Oily stains, discolorations
or crystalization on wrapper

- 1** Handle with care. Don't shake or bump.
- 2** Isolate it immediately
- 3** Don't open, smell, touch or taste.
- 4** Treat it as suspect. Call local law enforcement authorities



Various Domestic Devices

“Metal Pipe Bomb”



“Battery Bomb”



“Video Tape Bomb”



“PVC Pipe Bomb”



Cell phone Bomb

- Cell Phone purchased in Moscow
 - Detonated when turned “on”
 - Killed 23 year old woman



Many items are designed to look harmless






Potential Terrorist Targets

- Airports
- Theaters
- Cruise Ships
- Sport stadiums/arenas
- Bridges & Tunnels
- Water Supply Locations
- Research Laboratories
- Utility Facilities
- Historic Landmarks
- Mass Transit Facilities
- Federal, State and Local Governments
- Locations where Large Groups of People Congregate



Response Considerations

- Check for Radiation Release 
- Turn off ALL cell phones & radios
- Assess needs (PPE, shielding & decon)
- Review weather conditions
- Determine life safety threats
- Analyze potential for Secondary Attack

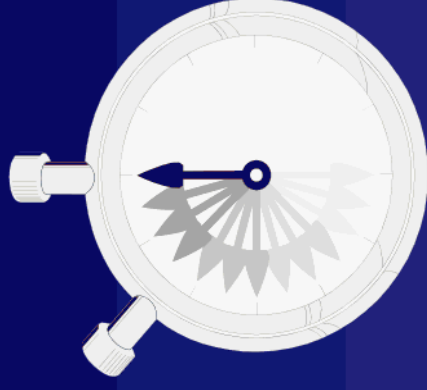


Communications

- Do not operate HT or mobile radio transmitters within 150 feet from suspected device
- HT's shall not be operated in a building in which police personnel are searching for an explosive device



Time

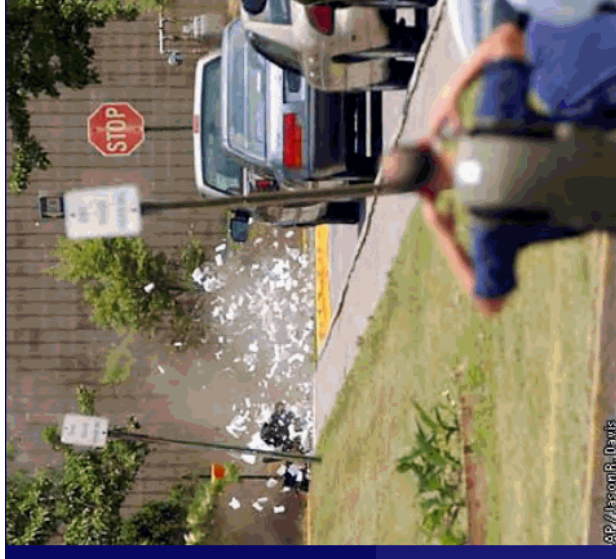


- Not on your side
- Risky as protection
- Minimize exposure time
- Time to detonation is unknown
- Do not go back to show device's location
- Once detonation occurs, harm is almost immediate



Distance

- More is always better
- Maintain safe distances
- Assume the “worst case” scenario
- Minimize personnel in blast area for rescue only
- If you can see the device, it can “see” you
- Move people away from the bomb,
 - Not the bomb away from people
- Never handle a device or suspected device



Damage Zones Chart

1 lb C-4

Ft. 1 2 3 4 5 6 7 8 40

Psi 1013 284 118 62 37 24 18 13 1

4800 lbs ANFO

Ft. 25 45 55 75 100 125 550

Psi 373 106 67 33 18 11 1



Effects of Overpressure

1psi-	Personnel Knocked Down
5psi-	Possible Ear Drum Rupture
15psi-	50% Chance Eardrum Rupture
30psi-	Possible Lung Injury
75psi-	50% Chance of Lung Injury
100psi-	Lethality Threshold
200-250 psi-	Nearly 100% Lethality



Shielding

- When Evacuation Distances cannot be met
- Use physical objects such as buildings & vehicles
- Remember structural differences
- Post-blast Shielding
 - PPE with SCBA or other respiration assistance



Crime Scene

- Emergency Responders should:
 - Preserve evidence & maintain chain of custody
 - Treat Entire Area as a Crime Scene
 - Disturb scene as little as possible
 - Support Law Enforcement

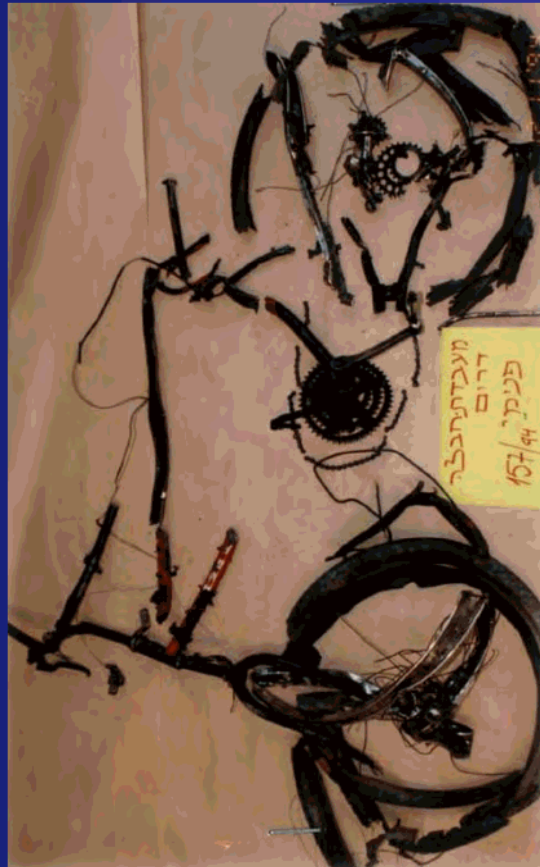




COMPUTER HOUSING



MOBILE PHONE



BICYCLE BOMB



EXPLOSIVE BELT
(ORTHOPEDIC SUPPORT BELT)



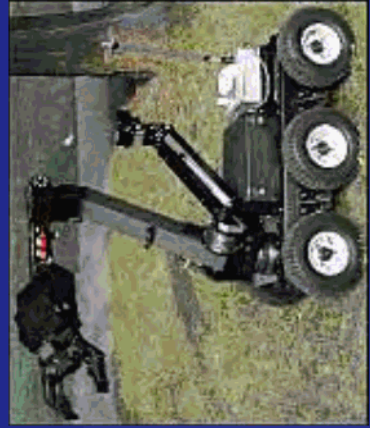
Safety

- Recognize
 - NEVER handle, move or inspect item
- Retreat
 - Note location
 - Leave same route as entry
- Report
 - Notify immediately



Safety

- Explosive materials should only be handled by Bomb Technicians.
- Once a device is found evacuation should take place immediately.



TO REPORT ALL SUSPICIOUS
TERRORIST TYPE ACTIVITY

1-888-NYC SAFE



