



Person-Borne Improvised Explosive Devices

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Introduction

The Threat to Global Civil Aviation Remains Significant.

- Attacks against civil aviation could result in significant economic and psychological damage
- Credible intelligence indicates terrorist groups will continue to develop plans that target commercial aviation
 - This includes pursuing a wide range of aviation targets, various methods of attack, and attack capabilities, to include the use of **person-borne improvised explosive devices (PBIED)**.
- **PBIEDs** are explosives that are concealed on-person, either under or within clothing, shoes, or other types of personal apparel.
- Terrorist organizations worldwide continue to develop innovative PBIED's that could potentially thwart detection



As a result, aviation security screening must continue to adapt and improve to meet evolving threats



Types of PBIEDs

- **Metallic** PBIEDs are easier to detect because they can trigger both Walk Through Metal Detectors (WTMD) and Hand Held Metal Detectors (HHMD).
- **Non-Metallic** PBIEDs consist entirely of well disguised non-metallic components (Initiator/Primary) and are more difficult to detect using traditional metal detection instrumentation.



Examples of PBIEDs

- Vests
- Belts
- Shoes
- Underwear



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How PBIEDs Threaten the Aviation Industry

- Terrorists are exploring new PBIEDs configurations to side step aviation security measures
- Terrorists are using new types of threat materials to improve their development of PBIEDs
- Publications such as *Inspire Magazine* communicate plans and capabilities, share new ideas, and promote Jihadist views to incite readers to carry out attacks



Over the last decade, there have been a number of successful and unsuccessful aviation terrorist attacks



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The Shoe Bomber

Date of Attack: December 22, 2001

Attacker: Richard Reid

Plot: Detonate explosives hidden inside the attacker's shoes

Location of attack: On a flight from Paris to Miami

Series of Events:

- Passengers on the flight complained of a smoke smell shortly after meal service
- A flight attendant found Reid sitting near a window, attempting to light a match
- Reid was eventually subdued by other passengers and was arrested on arrival



Images of Reid and the configuration of the shoe bomb.

Outcome of Attack: Reid was unable to detonate the bomb due to perspiration from his feet dampening the black powder



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Russian Aircraft Bombings

Date of Attack: August 24, 2004

Attacker: (Black Widows) Satsita Dzhebirkhanova and Amanta Nagayeva

Plot: Attackers used explosives hidden under clothing

Location of attack: On two flights departing Moscow

Series of Events:

- First Attack: Volga-Avia Express Flight 1303, flying from Moscow to Volgograd. Communication with the plane was lost while flying over Tula Oblast
- Second Attack: Siberia Airlines Flight 1047, flying from Moscow to Sochi. The plane broadcasted a hijacking warning while flying, then it lost radar contact and crashed



Wreckage from one of the destroyed planes.

Outcome of Attack: 79 passengers from the two planes were killed; it was realized the tickets were purchased within one hour before each flight



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The Underwear Bomber

Date of Attack: December 25, 2009

Attacker: Nigerian born Umar Farouk Abdulmutallab

Plot: Attempted to detonate explosives hidden in the attacker's undergarments.

Location of attack: On a flight from Amsterdam to Detroit

Series of Events:

- Abdulmutallab attempted to set off the bomb while hiding under a blanket, but set his leg and part of the plane's wall on fire
- Attacker was subdued by passengers and crew
- Al Qaeda in the Arabian Peninsula (AQAP) claimed responsibility for organizing the attack



Images of the underwear bomb and of Abdulmutallab.

Outcome of Attack: Abdulmutallab confessed to the attempted attack and is sentenced to life in prison



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Domodedovo International Airport Bombing

Date of Attack: January 24, 2011

Attacker: Magomed Yeyloyev of North Caucasus

Plot: Detonated explosives in an airport terminal in an attempt to attack foreign travelers

Location of attack: Baggage claim area of the international arrivals hall of Moscow's busiest airport

Series of Events:

- Investigators believe Yeyloyev was wearing a belt packed with shrapnel, pieces of chopped wire, and between 2-5 kg of TNT
- It is believed that Yeyloyev was under the direction of Chechen rebel leader Doku Umarov



Roses left for the victims of the Domodedovo Airport bombing.

Outcome of Attack: 37 people were killed and 180 were injured



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Thwarted Terrorist Plot

Date of Attack: April, 2012

Attacker: Yemen based Al Qaeda member

Plot: Suicide bomber to board a flight bound for the United States with a PBIED hidden in his undergarments

Location of attack: United States inbound flight

Series of Events:

- The bomber had not yet targeted which plane to board nor bought a ticket when the bomb was seized
- Officials believe that this new type of PBIED was the work of Ibrahim Hassan al-Asiri, one of Al Qaeda's top bomb makers



Ibrahim Hassan al-Asiri

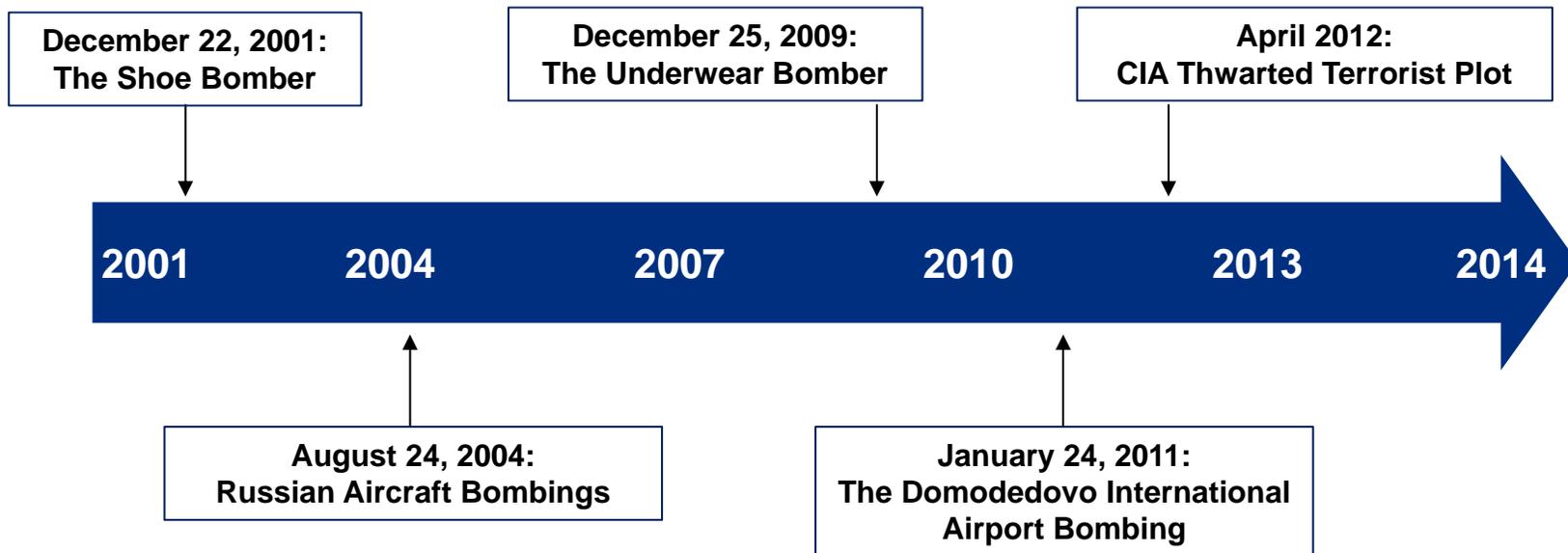
Outcome of Attack: Officials thwarted the plot with the help of foreign partners



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How to Detect and Deter PBIEDs

Since the deadly terrorist attacks on September 11, 2001, commercial aviation across the globe has been threatened by the use of PBIED attacks.



Aviation security needs to be continuously improved to detect and deter future attacks.



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Key Detection Technologies

Advanced Imaging Technology (AIT)

- Screens passengers for concealed weapons (metallic and non-metallic) and explosives

Explosive Trace Detectors (ETD)

- Detects a wide range of explosives
- Utilizes swab media to collect samples from carry-on items and passengers

Standoff Detection

- Allows for PBIED detection at greater distances
- Methods vary, but often focus on chemical identification to detect explosives and/or imaging

Advanced Imaging Technology (AIT)



Explosive Trace Detectors (ETD)



Standoff Detector



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Key Detection Capabilities

Passenger Screening Canines (PSC)

- Canines are specially trained to detect a wide range of explosives on passengers

Behavior Detection Officers (BDO)

- BDO's observe passengers as they go through security checkpoints. Passengers exhibiting suspicious behaviors are subject to additional screening.

Security Playbook Program

- The Security Playbook program strengthens transportation security by increasing the unpredictability of screening and by providing additional layers of security.
- This program employs security measures at direct access points and airport perimeters and uses a variety of resources and equipment to conduct screening of individuals and vehicles.

Passenger Screening Canines (PSC)



Behavior Detection Officers (BDO)



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Conclusion

- Terrorists remain focused on causing mass casualties to spread panic, fear, and significant economic damage
- The aviation community is a primary target for terrorist organizations and PBIED's are a weapon of choice for these groups.
- Terrorists continue to improve their PBIED capabilities in an attempt to circumvent traditional security measures.
- Combining random and predictable screening techniques results in an effective layered detection capability that is key to deterring terrorist attacks



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