



TLO

Learners will identify the primary components of commonly found IEDs.

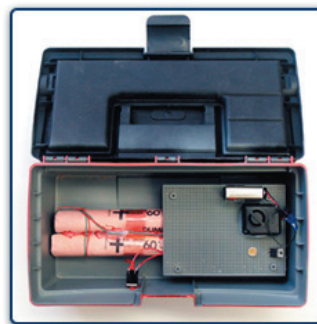
Recognizing improvised explosive devices (IEDs)

Homemade bombs are called improvised explosive devices, or IEDs. Frequently, they are designed to look like an object typically found in the area where they will be placed. For example, a bomb designed for use in a school might be packaged in a book.

Understanding the parts of an IED and seeing examples of IEDs may help you recognize and identify suspicious devices.

Note: This information will not train you to work as a bomb technician nor will it prepare you to handle or dispose of explosives.

A copy of Module 4: Recognizing Improvised Explosive Devices may be downloaded here (Resources section).



Module objectives

After completing this module, you will be able to identify the major components of IEDs and identify commonly found IEDs.



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Learners will be able to identify the major components of IEDs.

Major components of an IED

Improvised explosive devices, or IEDs, are typically comprised of four parts:

- A power supply
- An initiator
- The explosive material
- A switch

These components are easy to remember using the acronym PIES—Power supply, Initiator, Explosives, and Switch.



Power supplies

Initiators need a power supply, or source of energy. There are two types of power supplies:

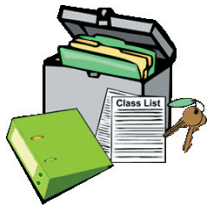
- Non-electrical
- Electrical

Types of power supplies

Non-electrical power supplies that provide energy to initiators typically have a mechanical action. One example is a spring under pressure—the arm of a mousetrap. In some devices, the striking arm could start a non-electrical initiator.

Batteries, including common household batteries and the type found in musical greeting cards, are sometimes used as an electrical power supply for electrical initiators. In fact, many IEDs delivered through the mail have electric initiators which require a source of electrical power.



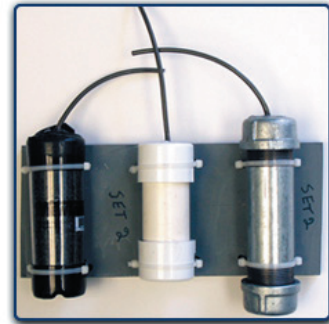


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Initiators

The initiator transmits energy to the explosive material. For example, the fuse to a cannon is an initiator that ignites the explosive — the gunpowder. Explosives either deflagrate, which means to burn, or detonate, which means to explode.



Types of initiators

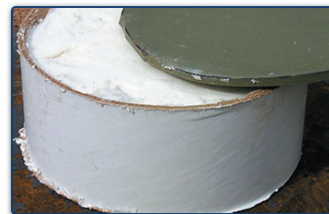
A blasting cap is an initiator that creates a small explosion, which in turn triggers a larger one in the explosive material. Blasting caps function like a firecracker but because they contain a small amount of high explosives, they are far more powerful than firecrackers.

A firearm cartridge primer is a typical non-electrical initiator.

⚠ Module 4 Practice 1

Types of explosives

Explosives are the IED component responsible for most of the damage resulting from an explosion. When they ignite, or detonate, explosives rapidly decompose releasing great quantities of gas and thermal energy. The packaging of the IED usually fragments into projectiles, causing additional damage. Some IEDs include shrapnel, which causes further injury or death.





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Shrapnel

In 1784, British officer Henry Shrapnel discovered the extra damage that could be realized by packing artillery shells with iron balls. Over time, shrapnel came to mean any object thrown from an explosive upon detonation.



Technically, shrapnel differs from fragmentation in that shrapnel is not a working part of a bomb. Shrapnel may include nails, ball bearings, marbles, nuts, bolts, screws or tacks placed in the device or fixed to the outside of the device.

Categories of explosive materials



Explosives are categorized by two criteria:

- The stimuli to which they respond
- Their degree of response once initiated

The terms low explosive and high explosive refer to how the explosive materials release energy. Low explosives deflagrate, or burn, at speeds lower than 3,000 feet per second. High explosives detonate, or explode, at a speed over 3,000 feet per second. This categorization dictates the safety measures appropriate for an explosive material.

Low explosives

Low explosives are designed to burn, or deflagrate. Black powder and smokeless powder are low explosives common in military and civilian use. They are usually initiated with a spark or flame.





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High explosives

High explosives detonate, or explode, rather than burn. In sufficient quantities, they are capable of massive destruction. They do not need to be confined to cause damage and fragmentation. High explosives are usually initiated by the shock of a detonator, or blasting cap. Typically, they will not detonate from a spark or flame — which is adequate for low explosives.



High explosives are categorized by their sensitivity to initiation and their explosive force:

- Primary high explosives
- Secondary high explosives
- Tertiary high explosives



Primary high explosives

Primary high explosives are the most sensitive of all explosives. They are easily detonated by heat, friction, impact, electrostatic discharge, or shock.

Primary high explosives are powerful enough to completely and instantaneously detonate other less sensitive, secondary explosives. This makes them suitable for use in blasting caps and military fuses.

Common primary high explosives include lead styphnate, lead azide, mercury fulminate, copper acetylide, barium chromate, silver azide, and DDNP (diazodinitrophenol).

Secondary high explosives

Secondary high explosives are usually used as main charges. They are less sensitive to shock, friction, heat, impact, and electrostatic discharge, and less hazardous to handle and use.

Because they are relatively insensitive, they must be detonated by both shock and heat. A small amount of a primary high explosive in the detonator will supply the needed shock and heat. Dynamite, C-4, and TNT are common secondary high explosives and are usually used as main charges.





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Tertiary explosives

Tertiary explosives are the most insensitive types of explosives. Most are fertilizer based, using Ammonium Nitrate (AN). Tertiary explosives will typically detonate only when exposed to a large detonation of another explosive material, usually a secondary explosive. These secondary explosives are called boosters. Dynamite can be used as a booster to initiate tertiary explosives.

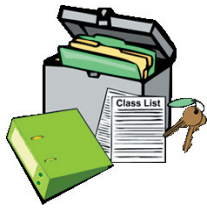


Switches

Switches are typically used to activate an IED remotely as they allow the bomber to be a safe distance from an IED before detonating it. Switches are either mechanical or electrical.

In theory, any switch that can turn something on or off can activate an IED. Only the resources, skills, and imagination of the bomber limit how IEDs are used and their complexity. A functional switch can be made from a range of items such as simple on/off switch, a clock, or a sophisticated electronic circuit.

 **Module 4 Practice 2**



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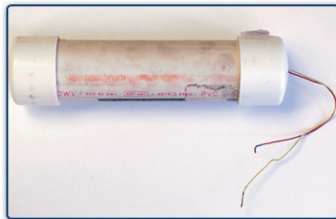
Learners will be able to identify commonly found IEDs.

Commonly found IEDs

Typically, IEDs are designed so they can be concealed in a container or some sort of packaging. The packaging may enhance the destructive effect, such as a metal pipe, or disguise its contents.

Common IEDs include the following types of bombs:

- Pipe
- Backpack
- Hypergolic
- Bottle
- Vehicle



Pipe bombs

Pipe bombs are the most common low explosive IED and look like a pipe with both ends closed. They may be made of galvanized steel, PVC pipe, or most any tube-shaped material.

Pipe bombs typically have a two-step detonation. A fuse is inserted into a pipe filled with black powder. When the fuse is ignited, the flame ignites the black powder. High pressure generated from combustion of the explosive tears the pipe apart. This pipe fragmentation has the potential to cause tremendous damage.

Crickets

Another common version of a pipe bomb is a cricket. Instead of using pipe to package the explosive material, a CO2 cartridge is used.

Frequently, crickets use the same ingredients as a pipe bomb. They are usually constructed with a simple burning fuse initiation system, and do not utilize switches or batteries that energize the initiation system.



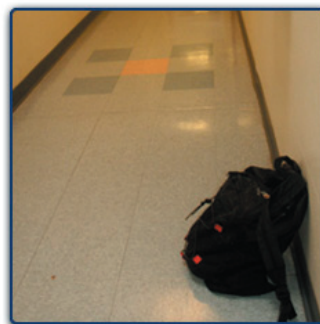


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Book and Backpack Bombs

Book bombs are hollowed out books with a pipe bomb inside. Their destructive effect can be amplified by attaching a chemical agent to the device. When the device is exploded, the chemical is dispersed.

A backpack bomb is a bomb concealed in a backpack. The backpack works to conceal the bomb as well as provide space for additional bombs.



Hypergolic Bombs

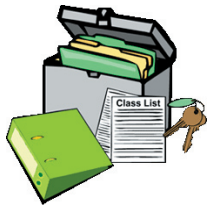
A hypergolic bomb is a bomb that detonates when a fuel and an oxidizer ignite spontaneously on contact. The two agents must be kept apart until the device is placed at the target site. One design is to put some sort of fuel in a glass jar. Then, a styrofoam cup containing a reactive agent, typically an acid, is placed in the opening of the jar. As the acid burns through the cup, it mixes with the fuel in the jar. Detonation occurs when the two chemicals mix. Mechanical or electrical timers may also be used to begin the mixing.

Bottle Bombs

A bottle bomb, or Molotov cocktail, is another type of hypergolic device. A solid form of a chemical is dropped into a bottle containing a liquid form of a reactive chemical. The two chemicals react, and the bottle explodes when the force of the reaction is greater than the tensile strength of the bottle. Because the reaction time may be very quick, this type of bomb can be very dangerous to the person building it. A bottle bomb does not need an external initiator.



 **Module 4 Practice 3**



Learners will be able to identify commonly found IEDs.

Vehicle bombs

A vehicle bomb is an IED that is built to fit in and detonate in a car or truck. They may be very powerful and commonly use ANFO, ammonia nitrate and fuel oil, as the primary explosive material. ANFO is easily obtainable.

Both the World Trade Center bombing in 1993 and the Oklahoma City bombing featured explosives packed into large vehicles. As a consequence, everyone is wary of vans or large delivery trucks. This thinking may get in the way of understanding what to look for. It is possible to create a catastrophic event with an amount of ANFO that will fit in a compact car.



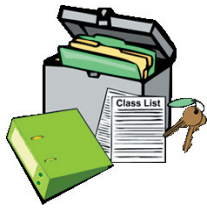
Size matters

The bomb detonated at the World Trade Center in 1993 contained approximately 1,200 pounds of explosives. A large car, such as a SUV, can hold approximately 1,500 pounds of ANFO.

Catastrophic structural failures can be caused by as little as 500 pounds of ANFO strategically placed. A small car, such as a Corvette, can hold almost 500 pounds in its trunk.

Larger devices enclosed in a delivery truck could cause widespread damage if detonated in a developed area.

 **Module 4 Practice 4**



TLO

Learners will identify the primary components of commonly found IEDs.

Module 4 Summary

- **The major components of IEDs**

IEDs typically, but not in every instance, have four primary components. The components are easy to remember using the acronym PIES—power supplies, initiators, explosive materials, and a switch. The power supply provides the initiator with a source of electrical or non-electrical power. The initiator transmits energy to the explosive material. The explosive material is the IED component responsible for most of the damage. Explosives are categorized into high and low explosives by the stimuli to which they respond and the degree of response once initiated. A switch is the component that allows the bomber to be a safe distance from the device when detonated.

- **Commonly found IEDs**

IEDs are designed to be concealed and frequently are packaged in material common to where they will be placed. Pipe bombs and crickets are common low explosive devices that typically use black powder for the explosive material. Pipe bombs are easy to conceal in a backpack or book. A bottle bomb is made when two reactive chemicals are mixed together in a bottle. Vehicle bombs are IEDs built to fit in and detonate in a vehicle.

 **Module 4 Knowledge Check**