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BOMBERS, WIRES AND EXPLOSIVES PART II. – DEATH ARRIVES WITH US –²

*„Regarding terrorists forgiving is God’s task.
Our job is to organize the meeting!”³*

INTRODUCTION

In war zones, areas of civil wars and due to terrorist activities a large number of explosive devices are left on the operating areas. Trained experts from terrorist organizations can easily use these items to create explosive devices used for malicious activities. When individuals of a terrorist organization commit bombings against a better armed, stronger military force we call it asymmetric warfare. Asymmetric challenges are such unconventional or low cost malicious actions against which it is not possible to prepare adequately (terrorism, using of threatening with weapons of mass destruction).

The costs of this form of warfare are low, can be done by simple tools and methods, consists of all types of – often self sacrificing - guerilla and partisan style ambushes and other actions. Thus it is the weapon of technically „weaker”, less trained side mostly fighting in occupied territories against the invading forces. The forces employing asymmetric warfare use simple and often unusual means of fighting with great success exploiting the strength of the opposing force as their main weakness. Their goals are to achieve maximal result with as minimal force as possible. The small size units enable to make quick decisions and successful actions.

They do not face the enemy in a head-on fight as they do not own the necessary military potential. Experience show, that in a prolonged armed conflict or war the possibilities of asymmetric warfare to spread increases with the elapsed time. No wonder we are facing this type of warfare in Afghanistan and Iraq.

The safety of friendly or allied troops requires the detection and proper handling of explosives devices which jeopardize their activities. During peacetime activities in former or active war zones we can often encounter land mines (anti-personnel, sometimes anti-tank) used by regular military forces of various countries but improvised home made devices are also widely used. So it is necessary to analyze and organize our knowledge and experience gained in domestic or foreign operating areas and also to discover and develop new solutions and methods in parallel to that.

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³ Source: Schwarzkopf general – Hence: <http://tortenelemklub.com/erdekessegek/jegyzetek/660-idezetek>;
Download: 10.07.2013.

Regarding the latter it is so important to learn about the new explosive devices. This – if we can call it – an “industry” is developing rapidly and because of the fast information exchange between terrorists the availability of specific IEDs are no longer restricted to certain regions.

VICTIM OPERATED IMPROVISED EXPLOSIVE DEVICE (VOIED)

This is the most widely used type of explosive device. They are planted into locations in which they are hard to detect by the opposing forces. They can be simple devices operating like anti-personnel or anti-tank mines or additional anti-defusal traps. The latter is used when they have observed the procedures of detection and defusal of explosives devices found earlier. Initiating mechanisms of such devices can be varied from pulling simple safety pins, breaking of electric circuits to much more complex methods. By examining the discovered devices it can be stated that there is no physical contact between the planter of the device and the victim. The victim triggers the explosion. In certain cases the planting of the device can happen much earlier than the arming. The victim operated devices have the common, significant problem – there is no safeguard for targeted operation, the explosion can be triggered by humans and animals alike. We can categorize these devices by their operating principles.

PRESSURE PLATE IMPROVISED EXPLOSIVE DEVICES

This is the most common type of IED due to the cheap construction costs and it is easy to plant. The main charge can be formed out of almost anything like unexploded projectiles, home made explosives or even devices with directional explosive effect. The attacker does not need to be present to trigger the explosion. The most serious drawback of these devices regarding civilians is that they can be activated by anything and anyone – friendly forces, civilians or even animals. Also a disadvantage is the difficulty of handling. If the circuit is closed while planting the device it can detonate prematurely. These devices can be found with simple detectors due to the amount of metal components. There are two types:

Victim Operated Pressure Plate Improvised Explosive Devices⁴

Most of the discovered devices were using two saw blades. Terrorists spread the well-tried method among them. From one viewpoint this is an advantage. Knowledge on the working method and structure allows soldiers to be trained easily to counter the threat. On the other hand it is a disadvantage since this easy method can be taught to completely uneducated terrorist personnel.

⁴ See more: DR. KOVÁCS Z. Az improvizált robbanóeszközök főbb típusai; Műszaki Katonai Közlöny XXII. évfolyam, 2012. 2. szám, pp. 37-52., ISSN 2063-4986



1. picture Pressure Plate various – Bicycle Seat Spring⁵

This method is popular due to the cheap costs and materials easy to obtain. Between two metal parts a non-conducting material is placed. When pressure is applied on the upper metal part, the plates close the circuit through the wires attached to the plates. Discovered unexploded devices were found to be inoperable due to contamination between the metal plates (sand, rock, debris) preventing contact or the electricity source providing the circuit ran down. After these, they started to employ insulation around the devices.

Radio Control Armed Victim Operated Improvised Explosive Devices

Contrary to the previous type in this case the operator can choose the target for the device. It can be armed during observation. It is an advantage for the user, that the handling is much safer as the device is not armed during the planting process. In case of mistakes (accidental contact closing the circuit) the device will not activate. The disadvantage of this method is the possibility to block the arming signal between the operator and the device by radio jamming which makes the device inoperable. The latest improvement to this structure is an external antenna placed outside of possible jamming range so the arming signal can be received by the device on a wire.

TRIP WIRE IMPROVISED EXPLOSIVE DEVICES

One end of trip wire is fixed while the other end triggers the explosion on pulling or cutting. The most common component used is a clothespin. They attach metal conductors to both halves of the spin and they break the circuit with an insulator of some sort. If the insulator is pulled out of the spin the circuit will be closed and the charge will explode. This device is difficult to detect and effective against both personnel and vehicles. Disadvantage in this case is that it can be defused relatively easily and there are no possibilities to select specific target. A conventional military tripwire AP-mine fits into this category. The home-made explosive device equipped with double tripwire system has the same method of planting of the single one. The difference is that it has two tripwires attached in two directions to make sure the victim activates the device coming from either direction. It is used mostly on bridges and narrow passes.

⁵ Source: <http://publicintelligence.net/victim-operated-improvised-explosive-device-voied-recognition-guide/>;
Download: 30.09.2013.

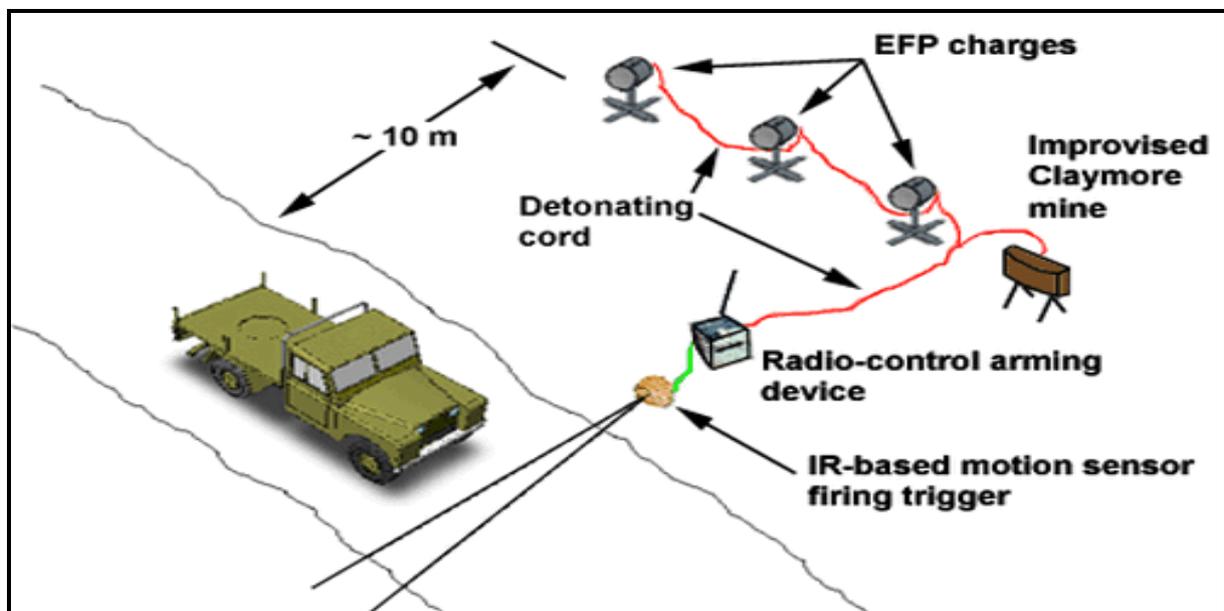
Improvised Claymore Mine

From the home-made tripwire explosive device the directional effect fragmentation mine has the most interesting structure. Using fragmentation mines are more and more popular between terrorists as they have a very high effectiveness. Often they are used together with rocket and grenade launchers to achieve an anti-armor capability. These devices require more expertise to use so they are planted by small groups. To acquire directional effect mines is not a difficult challenge from the viewpoint of the bombers.

It is important, however that the effectiveness and killing power of these mines have given distances. To increase this distance they used to apply more (mostly plastic) explosives in front of the mine and fill it with material for fragmentation effect (metal or glass pieces etc). For camouflage they put the device into cloth sacks, plastic boxes. Then they plant the device to a place where they had observed movement of larger enemy forces.

Explosive Devices with Explosively Formed Projectiles⁶

They plant this directional effect improvised explosive device the same way like a fragmentation mine. The target upon arrival usually cuts a wire or closes an electric circuit and activates the mine. This home-made device was developed against armored targets. This type uses victim or observer activation methods. They put the explosive into a tube like container and cover it with a dish-like copper plate which is convex in the direction of the explosive charge. The metal part will form an explosively formed projectile (EFP) of molten metal. This hypervelocity projectile will burn through and penetrate armor causing serious injuries to crew members with heat, blast and fragmentation effects. This EFP warhead can be initiated by any types of ignition. The device will be the explosive charge itself which they often use in groups connected by network systems.



2. picture Combined VOIED the sketch of forming⁷

⁶ See more: LUKÁCS László - Kis akna történelem; Nemzetvédelmi Egyetemi Közlemények 6. évf. 3. szám, 2002. pp. 15–57. at - http://portal.zmne.hu/download/bjkmk/muszaki/tortenelem_lukacs.pdf; Download: 20.09.2013.

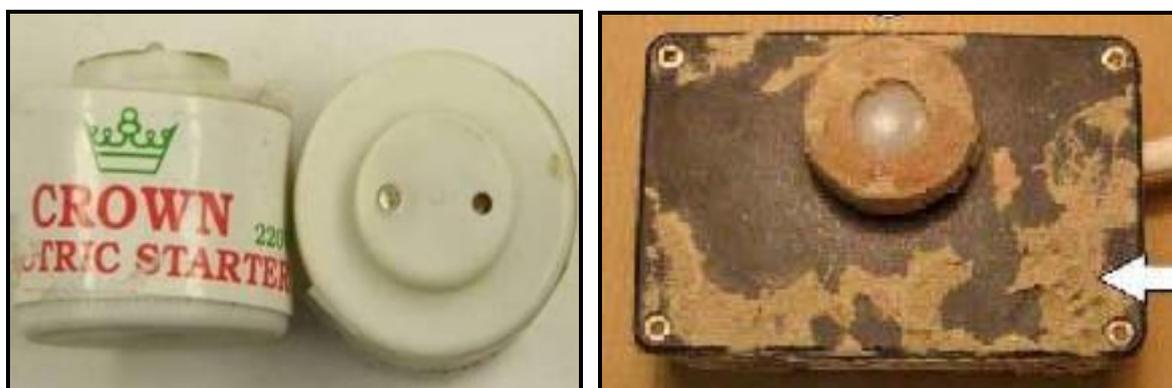
⁷ Source: <http://publicintelligence.net/victim-operated-improvised-explosive-device-clay-more-mine/>; Download: 20.05.2012.

SENSOR EQUIPPED HOME-MADE EXPLOSIVE DEVICES

The structure of this device includes a sensor which will trigger the device. These sensors can be motion detectors, photo-receptors or interrupt indicators. These sensors are also used for arming the device not only for triggering the explosion. Handling and planting such sophisticated and sensitive devices need special expertise.

Movement, Light, Infrared or Interrupt Activated Home-Made Explosive Device

The movement sensors in IEDs detect movement within the field of view of the sensor by measuring the difference between the temperature of warm-blooded creatures and the background temperature of the environment. Movement sensors can be passive infrared only, or combined with microwave sensors. IED with movement sensors are usually used indoors, because on open ground the sensor can be activated by warm-blooded animals, movement of vegetation, wind or strong sun radiation. The IEDs with photo-receptors detect fast changes of light intensity or luminosity and trigger the explosion. They use such devices indoor in any structure against personnel with fragmentation warhead. These devices are planted during daytime only to avoid accidental activation.



3. picture VOIED Switches - Light Sensor or Photo Cells & Passive Infrared (PIR)⁸

The sensor activates when in a dark place someone switches on the lights. Infrared or interrupt sensors can also be used on the field. Typically they attack interrupt indicators on mortar shells. The warhead detonates when the beam is interrupted. Since the beam can be broken by animals or any moving objects also the reliability of such devices are uncertain.

Explosive Postal Packages

Explosive postal packages are such terrorist tools, which allow the bomber to stay away from the target location completely. In such cases, the devices are packages addressed to the victim individual or organization by name and delivered by the post or a known courier. If the package is delivered by a postal service the arrival time cannot be anticipated. Due to this limitation delayed timing is not possible. The device is presumed to explode upon opening the package. If a package is not delivered by a postal service but had been placed near the entrance it is likely to be triggered by a timer, remote operator or movement detector.

The explosive postal packages can be belivered by a regular postal service, by its maker into an observed mailbox or post office box; or delivered by a third party individual (agent, courier)

⁸ Source: <http://publicintelligence.net/victim-operated-improvised-explosive-device-voied-recognition-guide/>, Download: 30.09.2013.

Letter explosive device

It is a simple structure consists of packing material, explosive and starter device. Usually a normal A/5 size envelope is used. It can be filled with standard military, industrial or home-made explosives. The most common explosive charges are TNT, pentrit, hexogen, deta plate, explosive tape. It is important that their size and strength must be suitable to make a letter bomb. Their consistence has to be solid, powdery or plastic. In case of explosive fluids the material is filled into the letter with the help of drinking straws. The weight depending on explosive strength must not exceed 30 grams. The explosive can be hidden quite well between two thick sheets of paper.



4. picture Letter explosive device⁹

A new method has appeared which makes detection very hard the impregnation of the paper with explosive material. They often cover the interior of the envelope with tin foil to avoid light screening. The starting devices can be mechanic, chemical, electric or combination of these. The area of effect of a letter bomb can be half meters. Within this range it can cause death or serious hand or head injuries to the person opening the letter.

Package explosive device

The explosive package works almost the same like a letter bomb. However it is more dangerous due to its larger explosive content and it has a wider area of effect. A heavy package is not particularly suspicious even if it's weight reaches 20kg. This means if can contain shrapnel-forming materials, fragments. Fortunately this method can be used on short range transportation only because packages are examined carefully on airports, postal trains and perhaps even in regional post offices. Delivery can be easy however by using a so called "courier-service" where they rarely or never examine packages.

Deceptive devices – Hoax

Within improvised devices these are not considered a separate category but I have to mention those devices the use to imitate IEDs. These are such item which look like home-made

⁹ Source: <http://www.securesearchinc.com/letter-parcel-mailing-tube-ieds-letter-bomb-model/>, Download: 10.05.2012.

explosive devices and are used cause distraction or to provoke an action by bomb-technician teams with the intent of observation. Often the use it as distraction and when the defusal team arrives they activate the real explosive device placed close to the hoax.



5. picture HOAX IED¹⁰

It is obvious that their goal is to eliminate or observe the bomb specialist crew itself. Since the usage of IED are their tools to achieve their goals (causing panic or deterrence) the biggest threat to them are those specialists who can prevent the destruction of such deadly devices.

PROTECTIVE EQUIPMENT AGAINST THE EFFECTS OF EXPLOSION

The fight against explosive devices is the biggest challenge. The defence and the preparation for defensive actions are the most important tasks. To achieve the highest level of protection we have to provide the latest methods and technology for the crew. From the wide range of protective gear some can be task specific and certain types are universal and can be used regularly for all types of defusing or neutralizing actions. It is necessary to categorize the equipment by types. Categories of most frequently used equipment are:

Personal Protective Equipment (PPE)

Personal protecting gear and equipment against home-made devices are: bomb-suits, attached helmets, gloves, special boots and other functional accessories. This category includes such additional protective accessories which are being used in other fields to reduce risks to personal health.

Detection gear, sensors, tool and procedures.

The detection of bombs, explosive devices and their components was always a challenge and it is still a driving force of the defensive developments and innovation. With the continuous development of explosives materials and devices the protective technologies must be improved as well. Modern technology does not provide a reliable background anymore for the identification of parts or ingredients used in bombing attempts. Surveillance and detection is crucial in the fight against explosive devices. The most common tools belong here are robots, metal detectors, x-ray scanners, detector gates, special optical systems. We can mention the

¹⁰ Source: <http://www.army.mil/media/261153>, Download: 30.09.2013.

procedures using search dogs here but experiments are being made to develop explosive indicating methods involving other kind of animals, too.

Equipment used during defusal or neutralization

After the identification of explosive devices the defusing and neutralization process of hazardous material is a extremely dangerous task. To increase safety of the operation the goal is to keep a safety distance during work. Taking this into account different robots are being used to provide more distance for specialists to be able to defuse the explosive devices.

Equipment, tools and procedures to decrease the effect of explosions

Equipment and procedures to decrease explosive effects can provide different ways of protection. I don't want to separate but for sake of categorization of protection it is important to mention the differences between target types of a bombing attempt. In case of stationary targets protection can include high flexibility glass, blast-proof walls, enhanced flexibility fabric and reinforced fiber materials. In case of moving targets reinforced structure, bullet and blast proof glass and also bomb covers, canvas and containers affecting the area of explosion.

Examination of explosion effects, data recording, evaluation of explosive device structures

With the examination of the effect of explosions, preliminary or follow-up data recording we create a knowledge base to know how high level of protection is needed to protect the crew and equipment in a similar situation. This category includes explosive indicator kits, forensic portable laboratories and various data recording equipment.

“We can call the 19th century the era of freedom fights, the 20th century the era of world wars. Shall we expect the 21st century to be mentioned in history book as the era of terrorist bombing attempts?”¹¹

CONCLUSION

Nowadays terrorism is one of the biggest problems and its most significant manifestation – bombing attempts. These actions are committed using home-made explosive devices the components of which can be easily obtained in a shop and their structures and forms are limited only by human creativity. These devices I demonstrated – like the title of this presentation says “death arrives with us” – are activated by the unsuspecting victim and pose the biggest risk of a possible serious or lethal injury. Often the reason is not to eliminate the victim, but to lure even more potential victims to the scene of the previous bombing. It gives us the chill if one rushes to help a wounded victim he or she can become a victim very soon. We cannot state the by knowing all these devices and procedures we have described above we can feel ourselves completely safe. The terrorists try out new tricky methods and more advanced equipment every day to take victims – usually referring to their faith. Bombs can be placen into carcasses of animals, plastic cans, used rubber tires, and if someone touches those...

¹¹ Source: Prof. Dr. LUKÁCS László – Épületek elleni robbantásos cselekmények és jellemzőik, Műszaki Katonai Közlöny, XXII. évfolyam, TÁMOP Építményvédelem és Robbantásos fémmegmunkálás KKT-k Különszám, Budapest 2012., ISSN 2063-4986, p. 4.

Our most important thing to do is to use all protective gear in any case. Even if that protection is not 100% safety but gives a fair chance for survival. To protect our own life and the lives of other people it is vital to study the structure and placement of explosive devices, to elaborate counter activity, to improve active and passive defensive procedures and also to modernize security and protective equipment.

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