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# EXPERIMENTAL SHOOTING WITH THOR-1 DISRUPTOR: NEW TYPE OF GAS DEVICE USED TO NEUTRALIZE IMPROVISED EXPLOSIVE DEVICES

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## ABSTRACT

*The paper presents experiments conducted with disruptor THOR-1, a new type of gas-dynamic device used to neutralize improvised explosive devices.*

*Disruptor THOR-1 [1] was designed and practically built as a gas-dynamic device that propels jets using colloidal particulate blast.*

KEYWORDS: disruptor, explosive device, experimental, shooting

## 1. Experimental conditions

During experiments it was pursued, in particular, the qualitative verification of the jet behaviour of the disruption agent to the impact with various targets and the effect of the shock wave generation on the targets, characterized by modifying the cinematic properties of the target or of the elements resulting from it.

To determine the performance characteristics of disruptor THOR - 1, four tests were performed.

When choosing experimental tests, the following objectives were taken into consideration:

- the exact objective of each test;
- the propulsion device used - THOR 1 disruptor;
- the availability of existing materials;
- the availability of facilities, equipment and staff responsible for testing;
- the existence of control devices and appliances.

The equipment and materials used:

- the ultra-fast shooting video camera;
- the computer software necessary for image acquisition;
- power source;
- the neutralizing THOR 1 set;
- the disruption agent: water.

## 2. Experimental results

The experimental results are presented as follows.

***TEST 1 NAME:*** the interaction study between jet and electric detonator

***PURPOSE:*** To determine the effect of disrupting jet on the electrically blasting cap fastened on a wooden panel.

***APPARATUS AND MATERIALS USED:*** JVC video camera; disruptor THOR-1; 12.7 mm pyrotechnic cartridge with 9.2 g of powder VUFL; disruption agent: water.

At the frontal collision between the water jet and the electrically blasting cap - the distance between the pipe and the cap being of 15 cm - it was observed deformation, not being detonated.

Loading data and results obtained:

| | |
|---|---|
| Shooting no. 1-4 | - electric cartridge - cal.12.7 mm<br>- disruption agent: water<br>- THOR disruptor -1<br>- the shooting was executed in very good conditions |

***TEST 2 NAME:*** The study of the interaction between the jet and an assembly consisting of an electric detonating cap inserted in an amount of 100 g plastic explosive;

***PURPOSE:*** The determination of the effect of the disruptive jet on an assembly consisting of an electric detonating cap inserted in an amount of 100 grams of plastic explosives fixed on a 15 cm diameter pressed wood panel.

***APPARATUS AND MATERIALS USED:*** JVC video camera; THOR-1 disruptor; 12.7 mm

pyrotechnic cartridge with 9.2 g of VUFL powder; disrupter agent: water.

At the frontal impact of the water jet with the electric detonating cap, the distance between the pipe and the cap was 10 cm. It was observed its deformation, not being detonated, fragments from the plastic explosive being scattered at approximately 2.80 m from the point of disruption.

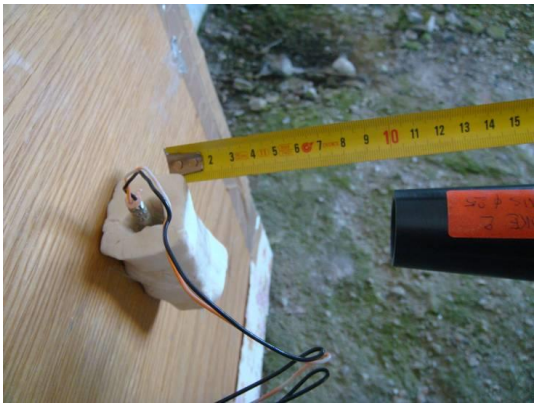
*The distance between the electrically detonating cap and the disruptor is about 15 cm*

*Disruptor ready for shooting*

*Electrically detonating cap deformed after disruption*

***Fig. 1.*** *The interaction between the jet and the electric detonator*

*The electrically detonating cap assembly is placed in an amount of 100 grams of plastic explosive*



*The distance between the electrically detonating cap inserted in an amount of 100 g plastic explosive and disrupter is about 10 cm*

*Disrupter ready for shooting*

*The effects of disruption on the pressed wood panel*


*The electrically detonating cap is deformed after the disruption*


*Fragment of plastic explosive resulting from disruption*


*The distance of approx. 280 cm at which fragments of plastic explosive were projected after disruption*

***Fig. 2.*** *The interaction between the jet and an assembly made up of an electric detonating cap inserted in a quantity of 100 g plastic explosive*

***TEST NAME 3:*** the study of the interaction between the jet and an assembly consisting of an electric detonating cap inserted into a 100 g of TNT;

***PURPOSE:*** to determine the effect of the disruptive jet on an assembly consisting of an electrically detonating cap inserted into a 100 g of TNT bin fixed to a 15 cm diameter pressed wood panel.

***APPARATUS AND MATERIALS USED:*** JVC video camera; THOR-1 disruptor; 12.7 mm pyrotechnic cartridge with 9.2 g of VUFL powder; disrupter: water.

At the frontal impact of the water jet with electrically detonating cap, the distance between the pipe and the seam was 10 cm. It was observed its deformation, not being detonated, fragments of the TNT core being scattered at a distance of about 2.80 m from the disruption place.

*The electrically detonating cap assembly is inserted into a 100 g of TNT body at a distance of 10 cm from the disruptor*


*Fragments of TNT resulting after disruption*

*Closure cap deformed after disruption*


*The distance of approx. 280 cm at which fragments of TNT were scattered after disruption*

***Fig. 3.*** *Interaction between the jet and an electrically detonating cap inserted into a 100 g of TNT*

***TEST 4 NAME:*** the study of the interaction between the jet and an assembly consisting of a detonating wick with a length of 5 m (about 100 g for the pentrite).

***PURPOSE:*** determination of the effect of the disruptive jet on a set consisting of a detonating wick with a length of 5 m fixed to a 15 cm diameter pressed wood panel.

***APPARATUS AND MATERIALS USED***: JVC video camera; THOR-1 disruptor; 12.7 mm pyrotechnical cartridge with 9.2 g of VUFL powder; disrupter agent: water.

At the front impact of the water jet with the detonating wick, the distance between the pipe and the wick being 10 cm, deformation was observed, not detonating.

*Disrupter ready for shooting. The distance between the detonator wick and the disruptor is 10 cm*

*Compensating cover deformed after disruption*

***Fig. 4.*** *The interaction between the jet and a detonating wick with a length of 5 m*

## 4. Conclusions

Due to the lack of retraction, the device can be operated remotely: ROV (Remote Operated Vehicle);

To obtain the maximum effect, the disruptor should be placed as closely as possible to the improvised explosive devices potential but without touching it, the maximum distance being approx. 15 cm;

Attacking the improvised explosive devices to be neutralized potentially along the longest route increases the possibility of neutralization;

After the inspection of the improvised explosive devices with x-rays, its weakest point can be attacked, allowing the maximum energy to be transmitted in the improvised explosive devices mass

Only the liquid agent is used as a disrupter agent.

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