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ABSTRACT

This article pertains to recent ammunition articles published in various newspapers and the Internet concerning Mr. Harold "Bubba" Beal's invention of a real world alternative to conventional lead-based ammunition, which provides supreme accuracy, velocity and terminal ballistics in comparison to other types of frangible ammunition being marketed in today's industry. Using various calibers of the frangible ammunition, which is being manufactured by the Dynamic Research Technologies (DRT), Grant City, MO, test firings were conducted at the USACIL in order to determine if the recovered jacketing from the frangible bullets were identifiable using the comparison microscope.

Recently, the authors reviewed published articles that were written in local newspapers and the Internet pertaining to manufacturing a revolutionary lead free frangible bullet in the calibers 9mm, 40 S&W, .45, .223 REM, .308 and 300 Win Mag, which were being sold to law enforcement and government agencies. The articles indicated that upon impact/penetration, "bullet core turns to powder of its original composition and there are thus minor traces of the bullet and/or its components, including any of the copper jacketing. The articles stated that Mr. Harold "Bubba" Beal invented a bullet that he nicknamed "The Bubba Bullet", which is a frangible bullet that breaks apart upon impact with a target while still being able to deliver terminal effects on that target (Photograph # 1).

Subsequently, we contacted Mr. John Worrell, President, DRT, Mr. Ross Tyser, Sales, DRT and Mr. Harold Beal who is the inventor of the DRT frangible bullet and verified the above mentioned information. All three individuals subsequently arrived at the USACIL where we had the opportunity to test fire the calibers 9mm, 40 S&W, .45, .223 REM and .308 in the USACIL indoor firing range. Based upon the wound cavity within a gelatin block, it was determined that the powder distributes itself uniformly and there appeared to be no loss of energy. Additionally, the lead free frangible ammunition appears to be very accurate at long ranges. The bullet cores are comprised of a compressed blend of powdered metals such as steel and tungsten (Photograph # 2). Unlike most frangible bullets, the bullets do not use polymer and/or various bonding agents; rather, DRT uses tin to hold the cores together. The high density frangible bullets are stable up to approximately 160,000 rpm, which results in better accuracy. The bullets are

smaller yet heavier and denser than similar type bullets and it does not possess impurities in its core that could cause the bullet to yaw in mid-air. Furthermore, the frangible bullets will disintegrate upon impact and thus reduce the risk of ricochet and personal injury to innocent bystanders.

From a forensics standpoint, several of the various caliber bullets were test fired both in the water recovery tank and the indoor firing range and later microscopically examined in order to determine if there were any striations for identification and/or elimination purposes (Photograph # 3). Based on the test firings, it was determined that upon impact, most of the powdered cores disintegrate; however, a small portion of the material can be located in the thickened portion of the jacketed base (Photograph # 4). Contrary to popular belief, there are sufficient striations found on the bullet jacketing of fired frangible bullets for comparison purposes (photographs #5 and 6).

Currently, DRT has twenty-two patents on various products and processes. They've spent the past three years building custom machinery and have a current production of 25,000 bullets per 8 hour shift. DRT is currently purchasing commercial cartridge cases from Winchester and Sellier & Bellot, Czech Republic; however, they plan on using their own headstamp within the next few months. The company is located at 405 N Lyon Street, St. Grant, MO, 64456. Currently, DRT has several contracts with various law enforcement agencies and the U.S. government and starting 1 July 2007, they'll be commercially selling their ammunition products through Ellett Brothers, Chapin, South Carolina.

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For further information on DRT frangible bullets, contact:

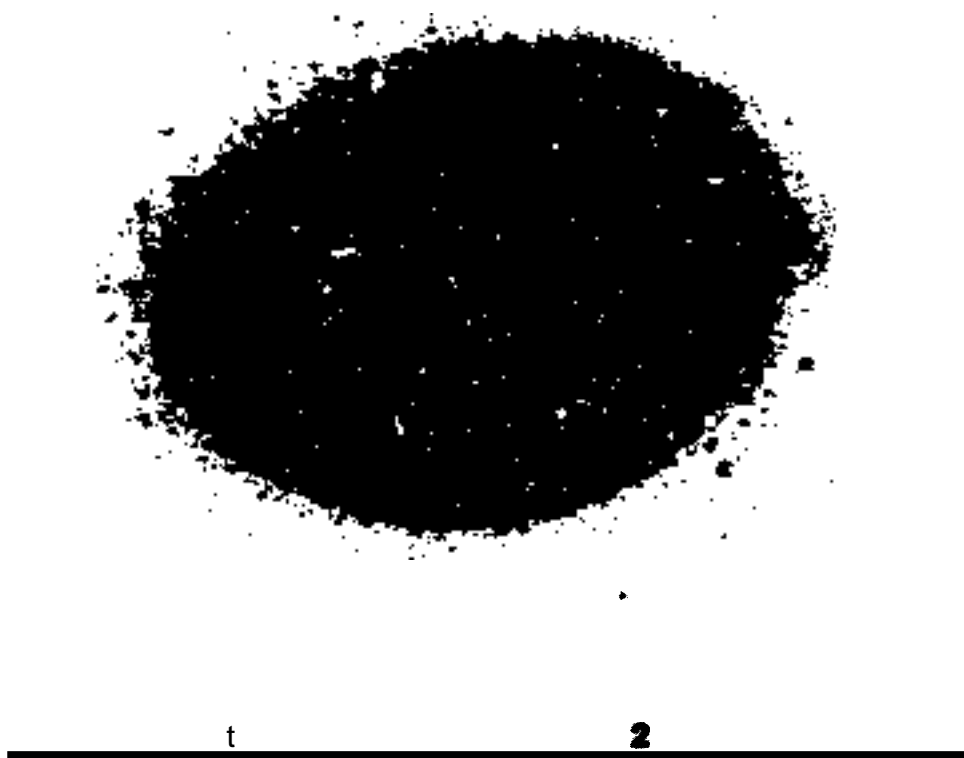
Mr. John Worrell
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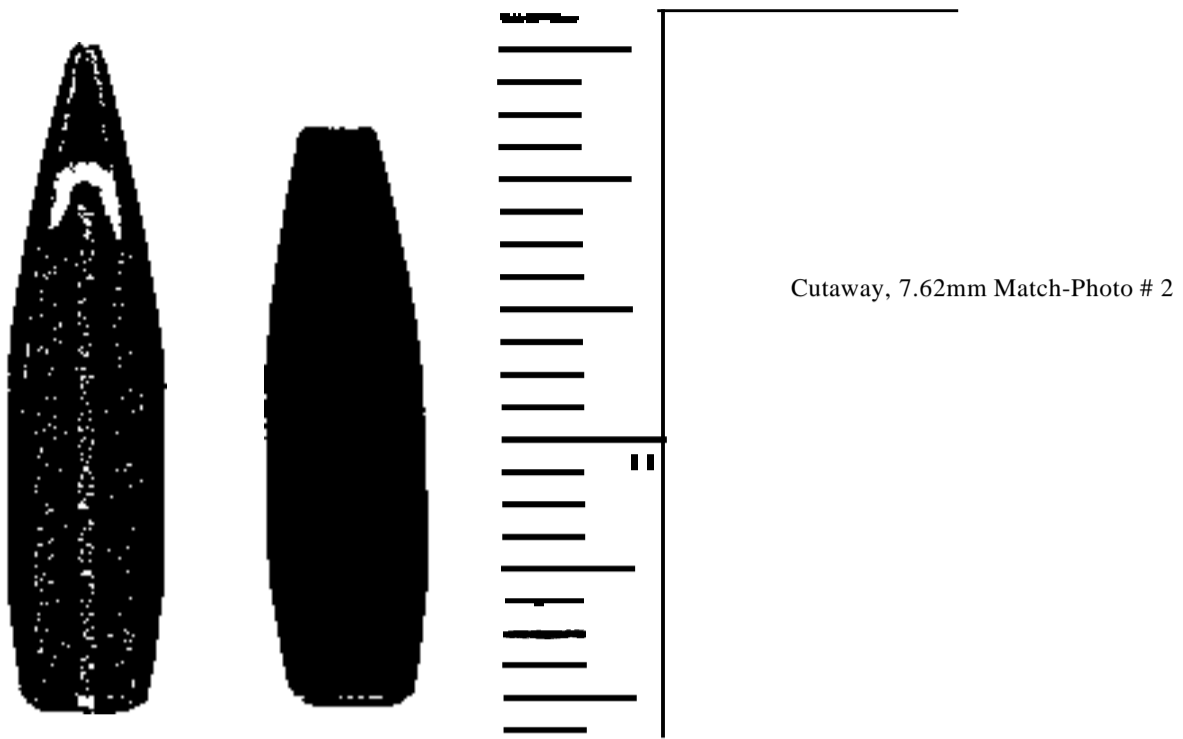
ACKNOWLEDGEMENT:

I would like to thank Mr. Matthew E. Graves for his photographic expertise.

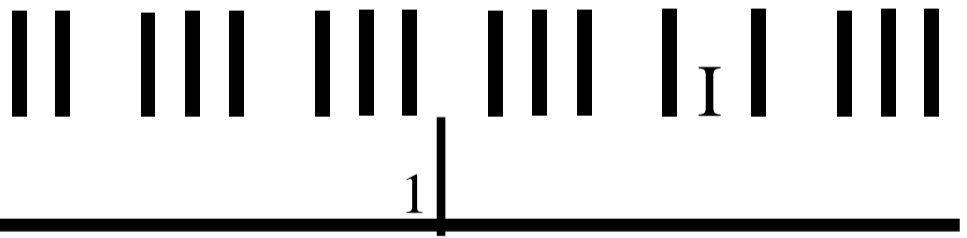
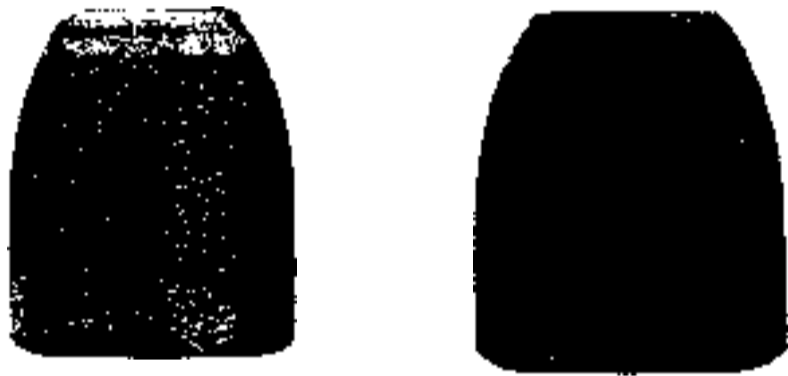
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DRT Powdered core from test fired bullets-Photo # 1



Powdered and Jacketed 45 cal
recovered bullets-Photo # 3





Jacketed fragments from various calibers-Photo # 4



Comparison of two 9mm jacketed bullet fragments-Photo # 5





Comparison of two test fired 9mm bullets-Photo # 6



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Key Words: 5.56x45mm, 7.62x39 mm Kalashnikov, Caliber interchange, magazine interchange, wrong caliber.

ABSTRACT

A question arose as to whether cartridges of caliber 5.56x45 mm could be fired in a Kalashnikov assault rifle and *if* so how many. Firings showed that this could be done but that a drastic reduction in muzzle velocity and a destabilization factor had to be taken into account. Comparisons can still be obtained even with different caliber ammunition fired in same weapon.

Introduction

The Israel Police Firearms Laboratory sometimes receives three different kinds of military rifles from terrorist cases: 7.62x39 mm Kalashnikov, 5.56x45 M-16, and Galil assault rifles.

In discussions among examiners in the laboratory, interest was generated to ascertain if ammunition from different calibers could be fired in the "wrong" weapon. More specifically, since the Galil and Kalashnikov magazines are extremely similar, we wanted to know whether the ammunition for one can be used in the other and what will happen if that is done.

We realized that the sub caliber firing posed the same questions that we had discussed and that it was prudent to examine as many parameters generated by these weapons as possible, such as intermediate markings on the bullets.

Testing and results

It is known that the actual firing of the 5.56 mm ammunition in the AK-47/AKM is very easy to accomplish (see Figure 1) [1], and can also occur in other calibers and weapon types [2].

We first tried to re-enact or understand how the wrong cartridge was "loaded" into the weapon with the following options:

1. Cartridges were loaded manually without paying attention or understanding the difference of shape or length.
2. Cartridges were already in the magazine.

These are the simplest choices, and the first option is by far the poorest choice but it can happen!

Seen in Figure 2 are three magazines from the three different assault rifles generally used in our region. It is easy to see that two of these magazines - the Galil and the Kalashnikov - have very similar external features. The dimensions and method of insertion are similar as well. Does this mean that a magazine can easily be inserted into a Kalashnikov? Not only can it be done (Figure 3), but also the magazine lines up in the proper position for loading of cartridges (Figure 4).

We also realized that the length of the 5.56 mm round (57.3 mm vs. 55.7 mm of Kalashnikov; a 1.4 mm difference) does not interfere with the ability to load the cartridge into the magazine (Figure 5), but the geometry of the Kalashnikov magazine itself (the stagger effect of cartridge placement) aids in the ability to load two cartridges. These have to be the two uppermost in the magazine (Figure 6).

On our firing range, we loaded Kalashnikov and Galil assault rifle magazines with military 5.56x45 mm ammunition. The magazines were inserted and the weapon cocked via its cocking arm and fired in one of the laboratory's AK-47's.

The next logical step was to measure the velocities of the caliber firing and determine the stability of the projectile. The velocities of the projectiles firing through witness papers placed 6 meters and 12 meters from the muzzle were measured by an Oehler model 83 chronograph.

In tests with each magazine type, the fired cartridge case did not eject! Repeated firings necessitated re-cocking the weapon. Immediately after firing, the manually ejected cartridge cases

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