B36 Terminal and Secondary Effects of Bullets Fired Through Automobile Windshield Glass

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After attending this presentation, attendees will learn about data regarding trends in terminal ballistics and secondary effects of bullets fired through automobile windshield glass. These trends include effects on the glass, on witness panels, and in body armor vests that correlate to factors in bullet type, velocity, and weight retention.

This presentation will impact the forensic community and/or humanity by demonstrating to forensic professionals and laymen how fired bullets react when passing through a glass obstruction, and the terminal results of said projectiles on the target. Law enforcemnt personnel will have a better understanding of ammunition characteristics in such a situation, and thus, will be better informed regarding choice of ammuniton to produce the effects desired by their agency.

While many studies have been conducted to explore terminal ballistics, most have been in response to requests from military and law enforcement agencies for data concerning penetration and wound patterns. Additionally, several studies have been completed addressing the terminal ballistics of bullets fired into body armor. However, very little literature currently exists that seeks to observe effects of bullets fired through obstructions.

In a laboratory environment, results obtained reflect ideal shots. In reality, many situations encountered by law enforcement personnel are much less than ideal. The high stress nature of such moments has a high impact on officers and suspects alike, and can cause widely varying results in reaction time and aim. The environs of the conflict further compound altercations of this nature. In other words, most situations occur as parties are firing at one another from behind some solid object or glass rather than a one-on-one confrontation on open ground. Any obstacle in the bullet path will change the effects of that bullet upon its final target, if it reaches the target at all. A controlled environment is necessary to observe any phenomena or trends of bullets fired through solid objects, but this will necessarily reduce the random nature of the very act the experiment is trying to replicate.

In particular, this experimentation was geared toward recording effects produced by firing through a glass obstruction. Glass was deemed a better material in which to visualize effects while keeping incidence of low angle impact (ricochet) low. Such cases involving glass are often experienced in shootouts as well as on the highway during driveby shootings. One such scenario encountered by law enforcement personnel occurs when they use their vehicles for cover from fire. With the support of the West Virginia State Police and its Firearm/Tool Mark section laboratory, this scenario was replicated for study. Shots were fired from approximately six feet away through a windshield and into a stabilized body armor vest. The setup was accomplished in part from the generous donation of windshields from a local supplier.

This poster will display the examined effects of bullets fired through an auto glass obstruction as well as the affect of velocity and weight retention upon the observed results. Additional factors in ammunition performance such as bullet type and manufacturing process are discussed. Seventeen forty-caliber (.40) common-duty ammunitions currently in use by law enforcement agencies were fired through glass windshields and witness panels into body armor. Velocity and weight retention as well as diameter of all bullet holes and other secondary effects were measured and recorded. Control tests of body armor vests as well as bullet recovery tank testing were also performed. Study of multiple test fires revealed general trends in bullet interaction with the windshield glass, the witness panel, and the body armor, respectively. Type of bullet played a significant role in the presence or lack of fragmentation. Of all brands tested, Federal Cartridge Co. Tactical law enforcement ammunition produced the highest area and approximate volume of damage upon impact with target. However, the philosophy of a particular agency or a particular situation in which shots are fired may determine which ammunition should be used to obtain desired result.

Terminal Ballistics, Firearms, Glass

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