

Memorandum



Subject Motor Vehicles and Ballistic Performance <u>DFN#801-06</u>	Date August 24, 2005
--	-------------------------

Subject	Date
---------	------

To
Enforcement Personnel

From
SA Richard Demurjian
New York Firearms Unit

The New York Firearms Unit, (NYFU), conducted ballistic performance tests on motor vehicles. This study was a continuation of a ballistic study done by Unit Chief Randy Smith and the Firearms Training Unit, TRDG, several years ago. The results of these tests are of interest to enforcement personnel since motor vehicles are present in almost all enforcement operations. The results of these tests should affect the tactics that you choose during a hostile confrontation.

The Test:

A Buick Skylark was shot with a variety of ammunition, in addition the door of a Volvo and another GM product was also tested. The shots were at distances and angles that were encountered during documented cases of Special Agent assaults. A number of different types of ammunition were tested including the following DEA approved service ammunition:

- .40 Gold Dot 165 grains.
- 9mm Gold Dot 147 grain
- .223 Federal Tactical bonded 62 grain
- 12 gauge Winchester 1oz. lead slug
- 12 gauge Remington reduced recoil OO buckshot

Ammunition commonly recovered as evidence was also utilized in the test:

- 9mm 124 grain full metal jacket

.45 ACP 230 grain full metal jacket
.357 125 grain jacketed hollow point
.223 62 grain full metal jacket
7.62x39mm 123 grain jacketed hollow point (AK-47)
12 gauge OO buckshot

The vehicles were shot at distances between 15 and 5 yards. Statistically these are the distances that were encountered in Agent involved shootings. Each shot was documented for performance against the vehicle. When possible, bullet fragmentation, bullet deflection, and penetration were noted.

The Results

When shot from the front of the vehicle, *almost all of the ammunition penetrated the windshield*. 12 gauge buckshot was the only ammunition that was unable to completely penetrate, however some pellets *did enter the vehicle*.



.40 cal. Gold Dot 165 grain (DEA Service Ammunition) penetrated the windshield and came to rest in the trunk.



All pistol ammunition penetrated the windshield. Some rounds were stopped in the headrest, others actually penetrated as far as the trunk.

All of the pistol ammunition tested penetrated the windshield when fired from the front of the motor vehicle. The depth of penetration was affected by what obstacles the rounds encountered as they passed through the vehicle. All of the rounds were either fragmented or deformed. The fragmentation and deformation of bullets will diminish their ability to disable your assailant.



.223 Tactical Bonded, (DEA Service ammunition)



.223 Tactical Bonded, (DEA Service ammunition)



.223 Tactical Bonded, (DEA Service ammunition)

Automobile Glass

Most motor vehicles will be manufactured with two types of glass: automotive safety glass and laminated windshield glass. Both types of glass react differently when struck by gunfire. Window tint will also affect the way glass will perform when struck by bullets. The most significant aspect is fragmentation. ***When safety glass and windshield glass is struck by gunfire, numerous glass fragments are produced. The fragments are projected on both sides of the glass, towards the target and also back towards the shooter.***



Glass fragments produced when the windshield was struck by several bullets...



.223 Full Metal Jacket fired through windshield produced numerous metal and glass fragments.

Passenger and rear windows may craze when struck by gunfire. This will limit your ability to see through the glass. Visibility is further reduced if there is after market tint applied to the glass as the tint holds the glass together rather than allowing it to disintegrate.



This window was nicked by a bullet that was fired through the door. As a result, it was no longer possible to see the target behind the door.

Motor Vehicles as Cover:

Our tests indicate that cars are very poor cover. Again, with the exception of buckshot, almost all of the rounds fired at the sides and doors of the vehicle did penetrate and strike the targets inside of the test vehicle.



Pistol ammunition penetrated both sides of the trunk and the target.

A common tactic is to use the car door and the vehicle's "A" pillar for cover. We tested this technique with surprising results. The car door did not reliably stop any pistol ammunition and it did not stop any of the rifle ammunition.



Use of the car door and the "A" pillar, over as.



The “A” pillar did stop some bullets, however many rounds ricocheted or drove fragments into the target.

Ricochets:

Shooting at any hard surface presents the possibility of ricochet. Vehicles are especially prone to cause ricochets because they present numerous curved hard surfaces. As a general rule, always attempt to shoot ***around*** cover rather than over it. As depicted below, the target is posed to shoot over the cover and is easily struck by any rounds that strike the trunk lid.



Pistol ammunition deflected off of the trunk striking the target in the head.



Without any real effort it is possible to deflect rounds into the target

Conclusion:

-Be mentally prepared, and realize that the vehicle you are driving has its limitations as a “fighting platform”.

-Be aware of your surroundings and utilize better cover if it is available.

-Have enough ammunition. Bullets will be fragmented by intervening barriers such as sheet metal and automotive glass, diminishing their effectiveness against your assailant.

-Use eye protection. These tests demonstrated that the next greatest threat posed by bullets is the glass fragments produced when glass is struck.

- Use cover properly. If possible, shoot around cover rather than over it. The curved metal surface of a motor vehicle is likely to cause bullets to ricochet.

-Wear body armor. Shooting into a motor vehicle will produce many secondary fragments that Special Agents could be protected from with the proper use of body armor.

Come to the range and practice. The faster you stop your assailant, the sooner they will stop shooting at you!

Any comments or suggestions regarding these tests may be directed to me or SA Michael Broderick, SA Anthony Lanza, or SA Eric Conaway.

The NYFU would like to thank GS Jack Teitelman for providing extensive technical support for these tests.

CC:

Unit Chief Randy Smith, TRDG

Unit Chief James Arroyo, SSAU

Group Supervisor Jack Teitelman