

CASE REPORT

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Bullet Ricochet in Automobile Ceilings

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ABSTRACT: Test shots were fired into real and simulated automobile ceilings in an attempt to determine what types of evidence should be available for determining the direction of flight of the bullet. The information obtained was used in a shooting investigation.

KEYWORDS: criminalistics, ballistics, automobiles

In a recent case several shots were fired from a .25-caliber pistol inside an automobile; one of the shots ricocheted off the center of the ceiling. Preliminary examination suggested that this bullet was traveling from front to back, but because an alternative explanation was suggested, it became necessary to obtain conclusive evidence, if it was available, of direction.

Few articles have been written in the forensic science literature about bullet ricochet. Jauhari [1,2], Mitosinka [3], and the Federal Bureau of Investigation [4] have published papers, but their information was not immediately applicable to this case. To determine what evidence should be available, a number of fully copper-jacketed .25-caliber bullets were fired from a .25 automatic Titan pistol, at various angles between approximately 10 and 45°, into the ceiling of an abandoned automobile. The distance from which the shots were fired was less than 1 m (3 ft). The target was a cloth liner separated from a sheet metal roof by a fraction of an inch so the cloth was free to flex and move. In addition, several shots were fired in the laboratory at a target that simulated the ceiling of an automobile. The cloth and both surfaces of the sheet metal were examined for evidence of directionality.

Evidence Obtained

The dents in the metal, on the side opposite the bullet impact, showed small fractures in the paint that were roughly V-shaped with the point of the V pointing back towards the gun (Fig. 1). These fractures are essentially opposite to the ones described by Mitosinka [3], which occur when a bullet strikes the painted side of the metal. Even the lowest angle shots produced these fractures if they struck with enough force to cause a dent. On the inside of the dents there were either oval or comet-shaped scuff marks. The oval marks did not appear to indicate any direction of bullet flight, but in the comet-shaped marks (Fig. 2) the head pointed towards the gun.

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FIG. 1—The exterior of a ricochet dent showing paint fractures that indicate the direction from which the shot came.



FIG. 2—Comet-shaped scuff mark on the inside of a ricochet mark.

The liner showed either one or two holes per shot. The shots with only one (entrance) hole were the lowest angle shots. The absence of a second (exit) hole is the result of the bullet being trapped between the metal and the cloth. In this case the direction is obvious from the relationship between the entrance hole and the ricochet mark.

When there are two holes present, the exit hole tends to be larger than the entrance hole. This relative size difference is probably due to tumbling or deformation of the bullet after ricochet. The liner in the test automobile was a hard fiberglass cloth and the exiting bullet broke the fibers, leaving a ragged hole with no particular indication of direction. Heavy cotton cloth was used in the laboratory and the exit holes were in the shape of a right angle tear with the corner pointing towards the gun.

Microscopic examination of the entrance holes showed bullet wipe (material wiped from the passing bullet by the target) primarily along the edge of the hole closest to the gun. On the low-angle shots this wipe extended into a "tail" pointing towards the gun. This tail is caused by the bullet sliding along the cloth prior to penetration. On the hard fiberglass cloth

the wipe marks were in the form of copper fragments, whereas on the softer material they were the dark wipe deposits expected from a bullet (Fig. 3).

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The automobile involved in the shooting incident had a vinyl roof, the destruction of which was not justified by circumstances of the case, so no paint fracture evidence was available. The liner was made of rubberized cloth and was fairly soft. The metal that deflected the bullet was a reinforcing piece thicker than the sheet metal used in the body of the car; however, the bullet did strike with enough force to make a visible lump in the outside roof. The dent itself was roughly oval and copper particles were found in the mark, but no evidence of direction was apparent.

The liner had two holes (Fig. 4), one each on opposite sides of the dent. The hole in the front was smaller and microscopic examination revealed minute abrasions present only along the front edge of the hole on the rubber surface of the cloth. Although there was no bullet wipe (in this case probably as the result of an intermediate target), these abrasions were apparently made by the bullet and indicate that the shot came from the front of the car. The hole to the rear of the dent was larger and had a square corner pointed towards the front of the car. The relative size of the two holes and the orientation of the right-angle tear were consistent with evidence observed in the test shots and demonstrated a front-to-back direction for the shot.

Conclusion

Examination of the test shots showed that a variety of types of evidence may be available when a bullet ricochets after passing through an intermediate cloth target. In the case in question this evidence was used to establish conclusively the direction of the shot, which in turn helped sort out the statements about what had occurred during the incident.

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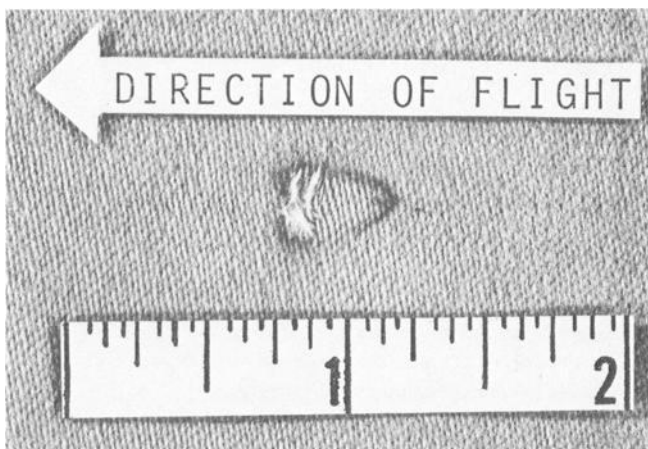


FIG. 3—Entrance hole showing bullet wipe "tail" pointing towards the gun.

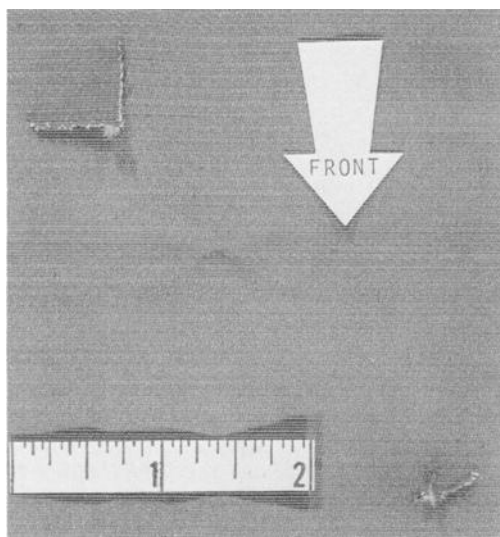


FIG. 4—Ceiling liner from automobile involved in the shooting incident.

References

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