

## Ejector's Cut-Out Marks in Shotguns and their Comparison Value

*A Case Report By Ezra Shoshani, Lior Nedivi, and Pavel Giverts, Israel National Police*

**Key Words:** Ejector cut-out marks, Breda, Remington, Beretta, shotgun, class characteristics, individual characteristics.

### ABSTRACT

**This report discusses ejector cut-out marks found on 12 gauge cartridge cases fired from different types of shotguns. These marks were never studied before by Israeli firearms examiners, nor has the phenomenon ever been reviewed extensively in professional literature.**

### INTRODUCTION

Firearms examination, which is part of tool marks examination, uses two kinds of marks: class characteristics and individual characteristics.

The AFTE glossary [1] defines the above as follows:

1. Class characteristics – “Measurable features of a specimen which indicate a restricted group source. They result from design factors, and are therefore determined prior to manufacture.”
2. Individual characteristics – “Imperfections or irregularities produced accidentally during manufacture or caused by use, abuse, corrosion, rust, or damage to an object. They are unique to that object and distinguish it from all other objects.”

The experienced firearms examiner learns, during his work, to recognize and identify the different class and individual characteristics of each weapon, which he examined. Usually, this knowledge is passed from senior experts to trainees, but from time to time, a new weapon, unknown to any of the experts, arrives to the laboratory and its marks have to be studied.

Such a study involves examination of the firearm production methods (especially machining processes), firearm mechanics, its way of operation and the test shooting of cartridges and bullets from the firearm in question. It is preferred, of course, to try and have a few firearms of the same model but it is not always possible. In this case the examiner can use other weapons, made by the same manufacturer, or weapons of the same type.

The following paper describes such a case, during which the examiners of our firearm laboratory learned about a “new” class characteristic and its comparison value. To the best of our knowledge, there is no report in the literature of such marks from such weapons.

### EXPERIMENTAL and DISCUSSION

### THE CASE STORY

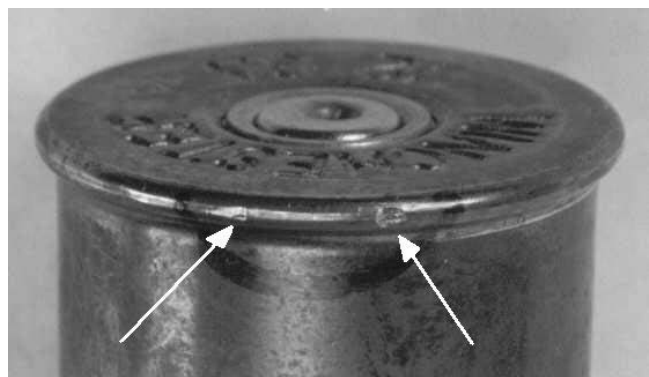
A game warden apprehended a poacher, who tried to shoot down a large vulture that is considered a rare bird in Israel. The warden seized the hunter's gun, a Breda semi-automatic shotgun, model Aries, caliber 12 gauge (*Figure 1*), and sent it for comparison, along with a 12 gauge cartridge case, found at the scene.



**Figure 1: The Breda semi-automatic shotgun, model Aries, 12 gauge.**

During examinations, the firearms examiner encountered difficulty in identifying sufficient individual characteristics to reach a positive comparison, between the evidence and test cartridge cases.

The firearms expert, of course, examined all conventional marks, such as firing pin marks, breech face marks, etc., but could not arrive at a conclusive decision. Further examination of the cartridge cases revealed two cuts on the rim of the cartridge (*Figure 2*).

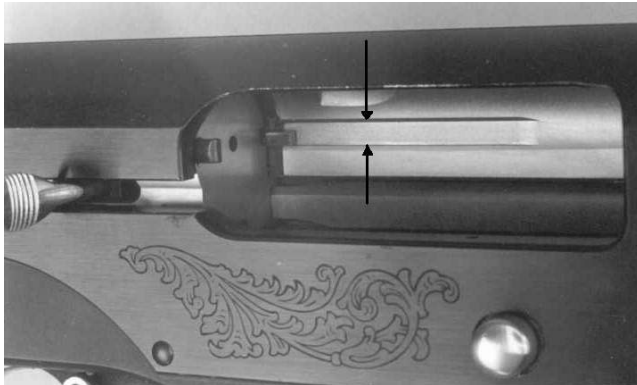


**Figure 2: The ejector's cut-out marks.**

These cuts, parallel to the ejector marks and found on all of the cartridge cases, led to the conclusion that they originated from one of the weapon's parts and could be used for comparison.

Inspection of the weapon showed that inside the frame there is a cut-out, fitted for the ejector (*Figure 3*). Measurements of the cut-out proved that its width coincided with the distance between the cuts found on the cartridge rims. Although marks from the cut-out are mentioned in the literature [1] regarding firearms such as Kalachnikovs, Uzis, or Galils, among others, the cut-out is on the breech face. In the case of the shotguns examined here, the cut-out was found to be on the body of the firearm, not the breech face.

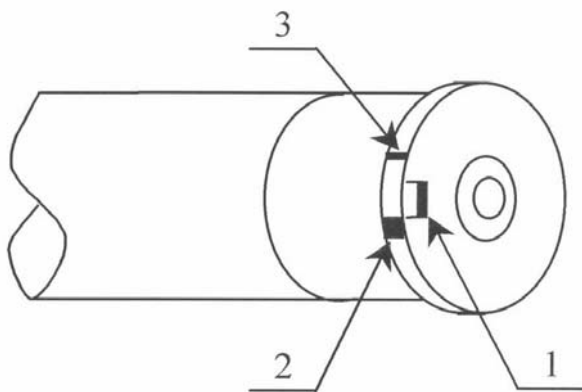
**Figure 3: Close view of the shotgun’s receiver (arrows**



**indicate ejector’s cut-out).**

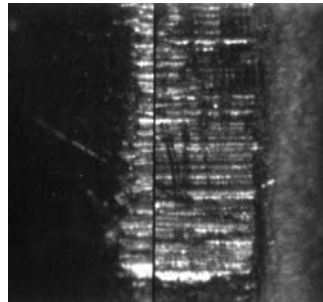
To be certain about the origin of the marks, extra cartridges were fired from the shotgun. This time, however, they were marked so that their position inside the weapon could be monitored. All the ejected cases bore the two cut-out’s marks, and the marks were positioned parallel to the ejector’s cut-out. This test proved that the marks were made by the ejector’s cut-out (*Figure 4*).

**Figure 4: A diagram showing the ejector & cut-out**



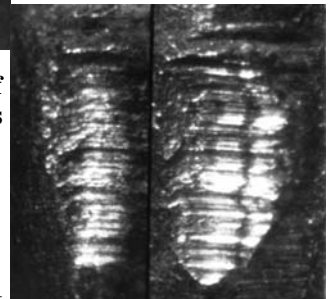
**marks. Notice the relative position between the marks. 1- Ejector mark, 2-Lower cut-out mark, 3-Upper cut-out mark.**

After the origin of these “new” marks was established, the gun parts were examined in order to ascertain whether or not they were manufactured through machining, thus being able to produce individual marks. Knowledge of machining processes and examination of the toolmarks showed that the marks made by these parts should be individual. Examination of evidence and test cartridge cases, under the comparison microscope, clearly showed a match of the individual marks, inside the cut-out marks. (*Figures 5 & 6*)



**Figure 5: Comparison of individual characteristics in upper cut-out mark.**

**Figure 6: Comparison of individual characteristics in lower cut-out.**



Some observations about these marks can be made:

- a. The ejector mark is closer to the lower cut-out mark. (*Figure 4*)
- b. The lower mark (*Figure 6*) is wider and deeper than the upper mark (*Figure 5*).
- c. Both marks contain individual characteristics.

The loading and manual extracting of unfired cartridges showed that marks also appear on these cartridges as well. The marks, from semi-automatic shotguns, are weaker than those found on fired cartridges. Nevertheless, they are sufficient for comparison purposes.

Efforts were made to determine if these marks are unique only to the Breda shotgun. Hence, other shotguns were inspected. Similar marks were found in the Beretta A390 (*Figure 7*), the Beretta RS200, the Remington 870 MAGNUM (*Figure 8*) and the Remington 870 (*Figure 9*). Two shotguns of the same model (Remington 870) were test fired, in order to verify that the family and individual characteristics were consistent and reproducible.

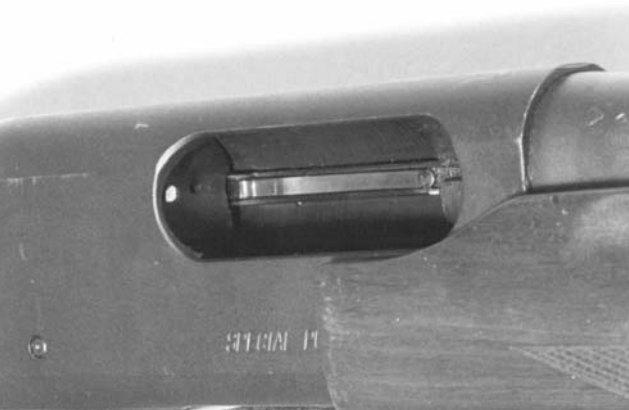
It is important to mention that the cut-out structures are not the same in the Beretta and Remington weapons. Nevertheless, they leave marks on both fired and unfired cartridge cases.



**Figure 7: Ejector's cut-out in Beretta A390 shotgun.**

### CONCLUSIONS

Ejector cut-out marks can be used both as class and individual characteristics. The good quality of the individual characteristics inside the cut-out marks, can assist the firearms examiner in his effort to come to a final conclusion concerning identification, be it positive or negative.



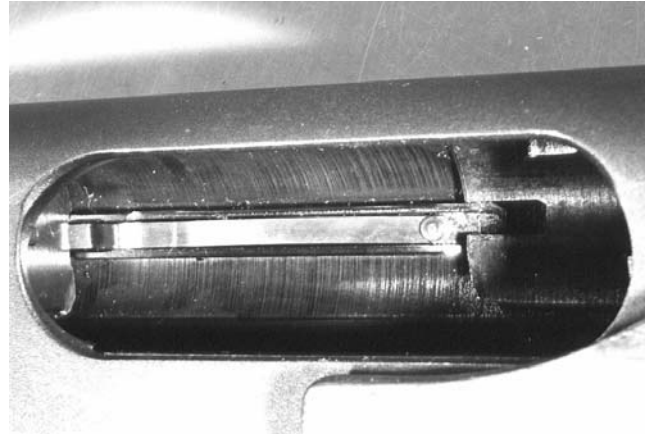
**Figure 8: Ejector's cut-out in Remington 870 Magnum shotgun.**

### ACKNOWLEDGMENTS

The authors would like to thank Dr. Jay Levinson, Dr. Arie Zeichner and Eliot Springer, for reviewing the article and giving their opinions, which contributed to this paper.

### REFERENCE

1. Glossary of the Association of Firearms and Toolmark Examiners by the AFTE Standardization Committee. Third Edition, 1994.



**Figure 9: Ejector's cut-out in Remington 870 shotgun.**