

# LES RAPPORTS DU GRIP

## **GRIP's Contribution in view of an International Tracing System of Small Arms and Light Weapons**

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## SUMMARY

One of the main handicaps in the struggle against the proliferation of light weapons and small arms is the difficulty, and often the impossibility, to identify the paths and the responsibilities implied in the production, the transfers and illicit use of these weapons. Two important factors contribute to this failing in the tracing process:

- the weapons are not marked in a reliable and universal manner, or are not marked at all ;
- even though they are used at the beginning in legality, the production and the transfers are not recorded systematically, allowing ulterior illicit transfers, without possibility to identify the link of the chain where the diversion intervened.

The authors first define what is an adequate marking and propose a technique of double marking. The first operation consists of a classical marking done by stamping. The second involves a more sophisticated but simpler marking done by laser on a part difficult to access of the essential piece of a weapon. This technique would permit, whatever happens, to recover at least an element of the marking that is necessary to single out the weapon in an adequate register that is defined in its turn. A centralised register on an international scale would be therefore an indispensable tool in the tracing of light weapons. A similar technique of marking is proposed for ammunition.

A section is dedicated to the creation of an international mechanism of tracing by the centralisation of the information via an international Agency established in the framework of the United Nations. The tasks of such an agency are briefly defined and the adoption of the principle of an international convention foreseeing such systems on the occasion of the UN Conference on Small Arms Trafficking in all its Aspects is proposed.

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## **1. Introduction**

In order to identify them, firearms and ammunitions can be marked by inscriptions like a serial number, the manufacturer's initials or name, the type of the weapon, or the purchaser's mark. These inscriptions, which are called « marking », are the only elements that permit the registration and the follow-up of the route covered by these items in order to localise them and to rise up to their source, a process which is called « tracing ». Presently it is very difficult and expensive to map this course and to make responsible the different intervening parties<sup>1</sup>.

To prevent small arms and ammunition trafficking and their harmful implication in internal conflicts, the international community must start to trace them through what it can master at the beginning of the chain, i.e. at the manufacturing stage, and to register them in order to permit to follow them all along their existence. Thus, from the first transaction, the tracing of their itinerary can be known. A centralised register, listing each of the transactions they can be subject to, would be a powerful instrument of transparency.

An international system of marking and tracing light weapons would be an efficient tool for combating the illicit production, transfers and use of these arms. It would not immediately solve the problem of the illegal weapons which are stocked everywhere in the world, but would permit to avoid the growth of these stocks and, in term, to glimpse their elimination. An agreement on a global scale is therefore necessary so that the signatory States can reinforce and harmonise their legislation in order to trace on a reliable manner the path covered by the weapons from country to country.

## **2. Objectives and general setting of the tracing**

- With an international system of tracing, the international community would be in a position to :
  - (a) identify the persons responsible of a light weapon diversion toward and within the illicit sphere ;
  - (b) reconstitute, by crosscheck of information, the connections used by the traffickers of small arms, and therefore to better combat against the international organised crime ;
  - (c) discourage the activity of the illicit arms trade and to reduce its application field ;
  - (d) act for the prevention of conflicts by giving the alert when excessive transfers are noted.
  
- To be able to trace light weapons and ammunitions efficiently, it is indispensable to dispose of :
  - (a) an appropriate marking on the international scale ;
  - (b) a centralised registration of the manufactures and of all the transfers that follow.

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<sup>1</sup> A talking example is the International Commission of Investigation of the UN on the transfers of weapons to Rwanda, set up in 1995 and rerun in 1998, that only succeeded to find very fragmentary information on the route taken by the weapons. The Commission could never determine the persons responsible of the illegal deliveries whereas at the time there was an embargo of the United Nations on the weapons.

- The manner with which the marking and the registration are done strongly influences the rate of success of the tracing, its costs and speed. It is therefore essential to adopt the appropriate measures at the stage of the marking and the registration. We present these in the following sections.

### **3. What does the adequate marking consist of ?**

#### **3.1. For small arms and light weapons :**

- Minimum information to be figured : a unique serial number including the year of production, the country of origin and the manufacturer's name.
- Other information as the model and the lot number can also be marked. It is true that if the registration is done correctly, these information are not indispensable since they can be recovered in the register. An overburdened marking should therefore be avoided.
- It is advisable to add the name of the first purchaser and his origin, if this is known at the time of the manufacture :
  - i. Such an additional information marked on the weapon is not expensive and permits to shorten the tracing operation.
  - ii. Knowing that the legislation of many countries requires that the purchaser signs an end-user certificate (and asks an express authorisation if he decides to re-export the weapon thereafter), it is especially important to make responsible the first purchaser. A visible indication of the latter is of some help.
  - iii. In practice, the marking of the weapon should be done at the time of the manufacture. All ulterior addition of marking, outside of the original manufacturer's facilities, can prove to be difficult and dangerous because it could drive to falsifications.
- It is preferable that the information contained in the marking are the most legible possible for the authorised institutions of any country, in order to facilitate the transmission of data. An identical codification system should be established to permit their centralisation. For example : 123456 00/BE/FN, corresponding to : unique serial number and year / country code / manufacturer code.
- Concerning the technical aspects, an adequate marking responds to the following criteria :
  - i. it does not damage the technical quality of the arm ;
  - ii. it is almost indelible, lasting and difficult to falsify ;
  - iii. the cost by unit of production is not so high ;
  - iv. it uses a simple technique (that can be applied easily in all countries) and, preferably, identical on an international scale ;
  - v. it can be applied on several parts of the weapon and necessarily on the main part defined like such by the manufacturer. The replacement of this main part should be forbidden unless there is a standard exchange of the former part with a new one duly marked and corrected in the register.

#### **Proposition of a marking technique for light weapons**

Casting, stamping and engraving are the methods used for marking the metallic products.

The marking by stamping consists in the impression of a mark on the support by the application of a strength, inducing the deformation of the crystalline structure of the material. It presents the advantage to be easily visible and legible. However this technique, like casting and engraving, has a major inconvenience : through different obliteration methods (as the filing, the hammering, the boring, the soldering, the perforation or double perforation, the supernumerary stamping, the replacement or the

removal of the part bearing the marking) the marking can either be altered or removed [Berkol, 2000]<sup>2</sup>.

After recent reports on the insufficiencies of the present weapon tracing system, some initiatives have been taken in order to study new possibilities of marking in order to lead to a universal system. Some of these techniques include the marking by chemical additives, by addition of inclusions (ultrasonic signature) or of tracers (electromagnetic, crystallographic or radioactive, computer chips), by perforation or by laser engraving.

The advantages and the inconveniences of each of these methods should be compared if the best technology is to be chosen. In order to insure the respect of the above mentioned marking criteria, the adoption of a combination of these different techniques appears judicious (technique of the double marking). These markings, elaborated at the time of the manufacture, permit to preserve the necessary information to locate the weapon in a register.

### **Double marking**

In order to satisfy at the same time to the requirements of simplicity and indelibility, it would be advisable to have a classic marking on the one hand by stamping the basic information (legible directly by a policeman) and on the other hand an essential marking more sophisticated and indelible (for example accessible in case of necessity and of which the falsification or simply the access would render the arm unusable). This second marking could be done on the parts difficult to be handled after the manufacture of the weapon, as the ejector, the breech, the extractor, thanks to techniques as the laser engraving or laser perforation directed by computer that permits inscriptions on a few square millimetres. The attempts of obliteration of this marking by classical methods would render the arm unusable and the falsification would require a very sophisticated technique whose result would not be satisfactory (at the time of reading, one should normally detect the modifications).

In this last case, the laser marking technique can be used at the same time to mark the serial number itself or as a mean of coding the number by using a matrix system (see figure 1 in the appendix). There are also laser marking techniques that print bar codes which have the advantage of not being visible to the naked eye<sup>3</sup>.

With regard to the essential marking, one can also use the stamping on parts of the weapon to which, after the manufacture, one cannot have access without damaging it. However, we suggest the use of the laser marking technique that presents several advantages. Particularly :

- i. it is a rather simple technology (see figure 2 in the appendix) and presents an acceptable cost by unit of production<sup>4</sup> ;
- ii. it can be used on a great number of parts of the weapons concerned because of its very small size ;
- iii. there is no physical contact between the laser and the support to be marked which permits its use on sensitive and not easily accessible parts ;
- iv. it is applicable to small arms already in circulation ;
- v. the risk of falsification, although technically possible, is extremely reduced and is certainly not profitable for the traffic in arms.

### **Remark**

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<sup>2</sup> According to officials of the National Institute of Crime-Detection Techniques and Criminology depending on the Belgian Ministry of Justice, about 1/3 of the weapons that come to the Institute for tracing have their serial numbers removed. They can reconstitute the serial numbers of a third of these weapons.

<sup>3</sup> NdYAG (Neodymium, Yttrium, Aluminium Garnet) type lasers ; see <http://135.145.12.198/acrob.html>.

<sup>4</sup> The price for a laser varies between 40,000 and 100,000 US\$, which is the usual price of a precision laboratory apparatus that could be rapidly amortised in a mass production.

The marking by stamping (complementary to the laser marking) could be usefully completed by marks signalling the replacement of certain parts of the weapon (for example by the addition of a letter, indicating what part it concerns : 123456/BE/FN-L, the letter L corresponding to the barrel, and indicating that it has been replaced or has been modified). This technique of addition to the original marking is already used by Glock® Company [Davey, 1992].

### 3.2. For rounds of ammunition :

- The present marking of ammunition is unsatisfactory. In lack of international constraint, the dealers use their acronym regularly without indication of origin, the marks are sometimes coded or, simply, non-existent. These information do not permit an adequate tracing. Additional inscriptions, particularly the lot numbers and the type of ammunition, can be indicated on the packaging. When rounds of ammunition come out of their original packaging, these indications are lost.
- On the other hand, ammunition are consumed after use which poses a problem for their tracing. Therefore the marking should take into account the tracing possibilities before and after the shooting of a round of ammunition.
- Ammunition are specifically considered as dangerous products. From then on, with regard to their packaging for transportation, they must get the probate of an institution recognised by the exporting country with respect to the international regulations based on the recommendations of the Committee of United Nations Experts [UN, 1993]<sup>5</sup>. Thus a harmonised marking and documentation system on an international scale is applied to the packaging of rounds of ammunition<sup>6</sup>. A similar system could be developed for the tracing of the ammunition themselves.
- Nearly all above-stated criteria concerning an adequate marking of light weapons are also of application for ammunition.
- The marking of ammunition should contain the following information : unique lot number including the year of manufacture, country code, manufacturer's code and possibly the code of the first purchaser. Let's note that the cartridge cases normally possess, but without legal obligation, a marking on the base (see figure 3 in the appendix) including information relative to the calibre, the manufacturer's mark and the presence of heavy metal (Sx for Sintox®, CF for Clean Fire®, LF for Lead Free®, etc.).
- There are numerous marking techniques for all the components of ammunition [Berkol, 2000] : projectile, cartridge case, powder, primer cap and priming mixture (see figure 4 in the appendix). For an efficient tracing of ammunition, it will be probably necessary to use a mixture of two or several marking techniques because the collect of information can vary before or after shooting and if one has access to the packaging or not. Only an advanced survey can reveal the best arrangement of these methods. However, it would be necessary to impose to the ammunition manufacturers at least the laser marking of the cartridge cases and possibly of the primer cap, even though they do not produce the cartridge cases themselves. Indeed, the marking of the cartridge cases, even after their manufacture, is easy and of an acceptable cost by unit of production.
- The marking of the cartridge cases is technically impossible to forge without damaging the ammunition. Nevertheless, a problem remains : a cartridge case can be reused in the manufacture of a new round of ammunition, undermining therefore an adequate tracing. However, the reuse of big quantities of cartridge cases by traffickers in order to scramble the tracks seems little profitable, and to all least discouraging for the traffic in big

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<sup>5</sup> <http://www.unece.org/trans/danger/danger.htm>.

<sup>6</sup> Let's note that it is possible to trace the different components of the finished packaging (for example the rollers of raw materials used in the production of a cardboard) by their original manufacturer and to determine the responsibilities of a technical failing at the time of the transportation or storage. This does not apply for ammunition.

quantities. In any case, the reuse is especially made by hunters and does not seem possible for criminals and warlords.

### **Proposition of a marking technique for ammunition**

- The laser marking technique could be applied to the cartridge cases or possibly to the primer cap of the rounds of ammunition because of the following advantages :
  - (a) The technique is simple, not expensive by unit of production and does not alter the cartridge case (it does not have any physical contact with the support during the marking) ;
  - (b) It permits to concentrate several information on a confined space ;
  - (c) The method is identical to the indelible marking applied on light weapons.
- One could also add the traces of chemical, explosive or crystallographic elements in the powder, the bullet or the primer cap. An efficient possibility appears to be the combination of different marking techniques on different components of the round of ammunition.

### **3.3. General remark :**

- There is a founded fear that some light weapons are manufactured in counterfeiting, and also endowed with a counterfeited marking. If the case arises, it would entail false accusations against some manufacturers. This danger can be easily surmounted by the latter, by using chemical tracers, difficult to synthesise and specific to each manufacturer, added to the basic material of the arm or the round of ammunition to obtain his « signature »<sup>7</sup>. This principle is similar to the one used to distinguish the true banknotes from the forgeries.
- This marking system, that can remain optional, coupled with the above-developed marking (technique of the double marking), is an useful instrument that allows the manufacturers of light weapons and ammunition to protect themselves from counterfeiting and false accusations.

## **4. What does the adequate registration consist of ?**

All information concerning light weapons and related ammunitions should be gathered in a register centralised on a national, regional and international scale. In order that the tracing functions, it is necessary to record these information from the manufacture and at every change of owner, that is every time that there is a transaction or a displacement in another State. Let's point out that it is the knowledge of at least one element of the marking which would serve as a reference mark in order to find an item in the register.

- The information to be recorded are, at least :
  - i. the description of the product;
  - ii. the content of the marking;
  - iii. the name and the localisation of the owner ;
  - iv. the date of entry in the register ;
  - v. the information concerning each transaction, namely:
    - a) the sender, the intermediary (if existent), the consignee ;
    - b) the starting, transit and destination points and the corresponding dates ;
    - c) the export, transit and import licenses (quantities and lots corresponding to the same license);
    - d) the end-user certificate ;
    - e) the shipper(s) ;
    - f) the control organisation ;
    - g) the nature of the transaction (commercial, State to State, non pecuniary)
    - h) possibly the insurer and the financial institution.

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<sup>7</sup> Some rare and expensive chemical additives can be used to this effect because, for a mass production, the cost by unit of production would be minimal. This would not be the case of a manufacture in counterfeiting, which is usually limited.

- An adequate record keeping of the international and intra-national transfers of weapons responds to the following criteria :
  - i. It is precise and easy to handle (computerisation) in order to permit to gather quickly all data with a view to reconstituting the entire route of a weapon.
  - ii. It is identical on the international scale and preferably centralised in order to permit to do crosschecks of information to identify the recurrent practices of traffickers.
  - iii. The information are kept during the usual life of the weapon or ammunition and then, they are archived.

## 5. Creation of an international tracing mechanism

It is highly recommendable that an international Agency, established within the framework of the United Nations, permanently centralises all recorded transactions and operates the controls and the follow-up of light weapons and ammunition [Berkol, 2000]. Endowed with a central headquarter, the Agency would act in connection with national offices depending on the States that would have adhered to it, for example by signing and ratifying an international convention<sup>8</sup>. Its tasks would be :

- i. To hold an international register centralising the data provided by States (stocks and transfers of the civil and military markets) ;
- ii. To proceed to verifications of newly manufactured products as well as at the time of the consignment and the receipt of the goods (conformity with the documents) ;
- iii. To control the stocks periodically (civil and military)<sup>9</sup> in order to verify their conformity to the register ;
- iv. To control the resales<sup>10</sup> and to transmit beforehand the data to the country of origin that should give its agreement in order to insure the respect of the end-user certificate;
- v. To initiate inquiries in case of mistakes or transgressions. However, in order to preserve the national security of States, the data must remain confidential and could be communicated only in the framework of official inquiries.

Let's note that the centralisation greatly facilitates the treatment of data while making it more efficient and faster and constitutes a lasting protection against the possible loss of data at the State's level, especially in those affected by an armed conflict.

### Generalities

- The registers of the manufacturers and the dealers should be computerised. The stocks and all movements (including the non pecuniary and intra-community transfers) would be communicated periodically to the local office of the Agency under the aegis of each State.
- To avoid possible deviations toward the illicit market during the transportation or via a relayed country, a solution would be to impose the sales in CIF terms (Cost, Insurance, Freight), which includes in the price the cost, the insurance during the transportation and the freight<sup>11</sup>. Therefore the products would belong to the seller and would be under his responsibility until the delivery to the buyer in good and due form under the control of the authorities of the importing country and the local Agency.
- Similarly, in various countries, the export and import licenses of several commodities (dairy products, flesh-coloured products, pasta, processed foodstuffs) are submitted to highly coercive financial security bonds. A similar security bond system could be applied for light weapon sales.

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<sup>8</sup> The detailed study of this international mechanism is the object of an ulterior work.

<sup>9</sup> Following the example of the controls done by multinational teams in the framework of the respect of the Treaty on the Conventional Arms in Europe. Such a process would permit to identify in an early phase the excessive accumulation of small arms and would be beneficial in regard to conflict prevention.

<sup>10</sup> Currently, resales are operated regularly without the country of origin's intervention.

<sup>11</sup> For example, for the exports of sugar from the European Union, the obtaining of subsidies (that are as important as the price of sugar on the international market) is conditioned to the remittance to the authorities of the maritime bills of lading and manifestos certified by the harbour authorities at destination. In these conditions, the sellers can only sell with CIF terms to ascertain the effective import of the product by the recipient.

- The manufacturers, sellers and brokers should be registered by States to be able to manufacture and to trade small arms and ammunition. Some recent initiatives suggest to include the registration of the transport agents.
- A particular attention should be carried to the brokers who often intervene as relay in the deviation toward the illicit market. They should inform the Agency and should ask for a license from the authorities of their country of residence (including in the country of transit) and should be held responsible for the material until its receipt by the buyer. The utility of recourse to an extraterritorial jurisdiction in order to regulate light weapon exchanges should be examined on basis of criteria founded on the international humanitarian law.
- A good intrinsic control manner would be to oblige the transport agents, insurers and financial institutions to accept only the transactions whose documents would be compliant to the laws and conventions existing on the subject.
- The sale of the surpluses of military weapons and seized small arms towards the civil market should be forbidden and the excesses should be systematically destroyed.
- With regard to the production under license, the produced quantities should not exceed the needs of the country in which the production takes place and their export should be forbidden. In the same way, all new concession of production under license should be forbidden.

## **6. Light weapons already in circulation**

With regard to light weapons that are already in circulation on the civil market, it would be necessary to call on the owners, in every country, so that they present them to the competent authorities in view of marking and registering them according to the new system. A certain delay, for example six months to one year, could be given to the owners in order to regularise their situation<sup>12</sup>. After this delay, all non regularised weapons would be considered illegal and the owners would expose themselves to severe sanctions. In order to encourage the possessors, the buy-back of the weapons and a bonus on recycling could be proposed. For security and defence forces, the delays of registration could be longer, for example 5 years.

Concerning the marking, the inscriptions already existing on the arms could be used or, in some cases, a new serial number could be stamped. The laser marking technique could be easily applied to the weapons already in circulation.

## **7. Toward an international convention**

The reduction of the human costs due to the proliferation of light weapons and small arms mainly depends on the creation of a sense of responsibility by all the actors of the arms circuit. Although it is incumbent on the users of weapons to respect human rights, the liabilities of the producers and the sellers against the international community should be redefined for the use of weapons that they deliver on the market.

The establishment of an international tracing system containing internationally recognised standards on the possession and legal transfers of armaments could be reached by the adoption of an international convention. This would help States to accept the limitations more easily and to harmonise national legislation. The marking and the centralised record keeping of the information concerning light weapons and ammunitions would be a first stage toward this objective.

It is crucial that the principle of an international convention foreseeing such systems is adopted on the occasion of the United Nations Conference on Small Arms Trafficking in all its Aspects. This decision should be coupled with a calendar, a mechanism of assessment and an instrument of preparation and establishment of this convention.

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<sup>12</sup> The Canadian law of 1998 on the firearms foresees a delay of 18 months (<http://www.canada.justice.gc.ca>).

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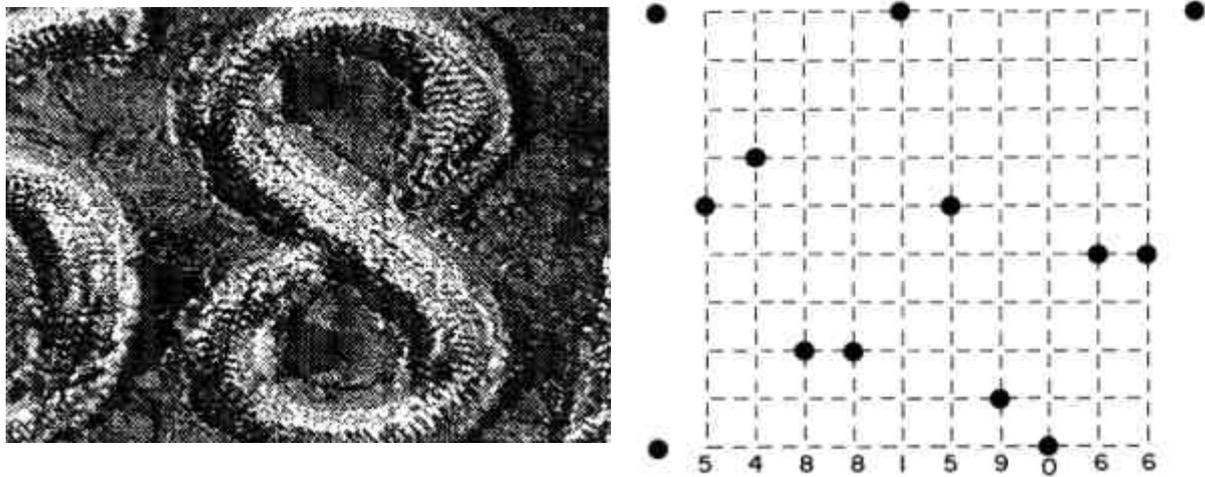
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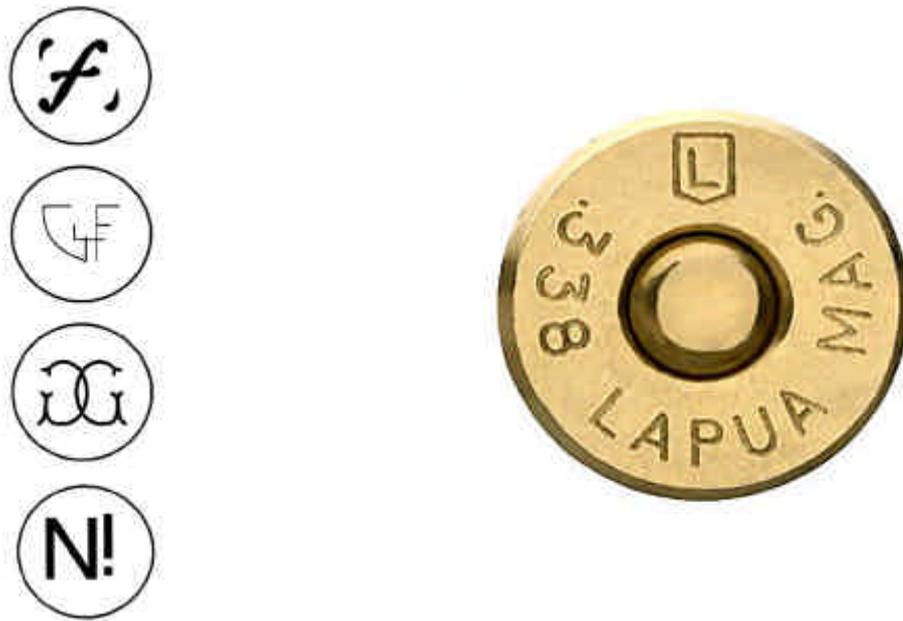
**APPENDIX**



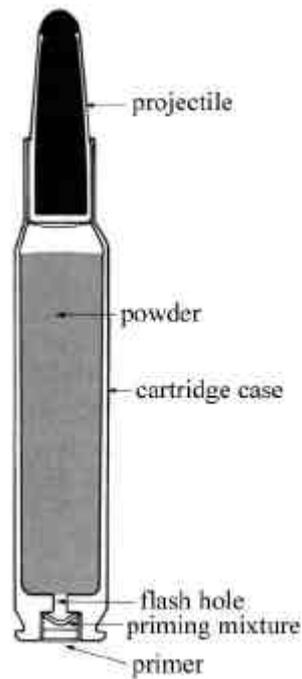
**Figure 1 :** Illustrations of laser marking technique and the matrix codification system [Collins, 1998 ; Polk et Giessen, 1975].



**Figure 2 :** Illustrations of the different possibilities offered by the laser marking technique (molten metal, vaporisation of the metal) [<http://135.145.12.198/acrob.htm>].



**Figure 3 :** Marking examples on the bases of the cartridge casings  
 [Jorion et Regenstreif, 1994] ; [<http://home.snafu.de/l.moeller/Geschossbilder.html>].



**Figure 4 :** Schematic representation of a cartridge and its constituent elements  
 [Herdener *et al.*, 1997].