

HANDVILLE

RECOMMENDATIONS FOR THE ESTABLISHMENT  
of  
A TEMPORARY FIREARMS IDENTIFICATION UNIT  
at  
THE V.B.I. FILIPINI STREET LABORATORY

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July 8, 1957

TO: Jack Ryan, Acting Chief,  
Police Administration Division  
FROM: Ralph Turner, Police Consultant

DATE: 5 July 1957.

SUBJECT: Suggestions re: turning comparison microscope  
over to Filipini Street laboratory.

During the FY-55-56, the MSU Police Advisory Group ordered one comparison microscope for firearms identification to be used in the Filipini Street laboratory. (Purchase order 30-79-120-5-60243). The microscope is a Bausch and Lomb, Large Comparison Microscope, with camera and accessories.

Cat. No. 31-29-25-21.

Cat. No. 31-29-25-22.

This equipment was delivered in Saigon during June 1957, and was held in the MSU office until Mr. Turner arrived. It was uncrated, assembled and found to be in working order after all pieces were checked.

Before this piece of equipment is turned over to the V.B.I. laboratory, certain recommendations should be made to Mr. Chanh regarding its use in the total area of firearms identification. The attached notes may be regarded as a guide for the establishment of a firearms identification section. It is suggested that they be translated into either French or Vietnamese and be mimeographed in a limited quantity for use by the laboratory personnel for operational and training procedures.

The report which I prepared in 1956 contained recommendations for the renovation of the Filipini Street laboratory. While none of these suggestions have been carried out, I do not think it advisable to withhold the comparison microscope until new quarters are built. Admittedly, a piece of equipment of this type should be placed in a suitable laboratory; however, in the best interests of the program, it may be desirable to install it at present, inasmuch as no American Aid equipment has reached the V.B.I. laboratory. When I visited the laboratory on July 3, 1957, I checked all of the rooms and have tentatively selected **one** which could be converted into a firearms section. Recommendations for this minimum remodeling are attached.

In view of the fact that Mr. Nguyen Van Thong, MSU Police Participant 56-57, will be returning shortly, there is additional merit in setting up the equipment, for it will provide him with an opportunity to apply some of the techniques which he studied while at MSU. I would suggest, however, that we do not turn the microscope over until they have completed most of the minimum suggestions which follow. I strongly urge that this be done as quickly as possible so that I will be able to spend some time with the people assigned to this work.

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## INTRODUCTION

The following paper has been prepared as a guide for the establishment of a firearms identification section in the V.B.I. Filipini Street laboratory. This outline was developed rather quickly in an effort to facilitate the transfer of one comparison microscope to the laboratory. It should be noted that these recommendations are of a temporary nature, and represent minimum planning and direction. The 1956 MSU report covering the establishment of a criminalistics laboratory has not been implemented as of this date; however, in the best interests of the program, it is felt that this piece of equipment can be turned over to the V.B.I. laboratory. This is with the full knowledge that, while working conditions are far from ideal, the V.B.I. participant, (Mr. Nguyen Van Thong, MSU 1956-1957) who has just returned from the United States, will be able to effect some of the skills and techniques which he acquired during his period of study at MSU.

The format of this paper is such that it can be used as a guide for the establishment of the firearms identification section, and with certain modifications, may be useful for instructional material within the National Police Academy. In addition to suggestions pertaining to the physical facilities of the laboratory, other sections of the paper include a brief resume of the principles of firearms identification, suggestions for training technicians, a typical case procedure, and recommendations

for the administration and operation of the firearms section. It is assumed that V.B.I. technicians will study the references noted in the paper. Many of these texts are available at the National Institute of Administration library.

The following recommendations are made with the knowledge that they represent the first step toward the renovation and upgrading of the Filipini Street laboratory. If the V.B.I. is to have the services of a firearms identification division, one of the important units of a modern forensic laboratory; and if those responsible for the future development of the laboratory wish to institute a sound, long range program of scientific criminal investigation, it is important that the suggestions found on the following pages be carried out as quickly as possible.

CHAPTER I  
GENERAL PRINCIPLES  
of  
FIREARMS IDENTIFICATION

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The special area of firearms identification, a sub-division of the general field of criminalistics, usually includes such techniques as the identification of questioned projectiles and cartridge cases, the examination of powder residue in weapons, the study of powder and shot patterns, dermal nitrate tests, the determination of exit and entrance wounds, the restoration of obliterated serial numbers on weapons brought to the attention of the police, the maintenance of museum and reference collections of handguns and ammunition, and the pursuit of research associated with forensic ballistics problems. This paper will discuss, in a limited way, only those problems related to the identification of fired projectiles and cartridge cases.

The identification of fired projectiles and cartridge cases is based on the study and comparison of microscopic tracings, or striations, impressed on the relatively soft surface of a projectile and/or the side and base of the cartridge case. The comparisons are made between the questioned (unknown) piece of physical evidence and test bullets and/or cartridge cases fired from a suspected weapon. The two pieces of evidence are examined with the comparison microscope.

The theoretical considerations involved in this study are as follows:

There are three (3) important parts of the revolver which impart microscopic markings to the projectile and case when a round of ammunition is fired in a hand gun. These are the barrel, breech-block and firing pin. In the semi-automatic hand gun, usually referred to as an automatic pistol, the ejector and extractor make marks, in addition to the barrel, breech-block and firing pin.

The principle involved in the transfer of identifiable striations from the gun to the projectile or case is based on the fact that during the manufacture and finish operations of the above-mentioned parts of the gun, tiny, microscopic marks are left on the hard metallic surface of the gun parts. With the exception of the brooching method for rifling barrels, it is quite difficult to remove all of these imperfections. These microscopic tool marks become more apparent as the quality of the gun manufacture deteriorates.

The second point to consider is the fact that when a round of ammunition is exploded within the chamber of the gun, tremendous gaseous pressure is generated. This pressure is sufficient to force the projectile out of the chamber and through the barrel. Inasmuch as this pressure is, for all practical purposes, equal in all directions, the cartridge case is expanded and forced backwards against the breech-block. In the automatic

weapon, the extractor and ejector also come in contact with the rim and base of the fired cartridge case with considerable force. In both the revolver and automatic weapons, the firing pins strike the soft metal of the primer cap with considerable force.

There now exists a condition wherein the soft metals, usually lead in the case of the projectiles, and brass and Woods or Rose metal in the cartridge case, are in contact, under great pressure, with the very hard metal of the gun. This contact is sufficiently great to cause any tiny imperfections on the surface of the gun metal to be transferred to the softer metals in much the same manner as a design is stamped or impressed on a piece of metal with a punch or press die.

Careful study of these striations on the gun parts has indicated that no two guns have exactly identical striations or imperfections. This is caused by the differences in wearing of the various tools used in the manufacture of the gun parts, i.e. rifling tools, milling machine cutting heads, etc. Thus, in effect, each gun manufactured carries its own set of identifiable markings. This principle is very similar to the basic concepts of fingerprint identification. While it is statistically possible to demonstrate that there may be two guns in existence with similar markings, it has also been demonstrated to the satisfaction of the courts that this is a practical impossibility. Therefore, this science of firearms identification has been accepted by the courts of the United States and other countries

of the world as a reliable type of scientific evidence. In the United States, the first case involving firearms identification occurred in 1917 in New York state. Since that date, evidence of this type has been admitted in court whenever it has been shown that the firearms identification expert has been properly trained and qualified. By the same token, evidence of this type, as is also the case with other types of scientific evidence, should not be admitted into court if there is any question about the competence or integrity of the expert witness.

CHAPTER II  
THE FIREARMS IDENTIFICATION LABORATORY

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The 1956 MSU report (Preliminary Report on the Establishment of a Scientific Crime Detection Laboratory, 31 August 1956) contained recommendations for the establishment of a firearms identification laboratory. In view of the fact that these suggestions have not been implemented as of this date, the following plan is offered as an alternative. These temporary recommendations are being made in order to facilitate the transfer of the comparison microscope to the VBI Filipini Street laboratory.

On July 3, 1957, a visit was made to the Filipini Street laboratory and one room was selected for the installation of the comparison microscope. This met with Mr. Chanh's (Laboratory Director) approval, and he indicated that some of the material which is presently stored in this office could be moved elsewhere. The following recommendations indicate minor renovations which must be made before the comparison microscope can be turned over to the V.B.I. :

1. Install black, or light-tight curtains on all windows so that the room may be darkened for visual examinations and photography, when necessary.
2. Remove all chemicals presently stored in this office. Particular attention should be directed toward keeping corrosive chemicals, particularly acids, out of this

laboratory, in view of the fact that it is not air-conditioned. The comparison microscope should be covered with a suitable plastic hood at all times when not in use.

3. The following items of furniture should be requisitioned or constructed:
  - a. One work bench equipped with suitable hand tools for the dismantling, study, and repair of handguns submitted to the laboratory.
  - b. One museum case, with provisions for expansion, for the permanent collection of reference handguns to be assembled by the laboratory.
  - c. Suitable file cabinets for the storage of fired projectiles, cartridge cases, and museum ammunition.
  - d. One appropriate vault, which can be secured at all times. This is to be used for the storage of all evidence being examined in the firearms laboratory. Adequate safeguards are to be established by Mr. Chanh.
  - e. One bullet recovery box. The present water tank, which has been used for this purpose is satisfactory; however, another device will be discussed with Mr. Chanh.
  - f. One stand for the comparison microscope. Exact dimensions for this stand will have to be discussed with Mr. Chanh.

- g. Suitable filing cabinets for the storage of case reports, index cards, etc.

As soon as the necessary parts of the above recommendations have been completed, it will be possible to install the comparison microscope in the laboratory.

CHAPTER IIITRAINING FOR FIREARMS TECHNICIANS

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The training of firearms identification technicians will obviously present many difficulties. There are those who will point out, and correctly so, that it is impossible and/or prohibitive from a cost standpoint, to provide the type of training which is necessary for technicians in this area of specialization. The fact nevertheless remains, that whoever engages in this work will eventually be participating in the administration of justice. The moral implications of this responsibility are obvious. In addition to this, is the fact that the technician is engaging in a scientific procedure, the results of which are not subject to limitations or interpretations imposed by any nationalistic or legal structure. If the findings are correct, they will be concurred with by any qualified technician throughout the world. Thus, emphasis must be placed upon proper qualifications, training and supervision.

The following recommendations will present an outline of the desired minimum standards necessary to fill the position of firearms technician, and then suggest how this may be implemented under existing conditions.

The American Academy of Forensic Sciences, through its section on Criminalistics, is in general agreement that the desirable qualifications for a firearms technician are as follows: Graduation from an accredited college or university (or its

foreign counterpart) with a major in one of the physical sciences, preferably physics, chemistry, or criminalistics. Graduate work is recommended wherever possible. This should be followed by a minimum of six months to one year of supervised apprentice instruction under the guidance of a qualified firearms identification technician. This period of training should also include at least one month's study at a reputable firearms manufacturing plant. This will involve observation and actual participation in all phases of gun manufacture. The supervised study should also include the solution of problems prepared by the laboratory director and training in report writing, case preparation, and courtroom testimony. Upon completion of this indoctrination, the laboratory director should be in a position to evaluate the technical competence of the student.

While the above recommendations could be carried out in the United States, modifications will have to be made insofar as the MSU Viet-Nam Program is concerned. They may be implemented as follows:

Every effort should be made to recruit and select people for assignment to the V.B.I. laboratory who have had the equivalent of U.S. college or university training in the physical sciences. Selection should also be based upon English proficiency. Assuming that the best possible candidate has been recruited, he can be processed for training at MSU. It is not necessary that the firearms technician spend three quarters at

MSU; however, it is necessary that he be registered in either the fall or winter quarter. This will enable him to enroll in the course in criminalistics which is taught each of these terms. During this time, it will be possible to arrange a special course of study under adequate supervision. After completion of at least two terms at MSU, arrangements should be made for study at one of the firearms manufacturing plants, i.e. Colt or Smith and Wesson, both located in the eastern section of the United States.

The program, which Mr. Chanh may develop in the Filipini Street laboratory, can be implemented with the help of Mr. Thong, who will be returning during the month of July. Mr. Thong was exposed to this type of training at MSU and should be able to develop a suitable training course. The steps to be followed are outlined below:

1. Assemble a collection of at least 50 to 100 handguns. They should be of various calibers, and all be in safe, working condition.
2. Fire at least 5 test shots from each gun. The recovered projectiles and cartridge cases should be filed, along with all necessary information pertaining to the description of the gun. i.e. make, model, caliber, serial number, number of lands and grooves, direction of twist of rifling, source of weapon, and any other pertinent information.
3. Test shots fired from each gun should be examined with

the comparison microscope until the technician becomes familiar with the characteristics of the weapon. This should also be done with fired cartridge cases. Photomicrographs should be taken until the technician is able to consistently produce good photographs and enlargements. The comparison microscope is equipped with a camera, shutter, adapter, and plate holders. Enlargements can be made with equipment presently in use at Filipini Street.

4. After the technician has made a complete study of all of the reference guns, the laboratory director should select a number of guns from the reference collection, fire test shots from these guns and require the technician to identify from which gun the unknown bullets and cartridge cases were fired. This, obviously, is a type of examination which should be conducted under carefully supervised conditions, for it is upon the quality of this work that the laboratory director will have to pass on the qualifications of the technicians. There is no reason why members of the MSU Police Advisory Team could not participate in this examination.
5. During this course of study and training, the technician should also be required to prepare case reports in the same manner as those required by the Trivunal. He should also be required to present his findings before a simulated

judicial group and explain the reasons for his conclusions. The technician should be prepared to demonstrate his method of examination, either by actual practice or through the use of appropriate photographs and diagrams. Again, members of the MSU Police Group could serve in an advisory capacity.

While the above recommendations may have certain shortcomings, the plan, as outlined, can at least serve as a guide for the training of firearms technicians under present circumstances.

CHAPTER IV  
CASE PREPARATION

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As indicated in Chapter I, this paper is concerned only with that phase of forensic ballistics which pertains to the identification of fired projectiles and cartridge cases. This chapter discusses the general principles involved, insofar as firearms identification problems are a part of a criminal investigation. While certain modifications will have to be made to conform with local police practices, the basic concepts are nevertheless, applicable to all situations.

COLLECTION AND PRESERVATION OF EVIDENCE

The collection and preservation of firearms evidence is no different from the rules governing other types of evidence; however, a few special recommendations are in order. The most important rules which apply, not only to firearms evidence, but to all types of physical evidence, are:

1. Evidence should not be disturbed until it has been properly photographed and recorded by means of notes and diagrams made at the crime scene.
2. Physical evidence should be handled by as few people as possible.
3. Whenever physical evidence is transferred for safe-keeping from one person to another, a receipt indicating

this transfer should be prepared. There should be no exception to this policy, regardless of rank or circumstances.

4. Physical evidence should be stored in a secure place, and not be altered in any way. This, of course, does not apply to that type of evidence which must be used (in part) for chemical analyses or similar types of examination.
5. A weapon found at a crime scene should first be carefully examined for traces of burned powder residue, possible odor of burned gun powder, and then checked for any latent fingerprints which may be on a smooth surface of the gun.
6. The weapon should then be unloaded, being careful to record the number and position of any fired and unfired cartridges which may be in the magazine or chambers of the cylinder. After rendering the gun safe, it is ready for further laboratory examination.
7. Spent or fired projectiles may be found at the crime scene, on or about the person of the victim of a shooting, or may be recovered from the body of the victim by an attending doctor or autopsy surgeon. Upon discovery or receipt of the bullet, it should be marked for identification and then stored in a small evidence container. The bullet itself should be protected by

cotton or similar material. When marking for identification, care must be taken not to obliterate any rifling marks on the surface of the bullet. Identification marks are usually placed on the base of the bullet. Marks may be placed on the nose, if there are no important markings, or bits of tissue, bone, blood or other material, which may be useful in further examinations.

8. In addition to finding fired cartridge cases in the chambers of revolver cylinders, crime scenes should be carefully searched for cases ejected from automatic pistols. The location of each case should be noted in a crime scene sketch, for it may be useful in providing a clue to the type of weapon used. Cartridge cases should be marked on the inside of the neck of the case, and should be protected with cotton when placed in evidence containers.
9. All evidence, properly recorded and accounted for, can be transmitted to the laboratory for examination.

#### TEST SHOTS

After the firearms evidence has been transferred from the crime scene to the laboratory, appropriate case records should be made. These should include a complete description of the weapon as it was found, a record of the serial number and other identifying features, and photographs of the gun, if this is deemed necessary. Ownership of the gun should be checked against

all available records.

If, after examination, the gun is felt to be in safe operating condition, test shots can be fired. It is important that the same type of ammunition submitted with the gun, or involved in the case under investigation, be used for test purposes. Generally speaking, it is desirable to keep the ammunition found with the gun for possible court requirements; however, if circumstances dictate that some of this ammunition be used for test purposes, appropriate records should be made. It is recommended that at least 4 to 6 test shots be fired; however, more may be required in certain cases. Test shots, along with cartridge cases, are then filed for further study.

#### IDENTIFICATION

The actual problems of firearms identification usually fall into three categories: 1) One or more bullets removed from the body of a victim, and/or cartridge cases found at a crime scene are submitted to the laboratory; however, there is no suspected weapon accompanying this evidence. 2) A firearm is submitted to the laboratory with the information that it may have been used in a previous offense where bullets and/or cartridge cases were found. 3) Bullets, cartridge cases, and a suspected weapon, all obtained at approximately the same time, are submitted to the laboratory. In all cases, the basic information usually desired by the investigator is the same, namely; "Were certain bullets or cartridge cases fired from a particular weapon"?

It is the duty of the technician to examine the "questioned bullets, those whose origin is unknown, and compare them with "known" test shots which he has fired from guns submitted to him for examination. The same questions and duties are applicable to fired cartridge cases. Known and test bullets and/or cartridge cases are examined with the comparison microscope until the technician is able to arrive at some conclusion. As a result of his work, he will be able to make one of three statements; either that the bullets or cases in question (1) Were or (2) Were not fired from the gun in question, or (3) the bullets are in such condition that it is impossible to render an opinion. This latter situation is not uncommon when the bullet in question has been badly mutilated or otherwise defaced.

If there is a positive identification, the technician should then take appropriate photomicrographs to illustrate the reasons for his conclusions and opinions. Photographic enlargements can be made for inclusion in the case report.

CHAPTER VFIREARMS LABORATORY ADMINISTRATION

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In addition to providing the type of information outlined in the foregoing chapters, the firearms laboratory can provide additional services to the law enforcement agencies. In order to be most useful, there must be satisfactory cooperation between the various agencies, in this instant, the Saigon Metropolitan Police Department, the V.B.I., the Civil Guard, and other city police departments. This cooperative service is described in the following paragraphs:

1. All firearms cases involving examinations of the type previously described, should be referred to the V.B.I. firearms identification laboratory. Technicians from this laboratory will render assistance to any law enforcement agency requesting such aid.
2. Arrangements should be made to have all hand guns and certain small arms, which have been confiscated by various police agencies, turned over to the V.B.I. firearms laboratory. Appropriate records should be made of this transfer, and the V.B.I. firearms laboratory be held accountable for these weapons. It is to be clearly understood by all parties involved, that this transfer of confiscated weapons to the V.B.I. laboratory is solely for the purpose of establishing a reference

collection of guns for use by the firearms technicians to aid in the solution of criminal cases.

3. The V.B.I. firearms laboratory should be charged with the responsibility of registering all firearms in the possession of both civilians and police personnel.  
While it is not specifically recommended at this time, it is pointed out that some metropolitan police departments in the United States fire and keep on file test shots from all hand guns which they register. It is not unreasonable to plan for the eventual firing and filing of test shots from the guns of all police personnel.
4. The V.B.I. shall maintain an appropriate case file of all firearms cases brought to its attention. This shall include test shots, fatal evidence bullets and cartridge cases, data sheets and case reports. These records will include complete information on cases, solved and unsolved.
5. Unless existing laws make this impossible, all firearms and related physical evidence should be returned to the V.B.I. firearms laboratory at the conclusion of a criminal trial.
6. Members of the V.B.I. firearms laboratory shall continue to pursue a program of study and research to improve the techniques of firearms identification, and shall also be

used to give classroom instruction in this area of criminalistics when such subjects are discussed in the various police training academies.

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