Idaho State Police Forensic Services

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APPROVED BY:

Quality Manager

Rev. 0 Issue 8-10-2006

# State of Idaho Department of Law Enforcement Bureau of Forensic Services

FIREARMS

FOOL MARK

EXAMINER

TRAINING

Manual

### Introduction

- Administrative Matters and Procedures Α.
- Background/History of Firearms Identification and Current Trends В.
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- Н.
- Firearms & Ammunition Development and Current Trends

  Manufacture of Modern Firearms

  Manufacture of Modern Ammunition

  Instrumentation

  Examination of Firearms

  Bullet Examinations and Comparisons

  Cartridge/Cartridge Case Examinations and Comparisons

  Shotshell/Shotshell Corporate Examinations ١.
- Shotshell/Shotshell Component Examinations and Comparisons J.
- Gunshot Residue Examinations and Distance Determinations Κ.
- Toolmark Examinations and Comparisons L.
- Serial Number Restoration M.

### **Section 9 Maintenance and Calibration**

### 9.0 Scope and Background

To insure accurate data, all equipment that has a direct effect upon the comparison and measurement processes is kept in proper working order. Measurement devices and reference standards receive periodic calibration. Other equipment is examined and maintained periodically to verify safe/effective operation. Calibration / maintenance intervals may be adjusted based upon past performance, where the item has demonstrated that it will remain within specifications throughout the calibration interval.

Any equipment that appears to be damaged, out-of calibration or functioning improperly is removed from service, until the nature of the problem can be determined and corrected.

#### 9.1 Procedures

### 9.1.1 Balances

Maintenance and repairs performed on the balance will be recorded in a maintenance log.

Balances will be calibrated annually by a certified outside vendor. The documentation of the calibration will be kept in the front office in the Quality Control Instruments file. If the balance is taken out of service for repair or an event occurs (such as moving the balance) an intermediate check will be performed and documented. In order to pass the intermediate check the accuracy of the balance will be +/-2%. The weights used in intermediate checks will be cleaned and calibrated annually by an outside vendor. The documentation for the calibration of the weights will be kept in the front office in the Quality Control Instruments file.

9.1.2 Comparison microscopes

The comparison microscopes will be cleaned and checked annually by an outside vendor

Each microscope will have a maintenance log and any maintenance or repair will be recorded.

9.1.3 Micrometers and Calipers

Each micrometer or caliper will be annually checked against a certified gauge block or micrometer disk. These checks will be documented and the micrometer or caliper must demonstrate accuracy within (+/-) 0.001" of the intended measurement.

### 9.1.4 Rulers, and other measuring devices.

### 9.1.4.1 NIST traceable devices

The measuring specifications and accuracy for the NIST traceable measuring devices and the certified measuring rods are determined during

certification of these devices and can be found in each laboratory's maintenance log. The NIST traceable measuring device will be calibrated and recertified every three years.

### 9.1.4.2 Rulers and tape measures

Measuring devices will be checked against the NIST traceable measuring device every three years.

The device will be checked against a NIST traceable device and should read 1:1. If it does not the device will be taken out of service. The checks will be documented in a maintenance log.

9.1.4.3 Damage or malformation

If damage or a malformation (i.e. breakage or melting) occurs that may affect the measuring device, it will be taken out of service and checked against the NIST certified measuring device before being put back into use. If the NIST certified measuring device is damaged or malformed, the NIST certified measuring devices will be taken out of service and calibrated before being put back into service.

9.1.5 Gage blocks

Gage blocks will be calibrated by an outside wendor every three years.

9.1.6 Trigger Pull Weights

Trigger pull weights will be checked annually. The weights will be checked using a certified balance. Tolerance for each weight is +/- 5% of the expected value. If a weight does not fall within the expected value it will be taken out of service. Rectification may include cleaning the weight or replacing the weight. The weight must be checked and have satisfactory results before being put back in service.

9.2 Safety Considerations

This procedure involves hazardous materials, operations and equipment. This procedure does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this procedure to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. Proper caution must be exercised and the use of personal protective equipment must be considered to avoid exposure to hazardous conditions.

### INTRODUCTION

The following syllabus will allow you as an examiner trainee to guide yourself through the various areas of knowledge integral to the field of firearms/toolmark identification. This syllabus is generic in its layout and allows some modification by the individual training examiner or lab manager to meet local conditions. paramount that you keep before you the primary and ultimate objective of this training period: to independently and completely examine and compare evidence relating to firearms and toolmark identification; to independently and competently render an opinion and reach conclusions relating to your examinations and comparisons; and to give expert testimony in courton matters encompassed within the broad definition of firearms/toolmark identification and to do this in a professional, competent and impartial manner. The obligation is yours to maximize on the effectiveness of the training period as an opportunity to learn everything possible in this field. The extent to which you exert yourself during this training and evaluation period will bear directly on the quality of your performance in the laboratory and on the witness stand. Note well that your technical abilities and your testimony will, in turn, bear directly on the future situations of accused persons, and especially in the discipline of firearms toolmark identification, the lives of accused persons can hang in the balance. You have a moral and ethical obligation to prepare yourself technically and professionally during training in order to be able to perform according to the most rigid standards.

You will be expected to carry out a study of all pertinent lab equipment, the Technical Protocol Manual, the Safety Manual, as well as the physical reference files.

It is required that you keep a loose-leaf notebook of your study notes on each of the items shown in the syllabus for research, discussion, demonstration, study or practical work. Your notebook can include handwritten notes, charts, graphs, photographs, brief photocopied material, etc., at your discretion, but it must address and broaden on each of the required items of study set out in the syllabus. Organization of your notebook in a format which parallels the syllabus is suggested. This notebook will serve as a ready reference in the month and even years following your qualification, and will assist in documenting your progress during training.

Your training will be monitored and assisted by the training examiner, who has responsibility for training matters. All outside schools, tours, lectures and contacts will be coordinated by the lab manager. You will be expected to meet the standards set by the training examiner for your successful completion of your training.

## A. ADMINISTRATIVE MATTERS AND PROCEDURES

1.		eau Chief/Lab Manager the eiency Testing Program.	laboratory Quality Assurance
BUF	REAU CHIEF	DATE	sic services
LAE	MANAGER	DATE	;iC
2.	Discuss with your Bui the reexamination of e	reau Chief/Lab Manage th	e laboratory policies regarding
BUF	REAU CHIEF	(MATE-V)	
LAE	3 MANAGER	DATE	
3.	Discuss with your Bur the following:	eau Chief/Lab Manager the	e laboratory policies regarding
	report (b) Inquiries from the (c) Request to give a (d) Request to testify (e) Request to testify	press and other media. deposition in a criminal case	or a preliminary hearing.
Bur	eau Chief	Date	
Lab	Manager	Date	
4.	Become familiar with	the requirements and th	ne facilities available for the

secure storage of evidence within the lab. Discuss this with the Bureau Chief/Lab Manager and an examiner from the lab.

Bure	eau Chief	Date	
Lab	Manager	Date	S
Crin	ninalist/Examiner	Date	ervices
5.		the requirements of lab second evidence while under existence with the Bureau Chief and a Date  Date  Date  The Firearms Reference C	curity in regards to firearms,
Bure	eau Chief	Date	
Lab	Manager	Bate Kell Coll	
Crin	ninalist/Examiner	Date	
6.	(a) Learn how to k	60,00	ing the FRC printed inventory tory for your use.
Bure	eau Chief	- Date	
Lab	Manager	- Date	
 Crin	ninalist/Examiner	Date	

Bureau Chief Date Date Lab Manager Date Criminalist/Examiner Know the procedures used in the lab for handling and examining evidence that 8. may be or is known to be infected by the ADS virus and/or other diseases. Criminalist/Examiner Obtain a copy of the Technical Protocols for Handling of Firearms and 9. Ammunition" which includes safety rules and procedures. Familiarize yourself with its contents and indicate you understand the rules and procedures contained therein by your signature below. Date Criminalist, Date Training Examiner

Be briefed by the Lab Manager in regard to his files, records and procedures in

regard to delinquent (unaddressed) cases, annual and sick leave, time and attendance, report files, ordering expendable supplies, purchase orders and

obtaining necessary tools, equipment and protective clothing.

7.

### Basic References:

Policies and procedure manuals for the laboratory.

"AIDS/HIV Carriers, An Organizational Response" FBI Law Enforcement Bulletin, June, 1989.

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# B. BACKGROUND/HISTORY OF FIREARMS IDENTIFICATION AND CURRENT TRENDS

1.	Define the following to (a) firearms ide (b) ballistics	
 Trair	ning Examiner	Date
Lab	Manager	Date
2.	the history, principles broadest sense. Sup	ctions from the basic references and prepare a report or evolution and scope of firearms identification in its ort your report by data accumulated in your notebook raining Examiner who will review your report.
Trair	ning Examiner	Date (C)
Lab	Manager	Date Collect ME
3.	Formulate an answer (a) Is firearms iden (b) What are the identification comparis (c) What is the bas (d) Can experts in conclusions? Why? (e) How does "pro	Date  Date  Date  Date  Date  O the following questions:  Ification an art or science?  ypes of conclusions that can be reached in firearms ons?  Is for each of the above conclusions?  The field of firearms identification disagree regarding their ability relate to firearms identification?
Traiı	ning Examiner	Date
Lab	Manager	Date
4.	Examiners" (AFTE)	with the "Association of Firearms and Toolmarl o include its history, current officers, criteria fo es, the AFTE glossary and the AFTE journal and be able
Trai	ning Examiner	Date
	Manager	Date

5. Discuss with system o link shootings using converge a report on ea	mputer imagery such as	e ongoing research initiatives to DRUGFIRE and BULLETPROOF.
Training Examiner	Date	
Lab Manager	Date	:CES
6. Visit and tour the va examinations within yo		provide direarms and toolmark is visit with the Lab Manager.
Training Examiner	Date	-084
Lab Manager	Date  Date  e about the proficiency to the testing services. Particular to the profice of the profice of the testing services.	MER
the outside independed	conducted within the	esting program administered by icularly be aware of testing and field of firearms and toolmark with the Training Examiner.
Training Examiner	Date	
Lab Manager	Date	
8. Be able to demonstrat using the AFTE Glossa		owledge of firearms terminology
Training Examiner	Date	

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Lab	wanayor

Date

Select a topic for a research project to be completed during your training 9. period. Obtain approval from the Training Examiner before initiation of the project. This project should contribute to the overall fund of information in the field of firearms identification. These results will be shared with the lab upon completion. The results should be formulated in such a way to be a formal scientific paper ready for publication and/or a formal presentation at a

Date Date Porter of Unice Property of Unice Prop Training Examiner Lab Manager

### Basic References:

"Firearms Identification" Vol. I, MATHEWS

"Firearms Investigation, Identification and Evidence" HATCHER, JURY, and WELLER

"Introduction to Tool Marks, Firearms, and the Striagraph DAVIS

"The Identification of Firearms and Forensic Ballistics," BURRARD

"The Identification of Firearms" GUNTHER and GUNTHER

"Hatcher's Notebook" HATCHER

"Basic Firearms/Toolmarks Course" California Department of Justice

"AFTE Journal" Association of Firearm and Toolmark Examiners staff

"AFTE Glossary" AFTE Standardization Committee

"A Statistical Study of the Individual Characteristics of Fired Bullets" Journal of Forensic Science, January, 1959, BIASOTTI

### C. FIREARMS & AMMUNITION DEVELOPMENT AND CURRENT TRENDS

1.	advent of metallic car early rifling techniques	tridges, with particular er , percussion systems, prir a chronological outline of	inition development up to the mphasis on lock mechanisms, ning methods and pre-metallic this early development and
Train	ing Examiner	Date	ices
Lab N	/lanager	Date	:C services
2.	firearms which are	representative of comm	in particular the types of percial and military firearms
Train	ing Examiner	advent of metallic cartridge  Date  Date  The rimfire cartridge from	
Lab N	<i>N</i> anager	Date	
3.	Trace the evolution of the current generation	the rimfire cartridge from of modern .22 caliber rimf	the mid-nineteenth century to ire cartridges.
Train	ing Examiner	Date	
Lab N	/lana <b>ge</b> r	Date	
4.	powder cartridges to	the current generation of he chronological history of	elopment starting with black modern centerfire cartridges. this development and discuss
 Train	ing Examiner	Date	

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Date

Study a Standard Ammunition File (SAF), in particular cartridges and shotshells 5. which are representative of commercial and military ammunition development during the past three decades.

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Date

Lab Manager

Date

Conduct an in-depth study of exterior bullet coatings which have been 6. developed in the last decade. Prepare a report concerning how this new technology impacts the firearms examiner.

Training Examiner

Lab Manager

Date

Date 7. conducted by the FBI. Prepare a report listing trends you see unfolding in cartridge development and show any historical significance to these findings. and show

Training Examiner

Date

Lab Manager

Date

Basic References:

### "U.S. Martial Pistols and Revolvers" GLUCKMAN

"The Book of Rifles" SMITH

"Small Arms and Ammunition in the U.S. Service, 1776-1865" LEWIS

"Civil War Guns" EDWARDS

"Arms and Armor in Colonial America, 1526-1783" PETERSON

"History of Firearms from Earliest Times to 1914" CARMAN C

"The Development of Firearms" PETERSON in AMERICAN RIFLEMAN, March, April, May, June, 1960

"Firearms and Ammunition Fact Book" NRA STAFF

"Cartridges of the World" BARNES

"Cartridge Headstamp Guide" MUNHALL and WHITE

"Handgun and Shoulder Arms Assembly" NRA

"Small Arms of the World" W.H.B. Smith

"Encyclopedia of Firearms" H. Q. Peterson

"The Gun and its Development" GREENER

"Guns" POPE

### D. MANUFACTURE OF MODERN FIREARMS

- Numerous techniques are used in the manufacture of modern firearms. 1. Research in detail these processes and set these out in your notes. Include but do not restrict your study to the following machining methods:
  - (a) shaping
  - (b) planing
  - (c) drilling
  - (d) reaming
  - (e) turning
  - (f) boring
  - (g) milling-include both face milling and peripheral (slab) milling

(h) broaching
(i) abrasive machining-include honing, lapping, grinding, sanding, and ultrasonic methods
(j) sawing
(k) filing
(l) swaging
(m) electrochemical machining
(n) EDM
(o) investment casing

Date

Date Training Examiner Lab Manager

- Demonstrate your knowledge of the basic nomenclature of handguns, rifles, 2. and shotguns.
- Include, but do not restrict your study, to the following: breechface, a. breechbolt, bolt, bolt face, extractor, ejector, firing pin, rifling, barrel, lands, grooves, ramp, magazine, clip, ejection port, receiver.
- Point out these parts in several handguns, rifles and shotguns as applicable. b.

C.	Discuss the manufacturing techniques which would have been used to fabricate and finish each of the parts and note the machining marks on each
	part.
d.	Point out any "mark of abuse" which could contribute to the uniqueness of each part.
e.	Identify areas that machining marks might "carry over" to another firearm.

Traii	ning Examiner	Date	6
Lab	Manager	Date	iques: Services
3.	Research in detail the factorial content (a) broach (b) button (c) hammer forging (d) hook method (e) scrape method (f) ECM/EDM	buttons for study broach rifled.	iques: Ser
Trai	ning Examiner	State   Date	
Lab	Manager Of Iday	CONTRO Date	
4.	Obtain broaches and Determine the different those which have been	buttons for study ace between barrels broach rifled.	from the lab training materials. which have been button rifled and
Trai	ning Examiner	Date	Э

5. Discuss and define the following terms as they relate to firearms manufacture or firearms identification.

Date

Lab Manager

- (a) chambering
- (b) crowning
- (c) ballizing
- (d) bore slugging
- (e) forcing cone
- (f) bore
- (g) choke
- (h) choke tubes

Trail	ning Examiner	Date	
Lab	Manager	Date	
6.	Research the histo the manufacture of	ry and current significance of proof marks as the firearms. Discuss this with the Training Examine	∍y relate to ∍r.
Trai	ning Examiner	Politopte	
Lab	Manager	— State Date Date	

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7. Visit the manufacturing facilities of at least two firearms and/or barrel manufacturers such as Wilson barrels, Ruger, Smith and Wesson, Mossberg, Marlin and US Repeating Arms. Record notes in your notebook on each visit and produce a written report of your visit for lab files and an oral report for lab members. Particular emphasis should be placed on manufacturing and rifling techniques used by each manufacturer, noting methods and procedures which leave unique manufacturing toolmarks on firearms parts which, in turn, produce individual microscopic marks on bullets, cartridge cases and shotshell casings. Coordinate these visits with the Training Examiner.

Training Examiner	Date	
Lab Manager	Date	

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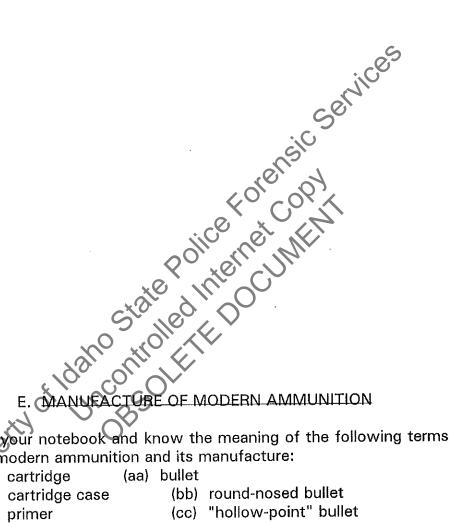
### **Basic References**

"Machinery's Handbook Revised 21st Edition" OBERG, JONES & HORTON "Firearms Identification" Part 1, Vol. 1, MATHEWS

"Small Arms of the World" W.H.B. SMITH

"The Book of Rifles" SMITH & SMITH

"Shooters Bible, Small Arms Lexicon and Concise Encyclopedia" MUELLER and OLSON



- Define in your notebook and know the meaning of the following terms as they 1. relate to modern ammunition and its manufacture:
  - (a) cartridge
- (b) cartridge case
- (bb) round-nosed bullet

(c) primer

- (cc) "hollow-point" bullet
- (d) shotshell
- (dd) jacketed bullet
- (e) shotshell casing
- (ee) bullet sizing
- (f) bottleneck cartridge
- (ff) wadcutter bullet
- (g) rebated-rim cartridge (gg) semi-wadcutter bullet
- (h) rimless cartridge
- (hh) soft point bullet
- (i) rimmed cartridge
- (ii) spitzer bullet
- (i) semi-rimmed cartridge
- (jj) swaging

- (k) shoulder
- (kk) cast lead bullet

(I) neck	(II) mold marks
(m) mouth	(mm) truncated-nosed bullet
(n) head	(nn) cannelure
(o) headstamp	(oo) ogive
(p) proof cartridge (pp)	brass-coated lead bullet
(q) tapered cartridge	(qq) copper-coated lead bullet
(r) extractor groove	(rr) nylon-coated lead bullet
(s) gauge	(ss) "silvertip" bullet
(t) battery cup	(tt) antimony
(u) brass	(uu) arsenic
· · · · · · · · · · · · · · · · · · ·	(vv) chilled shot
• •	
(w) wadding	(ww) high brass, low brass
(x) shot collar	(xx) lubaloy
(y) crimp	(yy) cram equivalent
(z) bunter	(zz) single base, double base
	2-1016
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	6, × 6, 4,
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(y) crimp (z) bunter  Training Examiner  Lab Manager  2. Sketch the cross-section of relationship to the head of the cross-section.	Date, Cli, 11/1
O Object the succession of	Berdan and Boxer primers, showing their
2. Sketch the cross-section of	portugic
relationship to the head of the	cartinge
relationship to the head of the constraining Examiner	
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	antial ingradients of priming mixture used in
	ential ingredients of priming mixture used in
modern cartridges.	
Troining Everniner	Date
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4. Know and discuss the difference between caliber and caliber type. Illustrate this difference by relating these terms to a discussion of the .22 caliber, .30 caliber and .38 caliber families of cartridges.

Training Examiner	Date
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Visit at least two ammunition-manufacturing facility such as Remington, 5. Federal or Winchester to observe the manufacture of rimfire and centerfire cartridges and shotshells. Make detailed notes of the manufacturing processes and generate a written report for lab files. Also prepare an oral presentation for lab members upon your return. Particular emphasis should be placed on Date Date Logan pellet and bullet manufacture, shotshell casing and cartridge case manufacture and the steps involved in the loading of cartridges and shotshells. Coordinate this visit with the Training Examiner.

Training Examiner

Lab Manager

**Basic References** 

"Cartridges" Herschel

"Cartridges of the World"

"SAAMI Jechnical Committee Manuals" SAAMI

"History of Modern U.S. Military Small Arms Ammunition" HACKLEY, WOODIN & **SCRANTON** 

"Military Small Arms Ammunition of the World 1945-1980" P. LABBETT

F. INSTAUMENTATION
following:
'cope
'ope

Differentiate between the following: 1.

(a) compound microscope

stereo microscope

comparison microscope

Date Training Examiner

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Date

Study the instruction manual for the various brands of stereomicroscopes. 2. Determine how to insert a reticule and how to check the calibration of the microscope.

Train	ing Examiner	Date	
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3.	optical aspects of the varie	he instruction manuals and thous brands of comparison micronilarities in each, both mechanica	scopies in the lab.
Trair	ning Examiner	nilarities in each, both mechanica	•
Lab I	Vlanager	Date  e following types of light source	
4.	Familiarize yourself with the in the lab on the comparison (a) fluorescent (b) fiber optics (with	ite / 1/1000	s which are in use
 Trair	ning Examiner	Date	
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5.	microscope, note the differ different surfaces: lead be cases, and various types above light sources with re source if possible. Gain a	source in the field of view rences in the quality of each uullets, jacketed bullets, various of surfaces containing toolmark espect to angle and vary the in appreciation for the effects of source on each type of surface.	ising the following types of cartridge s. Manipulate the tensity of the light f varying the angle
Trair	ning Examiner	Date	

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6. Set up a comparison microscope for your vision requirements and focus the "hairline". Prepare the microscope for your personal use, and familiarize yourself with each set of objective lenses on your comparison microscope. Become familiar with the different types of Polaroid film used in the lab with the comparison microscopes. Master the use of the Polaroid Land film holder. Using all of the objective lenses, make time exposures of the same objects while varying the intensity and angle of the light sources. Calculate the magnification for each set of objective lenses on your comparison microscope.

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- 7. Become familiar with and demonstrate the use of the following equipment:
  - (a) speed micrometer
  - (b) inertia bullet puller
  - (c) steel rule
  - (d) reticle in ocular lens of binocular microscope
  - (e) Ainsworth scale
  - (f) balances and scales located in the lab

Training Examiner	Date
Lab Manager Date	)

Basic References:

"The Stereomicroscope Instrumentation and Techniques" Schlueter & Gumpertz American Laboratory, April 1976

"The Leica Universal Forensic Microscope" LEICA

"Procedure for Bullet Comparison" AMERICAN OPTICAL

Manufacturers procedure and operation manuals

"Microscope Optics", Dr. P. BARTELS

"The Microscope A Practical Guide", G. H. NEEDHAM

G. EXAMINATION OF FIREARMS

If the following types of firearms are type to include the loading of carriage case and/or bullet after single and double action pistol, single and decided in the decided in the single shot pistol.

- Define each of the following types of firearms and explain in detail the 1. operation of each type to include the loading of cartridges and the subsequent movement of the cartridge case and/or bullet after firing.
  - (a) revolver, single and double action
  - (b) autoloading pistol, single and double action
  - (c) derringer and single shot pistols
  - (d) bolt-action rifle

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- (e) autoloading rifle
- (f) pump-action rifle
- (g) various single shot rifles
- (h) submachine gun
- (i) assault rifle

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	te the differences between a gas g shotgun.	
Training Examiner	 Date	vices
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3. Explain and illustration autoloading pistols:		he following types of
(b) delayed b (c) gas-delayed (d) short recoi (e) long recoi	oil action	
Training Examiner	Date	
Lab Manager	 Date	

4.		and reassemble the following n their mechanisms. Identify e	
	(b) Colt double (c) Ruger doub (d) "Old style"	esson double-action revolver e-action revolver ble-action revolver Ruger single-action revolver "Ruger single-action revolver	
 Train	ing Examiner	– Date	Services
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5.	(a) 9mm Luger (b) .45 Auto c (c) 9mm Luger (d) 9mm Luger (d) 9mm Luger (e) 9mm Luger (f) 9mm Luger (g) 9mm Luger (h) 9mm Luger (i) 357 Magnu (j) 9mm Luger (k) 380 Auton (l) 8mm Arisak	semble the following pistols echanisms. Identify each part of Browning, Hi-power, pistol aliber U. S. Pistol, Model 1916 of Steyr, GB, pistol of Glock, Model 17, pistol of Beretta, Model 92F, pistol of Smith & Wesson, Model 669 of H&K, P7, pistol of Desert Eagle pistol walther P38 pistol of Walther P38 pistol of Type 14 pistol of Luger P08 pistol	A1, pistol
Train	ing Examiner	Date	•
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6.	the mechanism and o	mble the following submachin	e guns. Note differences in priate photographs for your

- notes and identify the major parts by name.
- .45 Auto caliber RPB Industries, M10, submachine gun (open bolt and (a)

closed	bol	t)	١
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- (b) 9mm Luger SWD Inc., M11/Nine, submachine gun
- (c) 9mm UZI submachine gun
- (d) 9mm H&K, MP5, submachine gun
- (e) .45 Auto caliber US M3 submachine gun
- (f) 9mm Intratec, TEC 9, submachine gun
- (g) .45 Auto caliber Thompson submachine gun

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- 7. Familiarize yourself with the operation of each of the following firearms. Identify the major parts by name and make appropriate notes.
  - (a) .30-06 Springfield caliber V. S. Rifle, Model M1
  - (b) .308 Winchester caliber U.S. Rifle, Model M14
  - (c) .223 Remington caliber U.S. Rifle, Model M16
  - (d) .300 Savage caliber, Savage, Model 99, rifle
  - (e) ,30-30 Winchester caliber Winchester Model 94 rifle
  - (f) 7.62x39mm caliber AK47/SKS rifle
  - (g) .30-40 Krag caliber U.S. Rifle 1898
  - (h) .303 British caliber Lee Enfield rifle

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- 8. Familiarize yourself with the operation of each of the following shotguns. Identify the major parts by name and make appropriate notes.
  - (a) Remington, Model 870, shotgun
  - (b) Winchester, Model 12, shotgun
  - (c) Ithaca, Model 37, shotgun
  - (d) Browning, Model A5, shotgun
  - (e) Remington, Model 1100, shotgun

(i) Beretta, Silv	ver Snipe, over-under, double	e-barrel, shotgun
Training Examiner	Date	
Lab Manager	– Date	Services
Identify the major par  (a) .22 caliber (b) .22 caliber (c) .22 caliber (d) .22 caliber (e) .22 caliber (f) .22 caliber  Training Examiner  Lab Manager  10. Familiarize yourself w Demonstrate, using to place firearms in	Browning autoloading rifle Winchester, Model 62, rifle Remington, Model 582, rifle Ruger, Model 10/22, rifle Ruger, MKII, pistol Colt, Woodsman, pisto  Date  Vith the Range Rules and Sa firearms from No. 4 through a safe condition, how to lo se firearms in the laboratory	priate notes.
Training Examiner	_ Date	
Lab Manager	 Date	
11. Using the firearms in	n No. 4 through No. 9 abo	ove, study the various safety

(f) Harrington & Richardson, Topper Model 158, shotgun

(h) Savage, Model 311, side-by-side, double-barrel, shotgun

(g) L.C. Smith, side-by-side, double-barrel, shotgun

mechanisms employed in each design. Include thumb safety, grip safety, magazine safety, firing pin block, transfer bar, and any other mechanical safety. Illustrate how the firing mechanisms are blocked, interrupted, or otherwise stopped from operating.

Trair	ning Examiner	Date	
Lab	Manager	Date	Services
12.	pull. Determine	elf with the lab equipment use the trigger pull on at least one oups of firearms above using Date  Pate  Training Examiner from the use	of for measurement of trigger firearm from each of the No. 4 various methods and compare
Trair	ning Examiner	- Date	
Lab	Manager	Pate	
13.	determining whe trigger". Demon	e Training Examiner from the until the restriction of the strate, using one firearm from the rms above, how to conduct this	each of the No. 4 through No.
Trair	ning Examiner	Date	
Lab	Manager	Date	
14.		, and/or determine the implicat ety in the operation of a firearm	
		sive headspace (h) defective sa obstruction (i) high primer	afety

(j) rail splitting

(c) barrel bulge

(d) broken ex (e) push off (f) trigger sho	(I) improper timing	
(g) false half-	-	
Training Examiner	 Date	
Lab Manager	Date	cluding its physical dimensions,
Oction doctors of fram	-(1) X	cluding its physical dimensions, elocity limitations. Know how afe. Become familiar with the the range rules and emergency
Training Examiner	ano nitrolle Date	
Lab Manager	Date	
16. Attend Armorer's t	raining offered by various	manufacturers of firearms, at dinate these with the Training
Training Examiner	Date	
Lab Manager	 Date	

17. Explore the capabilities in restoring an inoperable evidence firearm to operating condition and also know the limitations and reservations which must be considered. Discuss this with the Training Examiner.

Training Examiner	Date	
Lab Manager	Date	
(b) inspector m	rarks nbers and markings er	tary which can be used to firearm using the following
Lab Manager	Date	
19. Discuss the following	topics with the Training Ex	xaminer and become familia

- with the capabilities and limitations of the lab in regard to these areas:

  - (a) marking evidence firearms(b) determining whether an evidence firearm has been "recently" fired
  - determining the manufacturer of a firearm from an examination of a part from a firearm

	(d) determining the comparing an evidence			n from a	photograph and
 Trainir	ng Examiner		Date		
Lab M	anager	Date	€		
20.	Become knowledgeable laboratory when they be rusted condition. Also reservations which me operating condition to condition to condition.	nave been rec become famust be consi	overed from villar with the dered when	vater or wo capabilities restoring s	hen they are in a , limitations, and
Trainir	ng Examiner		Date O	199	
Lab M	anager	Date	Received in		
21.	Discuss with the Tradetermine if a firearm which has been altered and verbally report you	to tire rull at	itomane, conu	onduct an automatic. uct this typ	Using a firearm
Trainir	ng Examiner	r Tilldings	Date		
Lab M	lanager	Date	e		

### Basic References:

- "The Book of Pistols and Revolvers" W.H.B. SMITH
- "Small Arms of the World" W.H.B, SMITH
- "The NRA Guidebook to Handguns" NRA STAFF
- "Military Small Arms of the Twentieth Century" HOGG and WEEKS
- "The World's Assault Rifles" MUSGRAVE and NELSON
- "Encyclopedia of Modern Firearms, Parts and Assembly, Vol I." BROWNELL
- "Gun Digest Book of Exploded Firearms Drawings" MUNTZ
- "Stoeger Gun Parts Catalog" STOEGER ARMS
- "NRA Guidebook to Shoulder Arms" NRA STAFF
- "Component Parts Catalog, Savage, Stevens, Fox, Springfield Sporting Arms" SAVAGE ARMS
  - "Mossberg Component Parts Catalog" MOSSBERG & SONS
  - "Remington Component Parts Catalog" REMINGTON ARMS
  - "Smith & Wesson Component Parts Catalog" SMITH & WESSON
  - "Shooter's Bible" STOEGER ARMS
  - "The World's Submachine Guns" NELSON
  - "The Machine Gun, Vols. I IV" CHINN
  - "NRA Firearms Handling Handbook" NRA STAFF

- "U.S. Military Firearms" J.E. HICKS
- "The Firearms Dictionary" STIENDLER
- "Jane's Weapons Systems" JANE'S ANNUALS

### Basic References (continued):

"The Standard Directory of Proof Marks" WIRNSBERGER

- "U.S. Rifle, 7.62 mm, M14" DEPARTMENT of the ARM WESLEY

  Joint Machana

  Mesley

  Mesley

- "The Modern Shotgun" BURRARD

# H. BULLET EXAMINATIONS AND COMPARISONS

1.	Define what is meant by or determine the significance of the following terms or phrases as they relate to the examination and comparison of fired bullets.
	Discuss with the Training Examiner.
	Discuss with the Training Examiner.  (a) slippage (b) shaving (c) obturation (d) leading edge and trailing edge (e) melting (f) blow-by (g) striation (h) individual microscopic marks (i) ogive (j) bearing surface (k) class characteristics (l) general rifling characteristics (m) "insufficient individual microscopic marks" (n) sorrosion
	leading
	(p) "limited individual microscopic marks" (q) "single-action" firing
	(r) "double-action" firing
Traini	ng Examiner Date
Lab M	anager Date

2.	As they relate to the examination a fragments, know the importance following:	and comparison of fired bullets or bullet of and limitations of determining the
	<ul> <li>(a) weight</li> <li>(b) caliber</li> <li>(c) caliber type</li> <li>(d) manufacturer</li> <li>(e) general rifling characteristic</li> <li>(f) pitch of rifling</li> <li>(g) depth of rifling</li> </ul>	Date Date (SAF). Know how to of the computer in order to determine the
	Discuss with the Training Examiner.	ce st th
Traini	ng Examiner	Date
Lab N	Manager Date	
3.	Familiarize yourself with the Standar search this file manually and by use manufacturer of fixed bullets. Demon the Training Examiner.	d Ammunition File (SAF). Know how to of the computer in order to determine the estrate your proficiency in using this file to
Traini	ing Examiner	Date
	Manager Date	<b>)</b>
4.	Become familiar with the Known S	pecimen File (KSF). Know its location, s as a reference file. Discuss with the
Traini	ing Examiner	Date

Lab	Manager	Date		
5.	how to use this f	le to compile a li	st of fir	racteristics (GRC) file. Know rearms in a "no-gun case". le to the Training Examiner.
Trair	ning Examiner	D	ate	e to the Training Examiner.
Lab	Manager	Date		510
6.	demonstrate your p manufacturer, and ri	roficiency in accura fling characteristics b could have been	tely dete of these used to	et fragments provided to you, ermining caliber, caliber type, fired bullets. Also prepare a fire these bullets provided to IRC files in conducting these
Trair	ning Examiner	ano official file	ate	
Lab	Manager	Date		
7.	proficiency in accur	ately determining th list of firearms whic	e rifling	d barrels, demonstrate you characteristics of these fired have been used to fire these

Date

Date

Training Examiner

Lab Manager

8.	Become knowledgeable test bullets. Know who cotton boxes and their from the lab in the re Know and observe all sa	nen and how t limitations. O	o use the horizontal bserve and assist the	recovery tank and Praining Examiner
Train	ing Examiner		Date Cientin	
Lab N	/Janager	Date	· & CO.X	
9.	ammunition or down-loa procedure for down-loa the Training Examiner of	ding ammuniti	other the reasons for ition for test firing. on for test firing. Under down-loaded test am	nder supervision of
Train	ing Examiner	OBS	Date	
Lab N	Manager Q	Date		
10.	Test fire "consecutivel bullets from "consecu similarities in the striation	itively-made" k	parrels. Observe th	ne differences and
Train	ing Examiner		Date	
lah N	Manager	Date		

Train	ing Examiner	Date	
	in a Evenniner	Date	
		m caliber Federal Nyclad bullet	
		m caliber Remington jacketed bullet m caliber Winchester silvertip bullet	
		caliber Remington jacketed bullet	
	(a) 38 Special	caliber Remington lead round-nosed bullet	
	Take appropriate photo	graphs notes.	
	following cartridges ar	nd attempt to identify the test bullets with each of	ther.
12.	Using the same .35	Magnum caliber revolver, test fire two each of	the
Lab IV	Vanager	O	
		CYA SO O	
i i dii i	ing Examinor	ie luis Co	
Train	ing Examiner	le caliber Remington with brass-coated lead bullets le caliber Winchester with eopper-coated lead bullets liber Remington with lead bullets  Date  Magnum caliber revolver, test fire two each of attempt to identify the test bullets with each of	
	_	ice cet it	
	(e) .22 Long ca	iber Remington with lead bullets	
	(c) .22 Long Rit (d) .22 Long Rit	le caliber Remington with brass-coated lead bullets le caliber Winchester with copper-coated lead bullets	3
	//- 00 Law Did	In a liber Winchester with land bullets	
	(a) .22 Long Rif	le caliber Remington with lead bullets	
	appropriate photograph	s and notes.	
11.	Using the same .22 cartridges and attempt	caliber firearm, test fire two each of the follow t to identify the test bullets with each other.	ving Fake
		. 10 C	

*(....)* 

13.	Using the same 9mi cartridges and attempaper appropriate photograp	pt to identify the	test fire t e test bulle	two each of ets with each	the following n other. Take
Traini	(b) 9mm Luger (c) 9mm Luger (d) 9mm Luger	Federal Hydro-sh PMC Starfire Remington Full m Winchester Silve CCI total metal ja	netal jacket rtip	test bulle	)
	<u>9                                  </u>			50	
Lab N	/lanager	Date	and in	310	
14.	Using a .22 caliber rethese bullets with earnize of the barrel arecover two test bulled compare these bullets.	ach other. Cut and crown the n ts using the same	off approx uzzle end	imately three of the barrel. on as above.	inches of the Test fire and Microscopically
Train	ing Examiner	COUNTELL	Date		
Lab N	Manager 0	Date			
15.	Using a 30 caliber r compare the tests w Examiner.	ifle test fire two vith each other.	c each of Conduct	the following this test wit	cartridges and th the Training
		Remington jacket Remington Accel			
Train	ing Examiner	-	Date		
Lab N	Manager	Date			

Using a .32 S & W caliber Harrington & Richardson revolver, test fire two each 16. of the following cartridges and compare the test bullets with each other. Conduct this test with the Training Examiner. (a) .32 S & W caliber Remington with lead bullet (b) .32 Auto caliber Remington with full metal case jacketed bullet

Date Training Examiner Date Lab Manager Test fire each of the following pistols. Using two test bullets from each pistol, Test fire each of the following pistols. Using two test bullets from each pistol, make microscopic comparisons of the test bullets. Conduct this test with the Training Examiner.

(a) 9mm Glock pistol
(b) 9mm H&K, Model P7, pistol
(c) 9mm Steyr, Model GB, pistol

ng Examiner

Date

Compile a list of reasons as to why bullet identifications cannot be made in 17.

Training Examiner Lab Manager

Compile a list of reasons as to why bullet identifications cannot be made in 18. some cases, and why some barrels and bullets can preclude or tend to preclude identifications. This list should include, but not be limited to, the results of the above testing.

Date Training Examiner Date Lab Manager

Discuss the significance of identifying manufacturing toolmarks on a fired 19. bullet from a victim with those on unfired bullets loaded into cartridges from the suspect. Read the article in the April, 1985 issue of the Crime laboratory Digest concerning "Manufacturing Toolmark Identification on the Base of Jacketed Bullets".

Train	ing Examiner	Date	
Lab I	Vlanager	Date	
20.	Discuss the feasibility of a fired bullet from an ex	f determining caliber and/or the rifling charact amination of a bullet hole in metal.	teristics of
	Training Examiner	Date  Date  firearm. Compare and identify test bullets	
Lab I	Vlanager	Date COR	
21.	fired test bullets with approximately 25 perce the barrel and compare this exam with the Train	firearm, "slug" the barrel and compare the parties the barrel of the barrel at the muzzle and "slug" this these tests with the previous test bullets.	previously- Cut off portion of
Trair	ning Examiner	Date	
Lab	Manager	Date	
22.	Obtain a copy of an examination of fired bu	d familiarize yourself with the lab protocollets.	ol for the
Trair	ning Examiner	Date	
Lab	Manager	Date	

### Basic References:

"Firearms Identification" Vol. I, MATHEWS

"Firearms Investigation, Identification and Evidence" HATCHER, JURY and **WELLER** 

"Introduction to Tool Marks, Firearms, and the Striagraph" DAVIS

"The Identification of Firearms" GUNTHER and GUNTHER ice"
"Hatcher's Notebook" HATCHER

"Hatcher's Notebook" HATCHER

"Property of Idano Pirole Hatcher Colon Property of Idano Pirole Hatcher Colon P "Identification of Firearms and Forensic Ballistics" BURRARD

45

### I. CARTRIDGE/CARTRIDGE CASE EXAMINATIONS AND COMPARISONS

 Describe "class characteristics" as the phrase applies to markings on a cartridge or a fired cartridge case. Determine the types of marks which can be left on a cartridge case/cartridge during loading/extracting and firing. Review a video tape regarding the slow motion of firing sequences using semiautomatic firearms.

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Training Examiner	Date	die
		00,
Lab Manager	Date	ci <sup>C</sup>

- 2. Test fire each of the following firearms at least twice. Using the test fired cartridge cases, visually relate the markings imparted to the fired cartridge case with the part on the firearm which produced these markings. Also load and extract at least two cartridges from each of the following firearms and visually relate the markings imparted to the unfired cartridges with the part on the firearm which produced these markings.
  - (a) 9mm SWD Inc. Mi 1/Nine, submachine gun
  - (b) 9mm Glock pistol
  - (c) .45 Auto caliber U.S. Pistol, Model 1911A1
  - (d) 9mm H&R, P7, pistol
  - (e) .22 long Rifle caliber Ruger, MKII, pistol
  - (f) .22 Long Rifle caliber Ruger, 10/22, rifle

Training Examiner	Date
Lab Manager	Date

3. Using the test cartridge cases and cartridges from paragraph 2, above, microscopically intercompare all of the markings with each other. Include the following types of markings in your microscopic comparisons: firing pin impression, breechface marks, chamber marks, anvil marks, extractor marks, ejector marks, ramp marks, and magazine marks. Photograph the results of

	your comparisons.	
Training Examiner		Date
Lab	Manager	Date
Winchester ammunition ammunition with both records twice using each branch photograph the marking  (a) .38 Special of the control of the cont		firearms using comparable CCI, Remington, Federal, and n of the appropriate caliber type for each firearm. Select nickel and brass primers. Test fire each firearm at least nd of ammunition. Microscopically intercompare and gs as in paragraph 3, above.  caliber Smith & Wesson, Model 10, revolver im caliber Smith & Wesson, Model 19, revolver & Wesson, Model 669, pistol le caliber Colt, Woodsman, pistol
 Trai	ning Examiner	Date
Lab	Manager	C. Date Date
5.	<ul> <li>Rifle caliber cartridge</li> </ul>	s, six .22 Long caliber cartridges, and six .22 Short he same manufacturer. Mark each cartridge to note the is fired. Intercompare and photograph the markings
Trai	ning Examiner	Date
Lab	Manager	Date

6. Discuss the possibility of comparing and identifying reloading-type marks on cartridges/cartridge cases. Identify the various types of marks which may be indicative of reloaded ammunition. Become familiar with the reloading

equipment in the lab and the procedures used in reloading cartridges. Reload several cartridges and compare reloading-type marks on these cartridges with each other.

Trai	ning Examiner		Date
Lab	Manager	Date	•
7.	on a fired cartridge ca be associated with th	ise from the sce e suspect. Ide	and identifying manufacturing toolmarks sene of a crime with cartridges which can entify the various types of manufacturing cartridges or cartridge cases.
Trai	ning Examiner		Date  Carbine and compare the test cartridge
Lab Manager		Date	ice net after
8.	cases with each oth cartridge cases. Load	and extract car	rtridges from this same firearm. Note and
Trai	ning Examiner	RS III PAI THE TO	Date
Lab	Manager	Date	<b>Э</b>

9. Read the following two articles in the October, 1989 issue of the AFTE journal and discuss them with the Training Examiner in the lab.

(b) "Firing Pin Impressions - Their Relation to Hammer Fall Conditions" Date Training Examiner Obtain a copy of and be familiar with the lab protocol for the examination of cartridges and cartridge cases.

Ing Examiner

Date

D Date Lab Manager 10. Training Examiner Lab Manager

(a) "Firing Pin Impressions - Their Measurement and Significance"

### Basic References:

- "Firearms Identification" Vol. I MATHEWS
- "Firearms Investigation, Identification and Evidence" HATCHER, JURY, and WELLER
- "Introduction to Toolmarks, Firearms and the Striagraph" DAVIS
- "Identification of Firearms and Forensic Ballistics" BURRARD
- "The Identification of Firearms" GUNTHER AND GUNTHER
- "Hatcher's Notebook" HATCHER
- "Hodgdon's Reloading Data Manual" HODGDON POWDER CO.
- "The NRA Handloader's Guide" NRA STAFF
- "Speer Reloading Manual" SPEER STAFF
- "Reloader's Guide" SHOOTER'S BIBLE
- "Hornaday Handbook of Cartridge Reloading" HORNADAY STAFF
- "Sierra Bullets Reloading Manual" SIERRA STAFF
- "Complete Guide to Hand Loading" SHARPE
- "Lyman Cast Bullet Handbook" RUMAGE
- "Handbook for Shooters & Reloaders" P. O. ACKLEY

## J. SHOTSHELL AND SHOTSHELL COMPONENT EXAMINATIONS AND COMPARISONS

- 1. Determine what type of examinations can be conducted and what conclusions can be reached from an examination of the following components. Discuss this with the Training Examiner.
  - (a) shot, deformed and undeformed
  - (b) fired card or fiber wads

	(c	fired	plastic	wads
--	----	-------	---------	------

- (d) fired shotshell casings
- (e) unfired shotshells
- (f) shot buffer material
- (g) shot collar and shot cup

Trair	ning Examiner	Date	
Lab	Manager	 Date	ices
2.	gauge and manufac in regard to making	turer of fired shotshell con g such determinations.  C	n regard to the determination of apponents. Know the limitations demonstrate your proficiency in the Training Examiner.
Traii	ning Examiner	nduct this type of search to  Date  Oate  w off a portion of the barre	COLLI
Lab	Manager	- Vate VO	214
3.	Reminaton shotshel	I with a powder piston w	el. Test fire this shotgun using a ad. Recover the test shotshell arks imparted to the test wads.
Trai	ning Examiner	Jnops Date	
Lab	Manager	Date	

- 4. Test fire the following shotguns using at least two test shotshell casings from each shotgun and microscopically compare the marks imparted to these shotshell casings. Include in your comparisons the following types of marks: firing pin impression, breechface marks (primer, battery cup, and head), extractor marks, ejector marks, chamber marks, and any other mechanism marks. Photograph these marks and discuses the significance of identifying any of these types of marks.
  - (a) 12-gauge Remington, Model 870, shotgun
  - (b) 12-gauge Remington, Model 1100, shotgun

(c) 12-gauge Mossberg, Model 195K, shotgun (d) 12-gauge Harrington & Richardson, Topper, shotgun (e) 12-gauge Beretta, Silver Snipe, shotgun (f) 12-gauge Charles Daly, Model 500, shotgun Date Training Examiner Lab Manager Date Using a 12-gauge Remington, Model 1100, shotgun obtain at least two test shotshell casings with each of the following types of ammunition. recover a representative number of the fired pellets and fired wadding from each test firing. Compare markings on these test shorshell casings with each other. Examine the fired components which were recovered and compare them to unfired components of the same type Discuss the significance of your findings. (a) 12-gauge Remington, 2 3/4" Magnum, 00 Buck (b) 12-gauge Remington, 2 3/4" Shur Shot #8 shot (c) 12-gauge Federal, 2 3/4" Magnum, 00 Buck (d) 12-gauge Federal, 2 3/4" Field load, #9 shot (e) 12-gauge Activ, 2 3/4" Field load, #7 1/2 shot (f) 12-gauge Activ, 2 3/4" Magnum, BB shot (g) 12-gauge Winchester, 2 3/4" Xpert, #6 shot (h) 12-gauge Winchester, 2 3/4" Super-X, #7 1/shot Training Examiner Date Date Lab Manager Discuss in detail the procedures used in reloading shotshells and familiarize 6. yourself with the shotshell reloading equipment in the lab. Know how to recognize reloaded shotshells from an examination of the shotshell casing Reload shotshells using the shotshell reloading and/or its components. equipment in the lab and examine the reloaded shotshells for reloading-type marks.

Date

5.

Training Examiner

rences:

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R

### Basic References:

"Firearms Investigation, Identification and Evidence" HATCHER, JURY and **WELLER** 

"Lyman Shotshell Hand Book" Third Edition, REMAGE

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### K. GUNSHOT RESIDUE EXAMINATIONS AND DISTANCE DETERMINATIONS

1.	Successfully	complete a	course	pertaining	to gunp	owder	and	primer	residues
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Date Instructor

( -)

Train	ing Examiner	Date	
Lab I	Vlanager	Date	
2.	Demonstrate your prof Griess test and the So photographic paper.	odium Rhodizonate test inclu	emicals used in the modified uding the test media and the
 Trair	ning Examiner	Date	talk place in the burning of
Lab l	Vlanager	Date	30
3.	Described in detail the smokeless powder, the	chemical reactions which modified Griess test and the	take place in the burning of ne Sodium Rhodizonate test.
Trair	ning Examiner	CONTRACTOR Date	
Lab	Manager  Property of 100	CONTROLLER DO	take place in the burning of the Sodium Rhodizonate test.
4.	Defiloristiate year pro	in the lab protocol manual: al Griess test ess test dizonate test ransfer	following techniques, using

Training Examiner		Date	
Lab	Manager	 Date	
5.	proficiency in condu the deposition of g taking, microscopic	ovided to you by the Training Examiner, demonstrated in the contracting "muzzle-to-garment" distance tests in cases invented and chemical examinations, test firing to productely determining "muzzle-to-garment" distance.	volving e note
Trai	ning Examiner	Date  Date  Date  Date  Date  Date	
Lab	Manager	Date	
6.	shot patterns. You	cting "muzzle-to-garment" distance tests in cases inv r examination should include note taking, microscop	oic and
Lab	Manager OF 19	ons, test firing of shot patterns, gunshot residue parmining "muzzle-to garment" distance.  Date  Date	
7.	Performance Envel	entitled "Graphical Analysis of the Shotgun/Shope in the Distance Determination Cases" in the 989 issue. Discuss this article with the Training Example.	AFTE
Trai	ning Examiner	 Date	

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Lab	Manage	ŗ
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Date

Attend an autopsy of a shooting victim at an autopsy facility. Document any 8. indications of gunshot residue deposits photographically. Also document the physical effects of the projectile on the body. Prepare a report on your observations and include any information obtained by the pathologist concerning his opinion on distance determination and bullet effects, cause of death, direction of bullet travel and other information pertinent to firearms identification.

property of Idaho State Police Police P Training Examiner Lab Manager

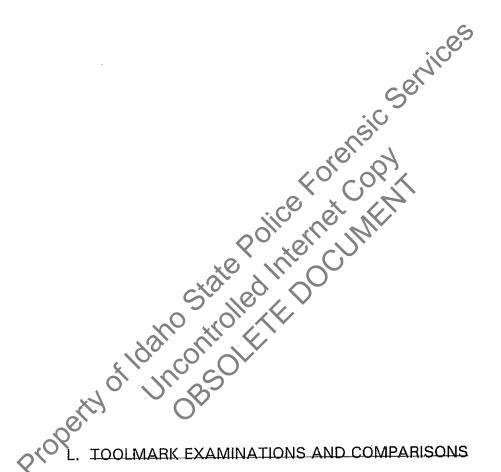
### Basic References:

"Gunpowder and Gunshot Residue" FBI Manual

"Homicide Investigation Techniques" WILSON

"Crime Investigation" KIRK

"Gunshot Wounds" DiMAIO



1. Review your notes in reference to the section entitled "Manufacture of Modern Firearms". Those machining methods are the basis for toolmark identification as they were for firearms identification. However, it should be noted that in the broad definition of toolmarks identification, certain other related types of examinations are also performed. Discuss your review with the Training Examiner.

Tra	ini	na	Exa	m	iner
Ha	11 11	HM.	$-\Lambda u$	111	11 101

Date

Lab	Manager	Date	
2.	expression. Also determine the kir	tool" and toolmarks identification in the narrow of define toolmark identification in its broadest ands of conclusions which may be reached in t et these out in detail and discuss these with	sense, and he toolmark
Trai	ning Examiner	Date  Date  Date  Ticance of examining submitted tools first for fore	
Lab	Manager	Date	
3.	Discuss the signif and itemize severa	Date  Ing a toolmark examination wherein no tool is person of conclusions which can be reached.	ign deposits
Trai	ning Examiner	COIL Date ONLY	
Lab	Manager	C Date Date	
4.	things as the type toolmark for comp	ing a toolmark examination wherein no tool is pes of conclusions which can be reached. Co be of tool, size of tool, action employed by to parison purposes, and unusual tool features. Dis- ne Training Examiner.	ol, value of
Trai	ning Examiner	Date	
Lab	Manager	Date Date	
5.	Define the follow three examples of	ving terms as they relate to toolmark identificat f tools or methods which could produce each cate	on and give

(a) shearing(b) pinching(c) fracture

	(d) scrape mark (e) impression (f) slicing	
Train	ning Examiner	Date
Lab	Manager	Date
6.	Using the tools of me	characteristics" as it applies to toolmark identification. thods selected as examples in the paragraph above, class characteristics in detail.
	from the lab. Produc	s representative of each category in paragraph 5 above the toolmarks with each tool and observe the class olmark. Very the angle and force with which each tool
Traiı	ning Examiner	* COUNTED COUNTE
Lab	Manager	Date  Date  Date  Date  of approximately 1/4 inch diameter, make cuts through employ a shearing, pinching and slicing action. Make
7.	test cuts in lead using copper wire as having the lead. Support your	of approximately 1/4 inch diameter, make cuts through employ a shearing, pinching and slicing action. Make the same tools. Attempt to identify the cuts in the seen made by the same tool as that which cut the test results with photographs and note any lighting ecessary by the color difference between copper and
Traii	ning Examiner	Date
Lab	Manager	Date
8.	Select a flat-bladed tool in a piece of copper or	such as a screwdriver, and a pry bar and make marks brass sheeting. Make the same type of marks in lead

with both tools. Microscopically compare those in the brass or copper sheeting with the test marks in the lead. Attempt to identify the appropriate marks with the appropriate tool. Photograph your results and comment on the difference in the quality of marks made by each tool.

Train	ing Examiner	Date	
Lab N	Manager	Date	es S
9.	Produce a set of	punch, produce an impression in test marks in lead and inter y these as having been made otographs.	compare these two marks.
Train	ing Examiner	Date	
Lab <b>1</b>	Using a junked doc produce impression	prknob and a serrated-jawed toons and scrape marks like those perhaps to the content of the cont	ol, have the Training Examiner produced by an attempt at an n lead like those produced by
——Train	the serrated-jawed on the doorknob warks on the door	tool on the doorknob. Micros with those on the test material knob and reproduce the tool-doespective serration on the tool.  Date	copically compare the marks I. Identify the tool with the
	Vlanager	 Date	

	fragments. Attempt single object. Take not	to identify the two fragm tes and support your result	nents as having once been a s by photographs.
Train	ing Examiner	Date	
Lab I	Vlanager	Date	S
12.	wood such as a dowel	rod with the ax blade and	ects. Cut a piece of seasoned attempt to identify the blade asistent with your "unknown" wood and the direction of the otographs.
Train	ing Examiner	Date C	
Lab I	Manager City of Iday	ge-diameter telephone cab ffects of a slicing action or of microscopic marks of in identifications of this so	
13.	Obtain a section of lar above and study the ethe quality and extent the problems involved of the cable.	ge-diameter telephone cab ffects of a slicing action or of microscopic marks of in identifications of this so	le and cut it with the ax used n a multi-stranded cable. Note each strand and comment on ort. Photograph the sliced end
Trair	ning Examiner	Date	
 Lab	Manager	Date	

Learn the technique of reverse lighting. Obtain a piece of brittle metal as from

an automobile bumper or fragment of pot metal and fracture it into two

11.

14.		arks they produce. Cite any excep	
Train	ing Examiner	Date	
Lab [	Vlanager	Date	
15.	knife. Attempt to ma Support your results v your examinations mi making the questione	make cuts and stabs into the side ke comparisons of the toolmarks vith photographs and notes. Disc ght be altered if the knife had d cuts, or if the knife had been aking the initial questioned cuts.	produced by the knife cust how the results of been sharpened afte used for an extended
Train	ing Examiner	Date  Date  Date  Date  Ontact examinations in regard to ontact examinations in regard to ontact examinations.	
Lab I	Vlanager	Date	
16.	Investigate pressure/contact with each in contact with each of this type and set the saminer	ontact examinations in regard to o each other for an extended time. ese out in your notes.	bjects which may have Research several cases
Trair	ning Examiner	Date	
Lab I	Manager	Date	
17.	Discuss and demonstropotential of such candidentifications.	ate the making of casts of toolm asts and of photographs alone	arks. Also discuss the in making toolmark
Trair	ning Examiner	Date	
l ob	Managar	Data	

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### Basic References:

"Machinery's Handbook Revised 21st Edition" OBERG, JONES & HORTON

"Handbook of Forensic Science" FBI

				ices
			sic	,
			B RESTORATION or the Restoration	
	M.	SERIAL NUMBE	B RESTORATION	
1. Re Nu	ead the Handboo	of Methods for Be prepared to	or the Restoration discuss the theory o	of Obliterated Serial of number restoration.
Training	Examiner	_ O <sub>^</sub>	Date	
Lab Man	ager	 Date	1	
			e and below the ind he indented area is I	entation of a stamped removed.
Training	Examiner		Date	
Lah Man	ager	 Date	ı	

- 3. Make a list of the various methods used to mark items by private industry. This list should include but not be restricted to: casting, stamping, embossing, debossing, coining, vibratory pencil, laser and electrical discharge machining.
- (a) Discuss with the Training Examiner the effect each of these marking techniques has on the subsurface of the marked area.

(b) Discuss with the Training Examiner how the marking methods used can directly affect the ability of the examiner to restore any obliterated markings and why.

Training Examiner	Date	
Lab Manager	Date Date	
4. Define in your notebook	the term "plastic deformation" of metal.	
Training Examiner	POLITICATE UNITED TO THE POLITICAL PROPERTY OF THE POLITICAL PROPERTY	
Lab Manager	Bate	
5. Briefly discuss in your between cold rolled ste		nce
Training Examiner	Date	
Lab Manager	Date	

- Discuss with the Training Examiner the effect that the following types of alterations will have on the subsurface of the marked item and how it will impact on the results of the examiner.
  - (a) grinding
  - (b) restamping
  - (c) pinging
  - (d) gouging

(e) healing (f) puddling (g) welding (h) removal (i) combinations	of the above	
Training Examiner	Date	
Lab Manager	Date	the Various alteration methods.
7. Determine the tell-tale Discuss how these restoration attempt.	signs that can be left by signs will determine	y the various alteration methods. your specific approach to the
Training Examiner	CYAIC   NDate	)~
Lab Manager	OB Date	y the various alteration methods.  your specific approach to the
incandescent, infrared, enhance the restoration	, UV, and fluorescent)	and how they can improve or ed to explain how the angle of
Training Examiner	Date	
Lah Manager	Date	

9.	Discuss the various me polishing and how they v	ethods of surface preparation such as will affect the results in the restoration at	sanding and
Traini	ng Examiner	Date	
Lab N	1anager	Date	
10.	Determine the chemical place in your notebook reactions of acid with steems.	reaction that takes place when etchin the appropriate chemical formulations feel and aluminum.  Date  reaction rate for the stressed area is father rest of the surface and why.	g is done and
	ng examine	czaje d niewo	
Lab N	/lanager	Pate	
11.	Determine whether the than the etching rate of	reaction rate for the stressed area is fa the rest of the surface and why.	ster or slowe
Traini	ng Examiner	Date	
Lab N	Manager	Date	

12. Determine the specialized equipment that might be used in number restoration and discuss these with the Training Examiner.

Trair	ning Examiner	Date
Lab	Manager	Date
13.	Discuss with the Tra photography on freshly	
 Trair	ning Examiner	Date Services
Lab	Manager	Date
14.	Determine the variou photography. Be prepactive circumstances each wo	red to discuss with the Training Examiner under wha
Train	ning Examiner	Date Union
Lab	Manager	Bate
15.	Research the various k number restoration and	nds of magnifying and enhancing equipment used for explain when and why each would be used.
Trair	ning Examiner	Date
Lab	Manager	Date
16.	Become familiar with th	e following chemicals:
	(a) CuNH4Cl (b) CuCl2 (c) NaOH (d) Hcl (e) HNO3	

(f) KCN (g) K2SO4 (h) Aqua Regia (i) H2SO4 (j) FeCl3 (k) H2O2 (l) Tartaric acid (m) Ammonium Pers	sulfate	
Training Examiner	Date	wices
Lab Manager  17. Obtain the proper safety labcoats) before attemptin hygiene policies to insure p	ig any chemical restoratio	year, masks, gloves, and ons. Review the chemica are used.
Training Examiner	Bate	7
Lab Manager	Date	
18. Define and place in your no (a) Frys Reagent (b) Arais Reagent (c) Hydroffueric acid (d) Turner's Reagent (e) Davis' Reagent		emical terms:
Training Examiner	Date	
Lab Manager  19. Become knowledgeable ovarious firearms manufacture  & Wesson, US Repeating A	urers including but not lim	nited to Colt, Ruger, Smith
Training Examiner	Date	

Lab Manager	Date
	ices
	e the best chemicals and techniques to use in number restoration of ving firearms:
, 10	Smith & Wesson revolver RG Industries revolver
(e) (f) (g) (h)	shotgun alloy receiver shotgun case hardened receiver
Training Examin	Winchester rifle Date  Date
Lab Manager	Date
using dif	everal firearms from the Training Examiner, alter the serial numbers ferent methods and then attempt to restore them. Prepare notes and phs to substantiate your conclusions and results.
Training Examin	er Date

Date

Lab Manager

	ss with the Training Examiner the methods used and the restoration process.
Training Examiner	Date
Lab Manager	Date
Attempt to restore th	of aluminum that have had stamped numbers removed. ese numbers using various techniques. Prepare notes bstantiate your conclusions and results.
Training Examiner	Date  Date  Date  Date  Ing Examiner how the combination of brief application of oy normal NaOH application can shorten the processing
Lab Manager	Date
24. Discuss with the Train CuNH4C12 followed I time on aluminum.	ing Examiner how the combination of brief application of by normal NaOH application can shorten the processing  Date
Training Examiner	Date
Lab Manager	Date
25. Discuss with the Train so well on chrome or r	ning Examiner why alternating HNO3 and HCl can work nickel plated firearms.
Training Examiner	Date
Lab Manager	Date
26. Research the effect of techniques you have le	electricity on the reaction time of the different chemical earned. Conduct restorations using this method.

Training Examiner		Date
Lab Manager	Date	

#### Basic References:

"Handbook of Methods for the Restoration of Obliterated Serial Numbers" TREPTOW

"Firearms Identification" MATHEWS:

"Firearms Investigation, Identification and Evidence" HATCHER, JURY and WELLER

# **Idaho State Police Forensic Services**

FIREARMS

&
TOOL MARK

EXAMINER

EXAMINER

TRAINING

Manual

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- 1 Administrative Matters and Procedures
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- 4 Manufacture of Modern Firearms
- 5 Manufacture of Modern Ammunition
- 6 Instrumentation
- 7 Examination of Firearms
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- 9 Gunshot Residue Examinations and Distance Determinations
- 10 Toolmark Examinations and Comparisons
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#### INTRODUCTION

The following syllabus will allow you as an examiner trainee to guide yourself through the various areas of knowledge integral to the field of firearms/toolmark identification. This syllabus is generic in its layout and allows some modification by the individual Discipline Leader/on-site trainer or lab manager to meet local conditions. It is paramount that you keep before you the primary and ultimate objective of this training period: to independently and completely examine and compare evidence relating to firearms and toolmark identification, to independently and competently render an opinion and reach conclusions relating to your examinations and comparisons; and to give expert testimony in court in matters encompassed within the broad definition of firearms/toolmark identification and to do this in a professional, competent and impartial manner. The obligation is yours to maximize on the effectiveness of the training period as an opportunity to learn everything possible in this field. The extent to which you exert yourself during this training and evaluation period will bear directly on the quality of your performance in the laboratory and on the witness stand. Note well that your technical abilities and your testimony will, in turn, bear directly on the future situations of accused persons, and especially in the discipline of firearms/toolmark identification, the lives of accused persons can hang in the balance. You have a moral and ethical obligation to prepare yourself technically and professionally during training in order to be able to perform according to the most rigid standards.

You will be expected to carry out a study of all pertinent lab equipment, the Technical Protocol Manual, the Safety Manual, as well as the physical reference files.

It is required that you keep a loose-leaf notebook of your study notes on each of the items shown in the syllabus for research, discussion, demonstration, study or practical work. Your notebook can include handwritten notes, charts, graphs, photographs, brief photocopied material, etc., at your discretion, but it must address and broaden on each of the required items of study set out in the syllabus. Organization of your notebook in a format which parallels the syllabus is suggested. This notebook will serve as a ready reference in the month and even years following your qualification, and will assist in documenting your progress during training.

Your training will be monitored and assisted by the Discipline Leader/on-site trainer, who has responsibility for training matters. All outside schools, tours, lectures and contacts will be coordinated by the lab manager. You will be expected to meet the standards set by the Discipline Leader/on-site trainer for your successful completion of your training.

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# Section 1.0 <u>ADMINISTRATIVE MATTERS AND PROCEDURES</u>

1.1	Proficiency Testing P	nager the laboratory Quality Assurance Program and the ogram.
Lab 1	Manager	Date:
1.2	Discuss with your Lab Ma evidence.	Date
T _1. 7	11.	Data
Lab	Manager	Date
(c) R (d) R (e) R (f) P	roviding telephonic results prior equiries from the press and other equest to give a deposition in a equest to testify in a civil case, equest to testify in a grand jury poviding a laboratory report to or	er the laboratory policies regarding the following: to issuance of a final laboratory report. media. riminal case. rocceding or a preliminary hearing.
1.4	Become familiar with the re-	uirements and the facilities available for the secure storage or uss this with the Lab Manager and an examiner from the lab.
Lab ]	Manager	Date
Disc	pline Leader/on-site trainer	Date

	appliances, evidence while unde examiner from the lab.	er examination, and	d lab space security. Discuss this with an
Disci	pline Leader	Date	
1.6	Familiarize yourself with the Fire	earms Reference (	Collection (FRC):
(a)	Learn how to locate firearms i obtain up-to-date copies of this i	_	the FRC printed inventory listings, and use.
(b)	Know the correct procedure for		
Disci	pline Leader	Date	ensic
1.7			files, records and procedures in regard to leave, time and attendance, report files, obtaining necessary tools, equipment and
Lab N	Manager	Date	
1.8	Obtain a copy of the Safety Mar understand the rules and proced	nual. Familiarize y	yourself with its contents and indicate you rein by your signature below.
Disci	pline Leader/on-site trainer	Date	<b>;</b>

Become familiar with the requirements of lab security in regards to firearms, electrical

1.5

# Section 2 BACKGROUND/HISTORY OF FIREARMS IDENTIFICATION

2.1	Define the following terms:  (a) firearms identification (b) ballistics	
Disci	pline Leader/on-site trainer	Date
2.2	principles, evolution and scope of fire	e basic references and prepare a report on the history, carms identification in its broadest sense. Support your totebook. Discuss this with the Discipline Leader/on-rt.
Disci	pline Leader/on-site trainer	DateO
2.3	Formulate an answer to the following	questions:
(a)	Is firearms identification an art or scie	ence? x
(b)	What are the types of conclusion comparisons?	is that can be reached in firearms identification
(c)	What is the basis for each of the above	e conclusions?
(d)	Can experts in the field of firearms Why?	identification disagree regarding their conclusions?
(e)	How does "probability" relate to finear	· ·
Disci	pline Leader/on-site trainer	Date
	6,04	
2.4		iation of Firearms and Toolmark Examiners" (AFTE) nembership, committees, the AFTE glossary and the hem.
Disci	pline Leader/on-site trainer	Date

2.5	Discuss with system operators the status of using computer imagery such as NIBIN/IE	of the ongoing research initiatives to link shootings BIS.
Disci	pline Leader/on-site trainer	Date
2.6	Visit and tour the various laboratories the within your region. Coordinate this visit was a superior of the coordinate that the various laboratories to the various laboratories labora	hat provide firearms and toolmark examinations with the Lab Manager.
Disci	pline Leader/on-site trainer	Date
2.7	Become knowledgeable about the profici independent testing services. Particularly conducted within the field of firearms at Discuss this with the Discipline Leader/on	ency testing program administered by the outside by be aware of festing and the results of testing and toolmark identification by this organization. In-site trainer.  Date  Date
Disci	pline Leader/on-site trainer	Pate
2.8	Be able to demonstrate a practical working AFTE Glossary as the standard.	ing knowledge of firearms terminology using the
Disci	pline Leader/on-site trainer	Date

## Section 3 FIREARMS & AMMUNITION DEVELOPMENT AND CURRENT TRENDS

3.1	metallic cartridges, with particular percussion systems, priming method	rms and ammunition development up to the advent of emphasis on lock mechanisms, early rifling techniques, ods and pre-metallic cartridges. Prepare a chronological and discuss it with the Discipline Leader/on-site trainer.
Disci	pline Leader/on-site trainer	Date
3.2	Study the firearms reference collected representative of commercial and metallic cartridges.	ction noting in particular the types of firearms which are d military firearms development since the advent of
Disci	pline Leader/on-site trainer	Date cartridge from the mid-nineteenth century to the current
3.3	Trace the evolution of the rimfire generation of modern .22 caliber right pline Leader/on-site trainer  Study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study the history of centerfire cart to the current generation of modern .22 caliber right plants and study and st	
Disci	pline Leader/on-site trainer	Date
3.4	Study the history of centerfire cart to the current generation of mo chronological history of this devel trainer.	ridge development starting with black powder cartridges dern centerfire cartridges. Make notes to show the opment and discuss it with the Discipline Leader/on-site
Disci	pline Leader/on-site trainer	Date
3.5	•	File (SAF), in particular cartridges and shotshells which and military ammunition development during the past
 Disci	pline Leader/on-site trainer	Date

3.6	Conduct a study of exterior technology impacts the firearms	_	Discuss	with	the	trainer	how	this	new
Disci	nline Leader/on-site trainer	Da	te.						

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# Section 4 MANUFACTURE OF MODERN FIREARMS

4.1	Numerous techniques are used in the manufacture of modern firearms. Research in detail these processes and set these out in your notes. Include but do not restrict your study to the following machining methods:	
	<ul> <li>(a) shaping</li> <li>(b) planning</li> <li>(c) Drilling</li> <li>(d) reaming</li> <li>(e) turning</li> <li>(f) boring</li> <li>(g) milling-include both face milling and peripheral (slab) milling</li> <li>(h) broaching</li> <li>(i) abrasive machining-include honing, lapping, grinding, sanding, and ultrasonic methods</li> </ul>	
	(i) abrasive machining-include honing, lapping, grinding, sanding, and ultrasonic methods (j) sawing (k) filing (l) swaging (m) electrochemical machining (ECM) (n) electrodischarge machining (EDM) (o) investment casing  Date  Demonstrate your knowledge of the basic nomenclature of handguns, rifles, and shotguns.	
Discip	line Leader/on-site trainer Date	
4.2	Demonstrate your knowledge of the basic nomenclature of handguns, rifles, and shotguns.	
	a. Include, but do not restrict your study, to the following: breechface, breechbolt, bolt, bolt face, extractor, ejector, firing pin, rifling, barrel, lands, grooves, ramp, magazine, clip, ejection port, receiver.	
<ul> <li>b. Point out these parts in several handguns, rifles and shotguns as applicable.</li> <li>c. Discuss the manufacturing techniques which would have been used to fabricate finish each of the parts and note the machining marks on each part.</li> </ul>		
	d. Point out any "mark of abuse" which could contribute to the uniqueness of each part.	
	e. Identify areas that machining marks might "carry over" to another firearm.	
Discip	line Leader/on-site trainer Date	

4.3	(b) button (e) scra	k method  pe method  M/EDM	
Disci	pline Leader/on-site trainer	Date	
4.4		for study from the lab training materials. Deter ch have been button rifled and those which have been	
Disci	pline Leader/on-site trainer	Date	
4.5	Discuss and define the following identification.  (a) chambering (b) crowning (c) ballizing (d) bore slugging (e) forcing cone (f) bore (g) choke (h) choke tubes	ing terms as they relate to firearms manufacture or	firearms
Disci	pline Leader/on-site trainer	Date	
4.6	•	rrent significance of proof marks as they relat ass this with the Discipline Leader/on-site trainer.	e to the
Disci	pline Leader/on-site trainer	Date	

4.7 Visit the manufacturing facilities of at least two firearms and/or barrel manufacturers such as Wilson barrels, Ruger, Smith and Wesson, Mossberg, Marlin and US Repeating Arms. Record notes in your notebook on each visit and produce a written report of your visit for lab files and an oral report for lab members. Particular emphasis should be placed on manufacturing and rifling techniques used by each manufacturer, noting methods and procedures which leave unique manufacturing toolmarks on firearms parts which, in turn, produce individual microscopic marks on bullets, cartridge cases and shotshell casings. Coordinate these visits with the Discipline Leader/on-site trainer.

Discipline Leader/on-site trainer	Date	ices
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	Korcoby	
	Solice the MEI	
	Date  Date	
	Stolleger	
2/9/31	concoll	·
eith on	OB	
prope		

### Section 5 MANUFACTURE OF MODERN AMMUNITION

5.1	Define in your notebook and know	the meaning of the following terms as they relate to
	modern ammunition and its manufac	ture:
	(a) cartridge	(aa) bullet
	(b) cartridge case	(bb) round-nosed bullet
	(c) primer	(cc) "hollow-point" bullet
	(d) shotshell	(dd) jacketed bullet
	(e) shotshell casing	(ee) bullet sizing
	(f) bottleneck cartridge	(ee) bullet sizing (ff) wadcutter bullet (gg) semi-wadcutter bullet (hh) soft point bullet (ii) spitzer bullet
	(g) rebated-rim cartridge	(gg) semi-wadcutter bullet
	(h) rimless cartridge	(hh) soft point bullet
	(i) rimmed cartridge	(ii) spitzer bullet
	(j) semi-rimmed cartridge	(jj) swaging
	(k) shoulder	(kk) cast lead bullet
	(l) neck	(II) mold marks
	(m) mouth	(mm) truncated cone bullet
	(n) head	(nn) cannelure
	(o) headstamp	(oo) ogive
	(p) proof cartridge	(pp) brass-coated lead bullet
	(q) tapered cartridge	(qq) copper-coated lead bullet
	(r) extractor groove	
	(r) extractor groove (s) gauge (t) battery cup (u) brass (v) "Rule of 17" (w) wadding (x) shot collar (y) crimp (z) bunter	(ss) "silvertip" bullet
	(t) battery cup	(a) antimony
	(u) brass	(uu) arsenic
	(v) "Rule of 17"	(vi) chilled shot
	(w) wadding	(ww) high brass, low brass
	(x) shot collar	(xx) lubaloy
	(y) crimp	(yy) dram equivalent
	(y) crimp (z) bunter	(zz) single base, double base
	2404	
Discip	line Leader/on-site trainer	Date
_		
5.2		and Boxer primers, showing their relationship to the
	head of the cartridge.	
D! !	1: T 1/	Dete
Discip	line Leader/on-site trainer	Date

5.3	Discuss the purpose and essential ingre	edients of priming mixture used in modern cartridg	es.
Disci	pline Leader/on-site trainer	Date	
5.4	by relating these terms to a discussion	Date  Ufacturing facility such as Remington, Federal confirmation and centerfire contributes and shotshes	lies
Disci	pline Leader/on-site trainer	Date	
5.5	Make detailed notes of the manufacture files. Also prepare an oral presenta emphasis should be placed on pellet a	uring processes and generate a written report for tion for lab members upon your return. Particu and bullet manufacture, shotshell casing and cartrid	lab ılaı dge
Disci	case manufacture and the steps inv Coordinate this visit with the Discipling	Date	

# Section 6 INSTRUMENTATION

6.1	Differentiate between the following	g;
	<ul><li>(a) compound microscope</li><li>(b) stereo microscope</li><li>(c) comparison microscope</li></ul>	
Disci	pline Leader/on-site trainer	Date
6.2	Study the instruction manual for or and how to check the calibration or	Tate  Date  Date  Date  Determine how to insert a reticule from manuals and the mechanical and optical aspects of
Disci	pline Leader/on-site trainer	Date OR
6.3	Familiarize yourself with the instrour microscopes in the lab. Note and optically.	nction manuals and the mechanical and optical aspects of the differences and similarities in each, both mechanically  Date
Disci	pline Leader/on-site trainer	Date
6.4	Familiarize yourself with the follothe comparison microscopes.  (a) fluorescent  (b) fiber optics (with and we have a second content of the c	wing types of light sources which are in use in the lab on
Disci	pline Leader/on-site trainer	Date

	toolmarks. Manipulate the above light source of the light source if possible. Gain an appropriate the source of the light source if possible.	cases, and various types of surfaces containing rees with respect to angle and vary the intensity reciation for the effects of varying the angle and e of surface. Discuss this with the Discipline
Discip	pline Leader/on-site trainer	Date
6.6	Prepare the microscope for your personal	vision requirements and focus the "hairline".  use, and familiarize yourself with each set of cope. Become familiar with the various digital  Date  Se of the following equipment:
Discip	oline Leader/on-site trainer	Date OR
6.7	Become familiar with and demonstrate the u  (a) speed micrometer (b) inertia bullet puller (c) steel rule (d) reticle in ocular lens of binocular (e) balances and scales located in the	The College of the Co
Discip	pline Leader/on-site trainer	Date
6.8	Review the maintenance and calibration of the	he balances in the firearms lab.
Discip	pline Leader/on-site trainer	Date

Using each type of light source in the field of view on a comparison microscope, note the differences in the quality of each using the following different surfaces: lead bullets,

6.5

### Section 7 EXAMINATION OF FIREARMS

7.1	Define each of the following types of firearm type to include the loading of cartridges and the and/or bullet after firing.	<del>-</del>
	<ul><li>(a) revolver, single and double action</li><li>(b) auto-loading pistol, single and doub</li><li>(c) derringer and single shot pistols</li></ul>	le action
	(d) bolt-action rifle	
	(e) auto-loading rifle	S
	<ul><li>(f) pump-action rifle</li><li>(g) various single shot rifles</li></ul>	:0
	(h) submachine gun	M
	(i) assault rifle	co,
	<b>、</b> ,	Pateo (ensico)
		, SI
Y3!:		(C)
Disci	cipline Leader/on-site trainer	DateO O
7.2	Explain and illustrate the differences between loading shotgun.	a gas-operated and a recoil-operated auto-
	10 10 10 10 10 10 10 10 10 10 10 10 10 1	
	C. (2) (3) (4)	
Disci	cipline Leader/on-site trainer	Nate
171301	Explain and illustrate the differences between loading shotgun.  Explain and illustrate the differences between the loading shotgun.	rato
7.3	Explain and illustrate the differences between t	ne following types of auto-loading pistols:
	" O. O. B.	
	(a) blowback action	
	(b) delayed blowback action	
	(d) gas-delayed blowback action	
	(d) short recoil action (e) long recoil action	
	(c) long recon action	
Disci	cipline Leader/on-site trainer I	Pate

7.4.		reassemble a representative sample of revolvers from the ograph and note the differences in their mechanisms. Identify
Discip	pline Leader/on-site trainer	Date
7.5	<u> </u>	a representative sample of the semiautomatic firearms in the Note the differences in their mechanisms. Be able to identify nanufacturers nomenclature
Discip	pline Leader/on-site trainer	Date Self
7.6	Field strip and reassemble reference collection. Note d major parts by name.	a representative sample of submachine guns in the firearms ifferences in the mechanism and operation of each. Identify the Date  Date  Description of a representative sample of military and civilian firearms reference collection. Be able to identify the major
Discip	oline Leader/on-site trainer	State
7.7	Familiarize yourself with the center fire rifles from the components and action type	ne operation of a representative sample of military and civilian firearms reference collection. Be able to identify the major of the various samples.
Discip	pline Leader/on-site trainer	Date
7.8.	firearms reference collection	e operation of each of a representative sample of shotguns in the n. Identify the major parts by name and make appropriate notes. as action types in the collection.
Discip	oline Leader/on-site trainer	Date
7.9.		ne operation of a representative sample of the rimfire revolvers, the major parts by name and make appropriate notes. Be able to pes in the collection.

Discip	pline Leader/on-site trainer	Date
7.10.	employed in each design. block, transfer bar, and any	I through No. 9 above, study the various safety mechanism include thumb safety, grip safety, magazine safety, firing pother mechanical safety. Illustrate how the firing mechanism therwise stopped from operating.
Discip	oline Leader/on-site trainer	Date
7.11.	Demonstrate, using firearms in a safe condition	the Range Rules and Safety Rules regarding firearms from No. 4 through No. 9 above and others, how to pla how to load and unload each, how to handle and carry the and how to safely test fire each of these different types
Discip	oline Leader/on-site trainer	Date
7.12.	Esmiliaring vermalf with	the lab equipment used for measurement of trigger pure at least one firearm from each of the No. 4 through No.
Discip		Date
7.13.	determining whether a fir	Leader/on-site trainer from the unit the protocol to be used earm "can be made to fire without pulling the trigger arm from each of the No. 4 through No. 9 groups of firearm the pe of examination.
Discip 7.14.	oline Leader/on-site trainer Research, define, and/or deto safety in the operation of a fi	Date braine the implications of the following terms as they relate rearm.
	<ul><li>(a) excessive headspa</li><li>(b) barrel obstruction</li><li>(c) barrel bulge</li></ul>	

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	<ul><li>(d) broken extractor</li><li>(e) push off</li><li>(f) trigger shoe</li><li>(g) false half-cock</li></ul>	<ul><li>(k) hairline cracks</li><li>(l) improper timing</li><li>(m) excessive pressure</li><li>(n) dented barrel</li></ul>
Discip	oline Leader/on-site trainer	Date
7.15.	construction of walls and backste firearms thought to be possibly u	o's firearms range including its physical dimensions, op, and bullet velocity limitations. Know how to test fire insafe. Become familiar with the use of all the equipment es and emergency medical treatment procedures.
		G®1
- Discip	line Leader/on-site trainer	Date
7.16.	Attend Armorer's training off manufacturing facilities if possil trainer.	ered by various manufacturers of firearms, at their ble. Coordinate these with the Discipline Leader/on-site
Discip	oline Leader/on-site trainer	Ale Date
7.17.	Explore the capabilities in restor	ing an moperable evidence firearm to operating condition I reservations which must be considered. Discuss this with
Discip	oline Leader/on-site trainer	Date

- 7.18. Review and record the references in the lab library which can be used to identify the manufacturer and/or source of a firearm using the following criteria:
  - (a) proof marks
  - (b) inspector marks
  - (c) factory numbers and markings

Discip	line Leader/on-site trainer	Date	
7.19.	<del>-</del> -	h the Discipline Leader/on-site trainer and becomens of the lab in regard to these areas:	ne familia
	(c) determining the manufacturer	ence firearm has been fired since it was tast cleaner of a firearm from an examination of a part from a rof a firearm from a photograph and comparing a aph	a firearm
Discip	line Leader/on-site trainer	Date	
7.20.	have been recovered from water	ow to submit evidence firearms to the laboratory or or when they are in a rusted condition. Also nitations, and reservations which must be considing condition to obtain test specimens from them.  Date  Date	so become ered when
Discip	line Leader/on-site trainer	Date	
7.21.	determine if a firearm has been	eader/on-site trainer how to conduct an examaltered to fire full automatic. Using a firearm c, conduct this type of examination and verbally respectively.	which has
Discip	line Leader/on-site trainer	Date	

(d) serial number(e) part numbers(f) company logos

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#### Section 8.1 BULLET EXAMINATIONS AND COMPARISONS

8.1.1.	Obtain a copy of and familiarize yourself bullets.	with the lab protocol for the examination of fired
Discip	line Leader/on-site trainer	Date
8.1.2.	Define what is meant by or determine the they relate to the examination and compart Leader/on-site trainer.  (a) slippage (b) shaving (c) obscuration (d) leading edge and trailing edge (e) melting (f) blow-by (g) striation (h) individual microscopic marks (i) ogive (j) bearing surface (k) class characteristics (l) general rifling characteristics (m) "insufficient individual microscopic (n) corrosion (o) leading (p) "limited individual microscopic (q) "single-action" firing (r) "double-action" firing	significance of the following terms or phrases as ison of fired bullets. Discuss with the Discipline copic marks"
Discip	line Leader/on-site trainer	Date

8.1.3. As they relate to the examination and comparison of fired bullets or bullet fragments, know the importance of and limitations of determining the following:

	(f) pitch of rifling (g) depth of rifling			
	Discuss with the Discipline L	eader/on-site tra	iner.	
Dissin	line Leader/on-site trainer		Date	S
-				artice
8.1.4.	file manually and by use of		order to determ	Know how to search this nine the manufacturer of fired the Discipline Leader/on-site
Discip	line Leader/on-site trainer	Politi	Date	
8.1.5.	Become familiar with the Krafiling system, and uses as a trainer.	nown Specimen Teference file.	File (KSF). K Discuss with	now its location, composition, the Discipline Leader/on-site
Discip	line Leader/on-site trainer	385	Date	
8.1.6.	/ 1 \	irearms in a "ne	o-gun case". De	(GRC) file. Know how to use emonstrate your proficiency in
Discip	line Leader/on-site trainer		Date	

8.1.7. Using test bullets and other fired bullets and bullet fragments provided to you, demonstrate

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your proficiency in accurately determining caliber, caliber type, manufacturer, and rifling

(a) weight(b) caliber(c) caliber type(d) manufacturer

(e) general rifling characteristics

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	in conducting these examinations.		
Discip	line Leader/on-site trainer	Date	
8.1.8.	accurately determining the rifling	ygonal rifled barrels, demonstrate your proficie characteristics of these fired bullets. Compile a ed to fire these bullets using the GRC file.	
		:08	
Discip	line Leader/on-site trainer	Date	
8.1.9.	Become knowledgeable about the Know when and how to use the hor Observe and assist the Discipline I bullets using each of these methods	facilities in the lab for the recovery of fired test rizontal recovery tank and fiber box and their limited eader/on-site trainer from the lab in the recovery of fired test and their limited eader/on-site trainer from the lab in the recovery of fired test.  Date  Date  Date  Date  Date  Date  Discuss we have a single test amount on using the SAF. Discuss we have a single test amount on using the SAF.	tations
	line Leader/on-site trainer	Date C	
8.1.10.	Discipline Leader/on-site trainer loading ammunition for test firm	he reasons for using substitute ammunition or ng. Know the proper procedure for down-ler supervision of the Discipline Leader/on-site	ith the down- loading
Discip	line Leader/on-site trainer	Date	
8.1.11.		rrels and/or microscopically compare test bullet erve the differences and similarities in the striation-site trainer.	
Discip	line Leader/on-site trainer	Date	

characteristics of these fired bullets. Also prepare a list of firearms which could have been used to fire these bullets provided to you. As necessary, use the KSF, SAF, and GRC files

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caliber ammunition, using both plated (copper and brass washed) and lead bullets. Attempt to identify the test bullets to each other. Take appropriate photographs and notes.		
Discipline Leader/on-site trainer	Date	
-	n caliber revolver, test fire two each n caliber ammunition, using jackete allets to each other. Take appropriat	ed, plated and lead bullets.
		ices
Discipline Leader/on-site trainer	Date	317
8.1.14. Using the same 9mm Luge ammunition, using both jacke each other. Take appropriate		
ammunition, using both jacket each other. Take appropriate  Discipline Leader/on-site trainer  8.1.15. Microscopically compare but the barrel of the gun was cut a	State Noate Controlled In Date C	
8.1.15. Microscopically compare but the barrel of the gun was cut a	lets before and after that have been and the muzzle end was crowned.	fired from a gun and then
Discipline Leader/on-site trainer	Date	
8.1.16. Using a .30 caliber rifle, test the tests with each other. Con	fire at least two different brands of aduct this test with the Discipline Le	<u>-</u>
Discipline Leader/on-site trainer	Date Page 25 of 47	Revision 00
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8.1.12. Using the same .22 caliber firearm, test fire two each of at least three brands of 22 LR

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•	rolver, test fire two each of the following cartridges and ch other. Conduct this test with the Discipline Leader/on-
<ul><li>(a) .32 S &amp; W caliber Re</li><li>(b) .32 Auto caliber Rem</li></ul>	mington with lead bullet ington with full metal case jacketed bullet
Discipline Leader/on-site trainer	Date
8.1.18. Test fire a representative sample two test bullets from each pist Conduct this test with the Discipl	
Discipline Leader/on-site trainer	Date  hy bullet identifications cannot be made in some cases, and
	Date tifying manufacturing toolmarks on a fired bullet from a
	f the Crime laboratory Digest concerning "Manufacturing
Discipline Leader/on-site trainer	Date
8.1.21. Discuss the feasibility of determ bullet from an examination of a b	nining caliber and/or the rifling characteristics of a fired pullet hole in metal.
Discipline Leader/on-site trainer	Date

8.1.22	. Compare test bullets with each of	other before and after from a	barrel that has been "Slugged".	
Discip	line Leader/on-site trainer	Date		
8.2. <b>C</b>	8.2. CARTRIDGE/CARTRIDGE CASE EXAMINATIONS AND COMPARISONS			
8.2.1.	Obtain a copy of and be familia cartridge cases.	r with the lab protocol for the	e examination of cartridges and	
Discip	line Leader/on-site trainer	Date	Services	
8.2.2.	cartridge case. Determine the ty	ypes of marks which can be to	eft on a cartridge case/cartridge	
Discip	Test fire 6 semiautomatic fires visually relate the markings imp	Tate Political Pare Chillians		
8.2.3.	Test fire 6 semiautomatic firest visually relate the markings imply which produced these markings the following firearms and visus with the part on the firearm which	. Also load and extract at lean last lean last lean last relate the markings imp	ast two cartridges from each of	
Discip	line Leader/on-site trainer	Date		
8.2.4.	Using the test cartridge cases intercompare all of the marking in your microscopic comparison	s with each other. Include the	e following types of markings	

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the results of your comparisons.

anvil marks, extractor marks, ejector marks, ramp marks, and magazine marks. Photograph

Discipline Leader/on-site trainer		Date
8.2.5.	ammunition of the appropriate caliber to nickel and brass primers. Test fire	imparable CCI, Remington, Federal, and Winchester ype for each firearm. Select ammunition with both each firearm at least twice using each brand of pare and photograph the markings as in paragraph 3,
	<ul> <li>(a) .38 Special caliber Smith &amp;</li> <li>(b) .357 Magnum caliber Smith</li> <li>(c) 9mm Smith &amp; Wesson, , pis</li> <li>(d) .22 long Rifle caliber Ruger</li> </ul>	& Wesson revolver tol
Discip	line Leader/on-site trainer	Date
8.2.6.	cartridges, six .22 Long caliber cartridg	and Wesson revolver, fire six .22 Long Rifle caliber es, and six .22 Short caliber cartridges of the same note the chamber in which it is fired. Intercompare to the fired cartridge cases.
Discip	line Leader/on-site trainer	Date
8.2.7.	cartridges/cartridge cases. Identify the reloaded ammunition. Become familia	ing and identifying reloading-type marks on various types of marks which may be indicative of ar with the reloading equipment in the lab and the Reload several cartridges and compare reloading other.
Discip	line Leader/on-site trainer	Date

8.2.8. Discuss the feasibility of comparing and identifying manufacturing toolmarks on a fired cartridge case from the scene of a crime with cartridges which can be associated with the suspect. Identify the various types of manufacturing toolmarks which may be present on cartridges or cartridge cases.

Discipline Leader/on-site trainer	Date	
other. Compare all of the	per U.S. Carbine and compare the test cartridge cases marks imparted to the fired cartridge cases. Load an rearm. Note and compare all of the marks imparted to	nd extract
Discipline Leader/on-site trainer	Date	
them with the Discipline Le	cles in the October 1989 issue of the AFTE journal an ader/on-site trainer in the lab. essions - Their Measurement and Significance" essions - Their Relation to Hammer Fall Conditions"	d discuss
Discipline Leader/on-site trainer	essions - Their Measurement and Significance" ressions - Their Relation to Hammer Fall Conditions"  Date  Their Measurement and Significance  Their Measurement and Significan	
8.3. SHOTSHELL AND SHOTS	HELL COMPONENT EXAMINATIONS AND	

# **COMPARISONS**

- 8.3.1. Determine what type of examinations can be conducted and what conclusions can be reached from an examination of the following components. Discuss this with the Discipline Leader/on-site trainer.
  - (a) shot, deformed and undeformed
  - (b) fired card or fiber wads
  - (c) fired plastic wads
  - (d) fired shotshell casings
  - (e) unfired shotshells
  - (f) shot buffer material
  - (g) shot collar and shot cup

Discip	line Leader/on-site trainer	Date
8.3.2.	manufacturer of fired shotshell co	e of the SAF in regard to the determination of gauge an imponents. Know the limitations in regard to making suctour proficiency in using the SAF to conduct this type of a-site trainer.
Discip	line Leader/on-site trainer	Date
8.3.3.	Using a shotgun, saw off a portion shotshell with a power piston was comparisons of marks imparted to	on of the barrel. Test fire this shotgun using a Remingto d. Recover the test shotshell wads and make microscopi of the test wads.  Date  Date  east two test shotshell casings from each shotgun an each imported to the growth of the contract.
Discip	line Leader/on-site trainer	Date
8.3.4.	microscopically compare the maccomparisons the following types	east two test shotshell casings from each shotgun an rks imparted to these shotshell casings. Include in you of marks: firing pin impression, breechface marks (prime r marks, ejector marks, chamber marks, and any other marks and discuses the significance of identifying an Date
Discip	line Leader/on-site frainer	Date
8.3.5.	representative sample of 12 gau size shot, buckshot and slugs for pellets and fired wadding from e casings with each other. Examine	shotgun, obtain at least two test shotshell casings with ge shotshell ammunition. Use small size shot, medium this test. Also recover a representative number of the fire ach test firing. Compare markings on these test shotshes the fired components which were recovered and compare same type. Discuss the significance of your findings.
Discip	line Leader/on-site trainer	Date

8.3.6. Discuss in detail the procedures used in reloading shotshells and familiarize yourself with the shotshell reloading equipment in the lab. Know how to recognize reloaded shotshells from an examination of the shotshell casing and/or its components. Reload shotshells using

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Discipline Leader/on-site trainer Date Successfully perform a competnacy test that includes at least one cartridge case comparison, 8.4 one bullet comparison and a shotshell or shotshell component examination and comparison. Discipline Leader/on-site trainer Successfully complete a mock court dealing with firearm examination.

Date

Da Date 8.5 Discipline Leader/on-site trainer

the shotshell reloading equipment in the lab and examine the reloaded shotshells for

reloading-type marks.

## Section 9. <u>GUNSHOT RESIDUE EXAMINATIONS AND DISTANCE</u> <u>DETERMINATIONS</u>

9.1.			icals used in the modified Griess test edia and the photographic paper.
Disci	pline Leader/on-site trainer	Date	nsic.
9.2.	Described in detail the chem powder, the modified Griess to	ical reactions which ta est and the Sodium Rho Date	ke place in the burning of smokeless dizonate test.
Disci	pline Leader/on-site trainer	Tate C	
9.3.	Demonstrate your proficiency set out in the lab protocol man (a) conventional Gries (b) reverse Griess test (c) sodium rhodizonat (d) Bashinsky transfer (e) blotting transfer	s test	wing techniques, using the techniques
Disci	pline Leader/on-site trainer	Date	
9.4.		ermination Cases" in th	the Shotgun/Shotshell Performance e AFTE Journal, October, 1989 issue. trainer.
Disci	pline Leader/on-site trainer	Date	

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9.5.	sample involving the deposition patterns. Your examination sh	ting "muzzle-to-garment" distance tests, with at least one of gunshot residues and one sample involving shot ould include note taking, microscopic and chemical ce test patterns and accurately determining "muzzle-to-
Disci	pline Leader/on-site trainer	Date
9.6	Successfully complete a mock cou	rt dealing with distance testing.
		:085
Disci	pline Leader/on-site trainer	Date
		ė's s
		rensey
		Date Date  D
		bolle lugarithm
		ie flutoc
	%0 *4	Ollect
	* Idai con	
	MOI THE	
	OREIT OF	

## Section 10. TOOLMARK EXAMINATIONS AND COMPARISONS

10.1.	Obtain a copy of and familiarize yoursel toolmarks.	If with the lab protocol for the examination
Diggin	pline Leader/on-site trainer	Date
Discip	onne Leader/on-site tramer	Date
10.2.	Those machining methods are the basis for tidentification. However, it should be no identification, certain other related types of review with the Discipline Leader/on site tra	on entitled "Manufacture of Modern Firearms". teelmark identification as they were for firearms ted that in the broad definition of toolmarks examinations are also performed. Discuss your iner.
Discip	oline Leader/on-site trainer	Date
10.3	Also define toolmark identification in its	s broadest sense, and determine the kinds of columns identification. Set these out in detail and
Discip	oline Leader/on-site trainer	Date
10.4.	Discuss the significance of examining subm several types of such deposits.	nitted tools first for foreign deposits and itemize
Discip	oline Leader/on-site trainer	Date

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Discip	oline Leader/on-site trainer	Date	
10.6.	Define the following terms of tools or methods which c	as they relate to toolmark ould produce each catego	identification and give three examples
	<ul><li>(a) shearing</li><li>(b) pinching</li><li>(c) fracture</li></ul>	<ul><li>(d) scrape mark</li><li>(e) impression</li><li>(f) slicing</li></ul>	to toolbark identification. Using the
Discip	oline Leader/on-site trainer	Date	CON
10.7.	tools of methods selected a class characteristics in detail Select at least two tools rep	as examples in the para  I.  Presentative of each category took and abserve the	graph above, describe their respective ory in paragraph 5 above from the lab.
Discip	oline Leader/on-site trainer	Date	
10.8.	tools which employ a sheari same tools. Attempt to ide same tool as that which cut	ng, pinching and slicing a entify the cuts in the cop t the test lead. Support y	iameter, make cuts through it with the action. Make test cuts in lead using the oper wire as having been made by the your results with photographs and note color difference between copper and
Discir	bline Leader/on-site trainer	Date	

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In a case involving a toolmark examination wherein no tool is submitted, determine the

types of conclusions which can be reached. Consider such things as the type of tool, size of tool, action employed by tool, value of toolmark for comparison purposes, and unusual tool

10.5.

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	results and comment on the dif	fference in the quality of marks made by each tool.	
Discip	oline Leader/on-site trainer	Date	
10.10.	of test marks in lead and interc	uce an impression in a piece of brass sheeting. Produce compare these two marks. Attempt to identify these as houpport your results by photographs.	
Discip	oline Leader/on-site trainer	Date	
	trainer produce impressions an Devise a method of obtaining tool on the doorknob. Micros	d a serrated-jawed tool, have the Discipline Leader/ord scrape marks like those produced by an attempt at an extest marks in lead like those produced by the serrated-jacopically compare the marks on the doorknob with the tool with the marks on the doorknob and reproduce the each mark to its respective serration on the tool.  Date  Date  Date  Attention of the marks and fracture it into two fragments. Attention of the marks and fracture it into two fragments.	entry jawed se or
Discip	oline Leader/on-site trainer	Date	
10.12.	automoune bumper of magnici	having once been a single object. Take notes and su	прі к
Discip	oline Leader/on-site trainer	Date	
10.13.	a dowel rod with the ax blade your test cuts are consistent wi	ains numerous defects. Cut a piece of seasoned wood sue and attempt to identify the blade with the cut. Insure th your "unknown" with respect to the orientation of the of the grain. Support your results with sketches	e that ax to
Discip	line Leader/on-site trainer	Date	

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Microscopically compare those in the brass or copper sheeting with the test marks in the lead. Attempt to identify the appropriate marks with the appropriate tool. Photograph your

•	n a multi-stranded cable. Note the qualid comment on the problems involved in d of the cable.	•
Discipline Leader/on-site trainer	Date	
10.15. Discuss the fact that generally saws, marks they produce. Cite any exception		tifiable with the
Discipline Leader/on-site trainer	Date Ser	
with photographs and notes. Discuss	and stabs into the sidewall with a fix toolmarks produced by the knife. Supplement the results of your examinations is making the questioned cuts, or if the fter making the initial questioned cuts.  Date	port your results might be altered
Discipline Leader/on-site trainer	Date	
10.17. Investigate pressure/contact examina	tions in regard to objects which maded time. Research several cases of the	y have been in his type and set
Discipline Ceader/on-site trainer	Date	
10.18. Discuss and demonstrate the making such casts and of photographs alone in		the potential of
Discipline Leader/on-site trainer	Date	
10.19 Successfully perform a toolmark compe	etency test.	

10.14. Obtain a section of large-diameter telephone cable and cut it with the ax used above and

Discipline Leader/on-site trainer	Date
10.20 Successfully complete a mock court	t dealing with toolmark examination.
Discipline Leader/on-site trainer	Date

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## Section 11. SERIAL NUMBER RESTORATION

11.1		Methods for the Restoration of Oblite scuss the theory of number restoration.	erated Serial Numbers by
on-site	e trainer	Date	
11.2	Sketch the entire stressed depict what remains when	area above and below the indentation the indented area is removed.  Date  Date  methods used to mark items by private ed to, casting stamping, dot matrix, las	on of a stamped item and
on-site	e trainer	State	
11.3	Make a list of the various include but not be restricted machining.	methods used to mark items by private ed to; casting, stamping, dot matrix, las	industry. This list should er and electrical discharge
(a)	Discuss with the Disciptechniques has on the subs	line Leader/on-site trainer the effect urface of the marked area.	each of these marking
(b)	Discuss with the Discipli	ine Leader/on-site trainer how the manner to restore any obliterated	<del>-</del>
on-site	trainer	 Date	
11.4		e term "plastic deformation" of metal.	
on-site	e trainer	Date Page 39 of 47	Revision 00

11.5	Briefly discuss in your notebook and the Discipline Leader/on-site trainer the difference between cold rolled steel and cast iron metal.		
on-sit	e trainer	Date	
11.6	Discuss with the Discipline Lea alterations will have on the subs results of the examiner.	surface of the marked item a	nd how it will impact on the
	(a) grinding (b) restamping (c) pinging (d) gouging (e) drilling (f) welding (g) filing (h) combinations of the all  Determine the telltale signs that of these signs will determine your signs.		Services
	(d) godging (e) drilling (f) welding (g) filing	, orensic	
	(h) combinations of the a	bove Colice rock MK	
11.7	Determine the telltale signs that these signs will determine your st	can be left by the various alter pecific approach to the restora	ration methods. Discuss how tion attempt.
on-site	e trainer	Date	
11.8	Discuss with the Discipline Le incandescent and fluorescent) and Be prepared to explain how the the results.	d how they can improve or en	nhance the restoration results.
on-site	e trainer	Date	
11.9	Discuss the various methods of s they will affect the results in the r		nding and polishing and how
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11.10	Determine the chemical reaction that takes place when etching is done and place in your
	notebook the appropriate chemical formulations for the general reactions of acid with steel
	and aluminum.

on-site trainer

Date

11.11 Determine whether the reaction rate for the stressed area is faster or slower than the etching rate of the rest of the surface and why.

on-site trainer

Date

11.12 Determine the specialized equipment that might be used in number restoration and discuss these with the Discipline Leader/on-site trainer.

on-site trainer

.Date

11.13 Determine the various ways photography can be utilized to document the process of serial number restoration. Also discuss its limitations.

on-site trainer

Date

11.14 Research the various kinds of magnifying and enhancing equipment used for number restoration and explain when and why each would be used.

on-site trainer

Date

11.15 Become familiar with the following chemicals:

(a) CuNH4Cl

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(b) CuCl2 (c) NaOH (d) Hcl (e) HNO3 (f) KCN (g) K2SO4 (h) Aqua Regia (i) H2SO4 (j) FeCl3 (k) H202 (l) Tartaric acid (m) Ammonium Persulfa	ate	
on-site trainer	Date	CONTRACTOR
11.16 Obtain the proper safety equipmattempting any chemical restorations. R precautions are used.	nent (e.g., eyewear, masks, eview the chemical hygiene	gloves, and lab coats) before policies to insure proper safety
on-site trainer	Date	
on-site trainer  11.17 Define and place in your noteboo  (a) Frys Reagent (b) Arais Reagent (c) Hydrofluoric acid (d) Turner's Reagent (e) Davis' Reagent  on-site trainer	ok these common chemical to	erms:
on-site trainer	Date	
11.18 Become knowledgeable of the r manufacturers including but not Arms (Winchester) and Remington	limited to Colt, Ruger, Sm	•
on-site trainer	Date	

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	(f) shotg (g) shotg	ne/nickel 25 caliber auto un alloy receiver un case hardened receiv hester rifle		
on-site	trainer		Date	- ices
11.20	serial numbers u	sing different methods a	and then attempt to	e Leader/on-site trainer; alter the restore them. Prepare notes and
		ubstantiate your conclus	· Co Co	
on-site	trainer		Date	
11.21	Be prepared to lessons learned d	discuss with the Discipluring the restoration pro	pline Leader/on-si ocess.	te trainer the methods used and
on-site	trainer	of The Book	Date	
11.2.	restore these nu	ieces of aluminum that imbers using various conclusions and results	techniques. Prej	I numbers removed. Attempt to pare notes and photographs to
on-site	trainer		Date	······································
11.23				combination of brief application shorten the processing time on
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11.19 Discuss the best chemicals and techniques to use in number restoration of the following

firearms:

(a) Colt pistol

(b) Smith & Wesson revolver (c) RG Industries revolver

(d) Ruger stainless steel revolver

11.24	Discuss with the Discipline Leader/so well on chrome or nickel-plated	on-site trainer why alternating HNO3 and Ho firearms.	Ol can work
on-site	e trainer	Date	
11.25	Research the effect of electricity or you have learned. Conduct restoration	n the reaction time of the different chemical ons using this method.	techniques
on-site	e trainer	Date Services	
11.26	Successfully complete a serial number	er restoration competency test.	
	e trainer  Successfully complete mock court de	Date Date with serial number restoration.	
11,27	Successfully complete mock court de	SILE TELEVISION NAMED OF TOSTOTALON	
	line Leader/on-site trainer	Date	
12.1 (will be compressed	e in that area, if the analyst is be	est is only being certified in one area the cost sing certified in all areas the costigned cast trainer will determine when this is complete the types of cases completed.	ses will be
Discip	line Leader/on-site trainer	Date	

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## Basic References:

Policies and procedure manuals for the laboratory

Manufacturers procedure and operation manuals

"AFTE Glossary" AFTE Standardization Committee

"Basic Firearms/Toolmarks Course" California Department of Justice

"Cartridges of the World" BARNES

"Encyclopedia of Modern Firearms, Parts and Assembly, Vol I." BROWNELL

"Firearms and Ammunition Fact Book" NRA STAFF

"Firearms Identification" Vol. I, MATHEWS

"Firearms Investigation, Identification and Evidence" HATCHER, JURY, and WELLER

"Gun Digest Book of Exploded Firearms Drawings" MUNTZ
"Gunshot Wounds" DiMAIO
"Handbook of Firearms and Ballistics" HEARD

"Handbook of Forensic Science"

"Handbook of Methods for the Restoration of Obliterated Serial Numbers" TREPTOW

"Handgun and Shoulder Arms Assembly" NRA

"Hatcher's Notebook" HATCHER

"History and Development of Small Arms Ammunition, Vol. 1-3, HOYEM

"Hodgdon's Reloading Data Manual" HODGDON POWDER CO.

"Hornaday Handbook of Cartridge Reloading" HORNADAY STAFF

"Introduction to Tool Marks, Firearms, and the Striagraph" DAVIS

"Identification of Firearms and Forensic Ballistics" BURRARD

"Machine Shop Practice Vol 1 & 2" K. H. MOLTRECHT

"Military Small Arms of the Twentieth Century" HOGG and WEEKS

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"NRA Firearms Source Book" BUSSARD & WORMLEY

"NRA Guidebook to Shoulder Arms" NRA STAFF

"Silencer History and Performance" PAULSON

"Small Arms of the World" W.H.B. Smith

"Speer Reloading Manual" SPEER STAFF

"The Book of Rifles" SMITH & SMITH

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0	11/15/06	Original Issue based on AFTE training guide From February 24 1995.
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