ASSOCIATION OF FIREARM & TOOL MARK EXAMINERS

TRAINING MANUAL

Revised Feb 2021 version 1.0

FOREWARD

The AFTE Training Manual was first published in 1982 and serves as a modular guide for the training of new firearm and tool mark examiners. The current version is the result of the work and input of many individuals over a number of versions. To all the individuals who have contributed to the training manual contained herein, we do extend collective recognition and gratitude.

ASSOCIATION of FIREARM and TOOL MARK EXAMINERS

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The Association of Firearm and Tool Mark Examiners (AFTE) Standardization Committee was formed at the 1977 Training Seminar in Virginia Beach in recognition of the need for a more unified language within our forensic science discipline. The initial realization of this necessity lead to the publication of the AFTE Glossary, now in its 6th Edition. The AFTE Board of Directors and the Standardization Committee further recognized that the environment in which our profession exists is changing and in order to remain at the forefront of the forensic science community, a standardized procedures manual was needed. In 2000, the Standardization and Training Committees were combined to minimize duplication of this effort and ensure the uniformity of the information generated.

In 2006, the committee was restructured in order to address three important areas of standardization for the AFTE community resulting in the formation of the Glossary, Training, and Technical Procedures Manual Sub-Committees. Although this manual is a product of the Training Manual Sub-Committee of the Association of Firearm and Tool Mark Examiners Standardization and Training Committee, it was written and edited by many AFTE Members and Technical Advisors. This training manual will be revised and updated periodically in the future with the assistance of any who wish to contribute.

The Training Manual Sub-Committee of the Association of Firearm and Tool Mark Examiners Standardization and Training Committee will have the ongoing responsibility for these revisions. If you see the necessity for changes and/or additions, it is requested that you contact, in writing, the current Chair of the Standardization and Training Committee or the Chair of the Training Manual Sub-Committee. To facilitate the tabulation of this information, comments and recommendations should be submitted in the same general format as the most current revision of the Training Manual. Submissions should be sent by email attachment and will only be accepted if generated using Microsoft Word© or any electronic document format that can be opened by Microsoft Word©.

INTRODUCTION

The following syllabus will guide the examiner trainee through the various areas of knowledge integral to the field of Firearm and Tool Mark Examination. This syllabus is general in its layout and allows some modification by the individual Training Officer to meet specific laboratory requirements. It is paramount that the trainee is cognizant of the primary objective of this training period: to independently and competently examine and compare evidence relating to Firearm and Tool Mark Examination; to independently and competently render an opinion and reach conclusions relating to examinations and comparisons; and to give expert testimony in court in matters encompassed within the broad discipline of Firearm and Tool Mark Examination in a professional, competent and impartial manner. The obligation rests with the trainee to maximize on the effectiveness of their training period and recognize the opportunity to gain as much knowledge as possible in this field. The extent to which the trainee applies them self during this training and evaluation period will bear directly on the quality of their performance in the laboratory and on the witness stand. The Firearm and Tool Mark Examiner's technical ability and testimony may directly impact the future of an accused person(s). Therefore, the trainee has a moral and ethical obligation to prepare themselves technically and professionally during training, in order to be able to perform under the most rigid standards.

The trainee will be expected to familiarize themselves with their laboratory's pertinent section equipment, technical procedures manual, administrative procedures manual, quality assurance manual, and safety manual, as well as print, video and physical reference files. Frequent interaction with the training officer, a mentor, or other experienced section personnel is integral to the success of this training. The trainee should not hesitate to ask questions.

The trainee will be expected to become thoroughly familiar with the basic references and materials which are listed after each area of study but should not restrict themselves to these basic references. The trainee should familiarize themselves with their laboratory's firearm section reference collection which should include reference files, related indices, manufacturer's literature and the journal of the Association of Firearm and Tool Mark Examiners.

It is required that the trainee keep a record of their training notes for each topic listed in the syllabus for research, discussion, demonstration, study or practical work. Their notebook may include handwritten notes, charts, graphs, photographs, limited photocopied material, etc., at their discretion; however, it should address and expand on each of the required topics of study set out in the syllabus. Organizing notes in a format that parallels the syllabus is suggested which will assist in documenting the trainees progress and serve as a ready reference in the months and even years following their

training.

In addition to the required tasks, a research project or projects to supplement the training syllabus may be an excellent learning experience. The trainee should be prepared to discuss their preferences regarding a project or projects and training syllabus with the Training Officer within thirty days after physically reporting to the section.

This hands-on guide should serve as the core of the trainee's instruction to be used under the guidance of a Training Officer who will assure that each aspect of this training syllabus is completed.

The Training Officer should coordinate all outside classes, tours and lectures. Within sixty days of physically reporting to the section, the trainee should have completed pertinent sections of this training syllabus to be sufficiently knowledgeable regarding section operations and reference files and capable of conducting tours of the section.

The Training Officer will interview the trainee to assess the trainee's level of experience in order to establish a baseline. The Training Officer should note any past training, experience, education, published articles and other credentials. The trainee's knowledge, skills and abilities as they pertain to the examiner position should be used to develop an Individual Training Plan (ITP). The ITP should contain projected completion dates for the established training goals and a copy will be provided to the trainee for information and guidance. The trainee will be expected to meet the standards set by the Training Officer for successful completion of their training. These standards are set forth in the Administrative Guide as well as in the trainee's ITP.

A. ADMINISTRATIVE MATTERS AND PROCEDURES

1. Meet with the Training Officer (or designee) and discuss the laboratory's mission, organization and management structure. Tour the facility and become familiar with the laboratory's requirements for restricted and secured access.

_____	_____	_____
Trainee	Trainer	Date

2. Meet with the Quality Manager and become familiar with the inspection agency that accredited your laboratory including the standard to which your laboratory is accredited. The Quality Manager will be able to give an overview of your laboratory's accreditation process.

_____	_____	_____
Trainee	Trainer	Date

3. Familiarize yourself with your laboratory's Quality Assurance Program / Quality Manual. Discuss the Proficiency Testing Program and the Training Program as they relate to the Quality system with the Training Officer.

_____	_____	_____
Trainee	Trainer	Date

4. Familiarize yourself with the security requirements of the Firearm and Tool Mark section regarding controlled access to the section, evidence lockers and evidence storage while under examination. Discuss with the Training Officer or an examiner from the section.

_____	_____	_____
Trainee	Trainer	Date

5. Read and familiarize yourself with your Laboratory's Safety Manual. This should include Personal Protective Equipment, biohazards, hearing protection, and lead exposure. Discuss with the Safety Manager and an examiner from the section.

_____	_____	_____
Trainee	Trainer	Date

6. Familiarize yourself with specific safety features/procedures in the firearm section, including panic alarms, range ventilation, and the use of eye/hearing protection.

Trainee	Trainer	Date

7. Familiarize yourself with the procedures for the transfer of evidence within your laboratory and evidence handling procedures, including evidence that may carry Hepatitis, the Human Immunodeficiency Virus (HIV) or other infectious biological agents. Discuss with the Training Officer or an examiner from the section.

(*Use Training Assignment #1 to complete this objective.*)

Trainee	Trainer	Date

8. Familiarize yourself with the requirements and the facilities available for the secure storage of evidence within the section. Discuss with the Training Officer or an examiner from the section.

Trainee	Trainer	Date

9. Read and familiarize yourself with your Firearm and Tool Mark Section policy and procedures manual. Discuss each section with your firearm section Supervisor/Training Officer/other designee. Sign any review sheets that accompany the manuals.

(*Use Training Assignment #1 to complete this objective.*)

Trainee	Trainer	Date

10. Discuss the opportunities for advancement within the firearm section and the laboratory system with your Section Supervisor or other designee.

Trainee	Trainer	Date

11. Discuss with your Laboratory Director or Section Supervisor the laboratory policies regarding the following:

    a) Providing preliminary verbal or written results prior to issuance of a final laboratory report
    b) Inquiries from the press and other media
    c) Request for pre-trial meetings or depositions in a criminal case
    d) Request to testify in a civil case
    e) Request to testify in a grand jury proceeding or a preliminary hearing
    f) Providing a laboratory report to other agencies
    g) Policies on working private casework
    h) The potential for re-examination of evidence
    i) Membership dues and attendance at professional meetings
    j) Training and funding

Trainee	Trainer	Date

12. Familiarize yourself with your laboratory's reference collections. Examples may include firearms, ammunition and fired-specimen collections. Determine, by reviewing laboratory policy, which of these collections can be used for identification, comparison, interpretation or training purposes.

    a) Be familiar with how the laboratory files these items for retrieval
    b) Understand the correct procedure for using the specimens in casework or training

Trainee	Trainer	Date

13. Familiarize yourself with the Association of Firearm and Tool Mark Examiner's website (https://afte.org/). This is a good opportunity to learn the requirements to become a Provisional Member.

Trainee	Trainer	Date

14. Familiarize yourself with the AFTE Certification Program located on the AFTE website. Certifications include Firearm Evidence Examination and Identification, Tool Mark Evidence Examination and Identification, and Gunshot Residue Evidence Examination and Identification.

Trainee	Trainer	Date

15. Through the AFTE website and journal, familiarize yourself with the history and development of AFTE.

Trainee	Trainer	Date

16. If possible, request to be an observer when a crime scene evidence unit is called out to process a scene or a vehicle. Observe the collection and preservation of various types of physical evidence including firearm and tool mark related evidence. Document with notes, photographs, sketches, evidence logs, incident reports etc. and include an overview of the crime scene observed and the evidence collected.

Trainee	Trainer	Date

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REFERENCE MATERIALS
ADMINISTRATIVE MATTERS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

General

Crime Laboratory Quality Assurance Manual

Firearm and Tool Mark Policies and Procedures Manual

Crime Laboratory Safety Manual

Firearms Safety

AFTE Technical Procedures Manual, “Safe Firearm Handling,” (2015):10-11. AFTE website: https://afte.org/uploads/documents/procedures.pdf

Dutton, G., “Firearms Safety in the Laboratory”, AFTE Journal, 1997; 29(1):37-41.

National Rifle Association (NRA), “NRA Gun Safety Rules”. https://gunsafetyrules.nra.org/

National Shooting Sports Foundation (NSSF), “Firearm Safety – 10 Rules of Safe Gun Handling”. https://www.nssf.org/safety/rules-firearms-safety/

Sapp, Rick, “The NRA Step-by-Step Guide to Gun Safety: How to Care For, Use, and Store your Firearms,” Skyhorse Publishing, 2016.

Chemical Safety

Material Safety Data Sheets (MSDS) or (SDS), as applicable can be obtained in print or electronically from chemical supply houses or go to www.msds.com.

National Research Council, “Prudent Practices in the Laboratory: Handling and Disposal of Chemicals/Edition 1,” National Academies Press, Washington, DC, 2011.

National Research Council, “Prudent Practices for Handling Hazardous Chemicals in the Laboratory,” Bibliolife DBA of Bibilio Bazarr II LLC, Andesite Press, 2017.

Occupational Safety and Health Administration, 29 CFR Part 1910, Occupational Exposures to Hazardous Chemicals in Laboratories; Final Rule.

Biohazards

Bigbee, D., “The Law Enforcement Officer and Aids,” U.S. Department of Justice, FBI, Second Edition.
https://www.ncjrs.gov/pdffiles1/Digitization/115274NCJRS.pdf

Bigbee, P.D., P.S. Sarin, J.C. Humphsreys, W.G. Eubanks, D. Sun, D.G. Hocken, A. Thornton, D.E. Adams, and M.G. Simic, “1989 Inactivation of Human Immunodeficiency Virus (HIV) by Ionizing Radiation in Body Fluids and Serological Evidence.” Journal of Forensic Sciences, 34(6):

Fent, Kenneth, and Maureen T. Niemeier, “2011 NIOSH Evaluation of Health Hazards in a Crime Lab.” Evidence Technology Magazine, 9(3):22-25.

National Research Council, “1989 Biosafety in the Laboratory: Prudent Practices for the Handling and Disposal of Infectious Materials.” National Academy Press, Washington, D.C.

Occupational Safety and Health Administration, OSHA Fact Sheet, OSHA’s Bloodborne Pathogens Standard.
https://www.osha.gov/OshDoc/data_BloodborneFacts/bbfact01.pdf

Occupational Safety and Health Administration, OSHA Fact Sheet, Hepatitis B Vaccination Protection.
https://www.osha.gov/OshDoc/data_BloodborneFacts/bbfact05.pdf

Occupational Safety and Health Administration, OSHA Fact Sheet, Protecting Yourself When Handling Contaminated Sharps.
https://www.osha.gov/OshDoc/data_BloodborneFacts/bbfact02.pdf

Personal Protective Equipment

Ball, P. and Mikko, D., "Protective Optics," AFTE Journal, 1992; 24(1):80-81.

Occupational Safety and Health Administration, Personal Protective Equipment.
https://www.osha.gov/Publications/osha3151.pdf

Centers for Disease Control and Prevention, The National Institute for Occupational Safety and Health (NIOSH), Personal Protective Equipment.
https://www.cdc.gov/niosh/topics/emres/ppe.html

Occupational Safety and Health Administration, Occupational Noise Exposure,
https://www.osha.gov/SLTC/noisehearingconservation/standards.html

Occupational Safety and Health Administration, Respiratory Protection.
https://www.osha.gov/SLTC/respiratoryprotection/standards.html

Parkinson, Gregory, "1995 Splash Shield Face Protection System". Journal of Forensic Identification, 45(3):266-267. (also cited as 45(4):)

Lead Poisoning

Busch, T., "Lead Poisoning in Shooting Range A Menace or a Hoax," AFTE Journal, 1980; 12(4):101-103.

Cayton, J.C., "Blood Lead Tests," AFTE Journal, 1975; 7(1):40.

Cayton, J.C., "Firing Chamber and Safety Measures Taken in the Firearm and Toolmark Work Environment," AFTE Journal, 1985; 17(3) Pages 95-99.

Occupational Safety and Health Administration, Safety and Health Topics, Lead.
https://www.osha.gov/SLTC/lead/

Occupational Safety and Health Administration, Protecting Workers from Lead Exposure at Indoor Firing Ranges.
https://www.osha.gov/Publications/OSHA3771.pdf

The National Institute for Occupational Safety and Health (NIOSH), Preventing Occupational Exposures to Lead and Noise at Indoor Firing Ranges https://www.cdc.gov/niosh/docs/2009-136/

Physical Plant Safety

Occupational Safety and Health Administration, 29 CFR 1910.155, Fire Protection Regulations, Subpart L.

Quality Assurance

Association of Firearms and Tool Mark Examiners, "Association of Firearm and Tool Mark Examiners Quality Assurance Program 1986," AFTE Journal, 1986; 18(3):10.

Bradford, L.W., "Barriers to Quality Achievement in Crime Laboratory Operations," AFTE Journal, 1983; 15(2): 71.

Bradford, L.W. "Forensic Firearms Identification, Competence or Incompetence," AFTE Journal, 1979; 11(2):12.

Brundage, D.J., "Proficiency Testing in Illinois," AFTE Journal, 1980; 12(4):76.

Hodge, E.E., "Guarding Against Error," AFTE Journal, 1988; 20(3):290-293.

Hodge, E.E. "Guarding Against Error," AFTE Journal, 1989; 21(2):450-453.

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"Proficiency Testing Recommended for Crime Labs," AFTE Journal, 1979; 11(2):22.

Serrill, M.S., "Forensic Sciences: Overburdened, Underutilized," AFTE Journal, 1980; 12(4):58.

Stroman, Angela, "Empirically Determined Frequency of Error in Cartridge Case Examinations Using a Declared Double-Blind Format," AFTE Journal, 2014; 46(2): 157 – 175.

Scientific Working Group for Firearms and Tool Marks (SWGGUN), "Quality Assurance Guidelines," National Institute for Standards and Technology (NIST) website, accessed April 24, 2019: https://www.nist.gov/sites/default/files/documents/2016/11/28/swggun_quality_assurance_guidelines.pdf

"SWGGUN Quality Assurance Guidelines," AFTE Journal, 2013; 45(1):82.

Thornton, J.I., "Nationwide Crime Laboratory Proficiency Project," AFTE Journal, 1979; 11(2):23.

Individual Certification

Collins, E., Deskins, D., Flater, et al., "Association of Firearm and Tool Mark Examiners Certification Program, Certification and Recertification Policies and Procedures – Revised," AFTE Journal, 2015; 47(1): 41-57.

Kopera, J., "Summary of the Study of the Feasibility of Certification," AFTE Journal, 1992; 24(1):84-90.

Kowalski, K.F., "AFTE Certification Program," AFTE Journal, 1996; 28(4):287-290.

Kowalski, K.F., "Summary Report on the Development of Certification Examinations for Practicing Firearm and Toolmark Examiners," AFTE Journal, 2000; 43(4): 373-379.

Laboratory Accreditation

American Society of Crime Laboratory Directors, Laboratory Accreditation Board Manual, current edition.

ANAB, ANSI-ASQ National Accreditation Board, current edition.

Rabren, C.L., "Laboratory Accreditation," AFTE Journal, 1982; 14(3):36.

AFTE History and Development

Association of Firearm and Tool Mark Examiners, "About AFTE," AFTE website, accessed April 24, 2019: www.afte.org

Association of Firearm and Tool Mark Examiners, “Association of Firearm and Tool Mark Examiners Bylaws,” AFTE Journal, 1990; 22(1):61-70.

Denio, D., “The History of AFTE Journal, the Peer Review Process, and Daubert Issues”, AFTE Journal, 2002; 34(2): p. 210.

Howe, W.J., “Report on the Formation of the Association of Firearm and Tool Mark Examiners,” AFTE Journal, 1989; 21(2):118-119.

Ethics

“AFTE Code of Ethics,” AFTE Journal, 1991; 24(3):342-345.

“AFTE Code of Ethics,” AFTE Journal, 1993; 25(1):ix.

“AFTE Procedures for Enforcement of the Code of Ethics,” AFTE Journal, 1990; 22(4):457-470.

“AFTE Code of Ethics,” AFTE Journal, 2000; 32(1): p.99.

“AFTE Code of Ethics,” AFTE Journal, 2001; 33(4): p.375.

“AFTE Code of Ethics,” AFTE website: https://afte.org/about-us/code-of-ethics

“ASCLD Code of Ethics,” ASCLD website: https://www.ascld.org/wp-content/uploads/2018/07/ASCLD-Code-of-Ethics-2018.pdf

Dutton, G., “Ethics in Forensic Firearms Investigation,” AFTE Journal, 2005; 37(2):79-85.

Dutton, G., “The Importance of Being Impartial,” AFTE Journal, 1998; 30(3): 523-526.

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B. BACKGROUND/HISTORY OF FIREARM AND TOOL MARK EXAMINATION AND CURRENT TRENDS

1. Define the following terms:

   a) Firearm and Tool Mark Examination
   b) Ballistics
   c) Interior Ballistics
   d) Exterior Ballistics
   e) Terminal Ballistics

(*Use Training Assignment #1 to begin this objective.*)

Trainee	Trainer	Date

2. Using applicable sections from the basic references and other relevant sources, prepare a report on the history, principles, evolution, and scope of Firearm Identification in its broadest sense. Support your report by creating a timeline of key advancements in the field of Firearm and Tool Mark Examination. Discuss your report with the Training Officer.

(*Use Training Assignment #1 and #2 to complete this objective.*)

Trainee	Trainer	Date

3. Research the contributions of key individuals to the field of Firearm and Tool Mark Examination. Summarize their contributions in a paper, devoting a paragraph to each individual.

Trainee	Trainer	Date

4. Prepare a short report on the history and development of laboratory instrumentation in the field of Firearm and Tool Mark Examination, with emphasis on the comparison microscope.

Trainee	Trainer	Date

5. Discuss with system operators the status of the ongoing initiatives to link shootings using computer imagery such as the National Integrated Ballistics Information Network (NIBIN). Prepare a report on the legacy, existing, and emerging technologies.

Trainee	Trainer	Date

6. If possible, visit and tour any laboratories that provide Firearm and Tool Mark examination and comparison within your region. Coordinate these visits with the Training Officer.

Trainee	Trainer	Date

7. Become knowledgeable about proficiency testing programs administered by outside independent testing services, with emphasis on proficiency testing programs conducted within the field of Firearm and Tool Mark Examination. Discuss these with the Training Officer.

Trainee	Trainer	Date

8. Be able to demonstrate a practical working knowledge of firearm terminology using the AFTE Glossary as the standard.

(*Use Training Assignment #4 and #5 to complete this objective.*)

Trainee	Trainer	Date

9. Optional but recommended assignment: Select a topic for a research project to be completed during your training. Obtain approval from the Training Officer before initiation of the project. This project should be original and contribute to or enhance the wealth of knowledge in the field of Firearm and Tool Mark Examination. These results should be shared with the section upon completion. In addition, your results should be formatted for publication in the AFTE Journal and/or for the presentation at an AFTE meeting.

(*Use Training Assignment #3 to begin this objective*.)

Trainee	Trainer	Date

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General

Association of Firearm and Tool Mark Examiners Standardization Committee, Glossary of the Association of Firearms and Tool Mark Examiners, 6th edition, 2013.

Burrard, G., The Identification of Firearms and Forensic Ballistics, 5th Edition, Wolfe Publishing Co., NY, 1990.

Davis, J.E., An Introduction to Tool Marks, Firearms and the Striagraph, Charles C. Thomas, Springfield, IL, 1958.

Drogin E.Y., "Chapter 1: Ballistics by Lisa Steele," Science for Lawyers, American Bar Association, June 23, 2008, pp. 1-29.

Firearms: Bullet and Cartridge Case Identification," Wiley Encyclopedia of Forensic Science, John Wiley and Sons, 2015.

Gunther, J.D., and Gunther, C.O., The Identification of Firearms From Ammunition Fired Therein With an Analysis of Legal Authorities, Skyhorse Publishing, New York, NY, 2015.

Haag, M. and Haag, L., Shooting Incident Reconstruction, Academic Press, 2nd Edition. 2011.

Hatcher, J.S., Hatcher's Notebook, 3rd Edition, Military Service Publishing Company, Harrisburg, PA, 1966.

Hatcher, J.S., Jury, F.J., and Weller, J., Firearms Investigation, Identification and Evidence, Ray Rifling Arms Books Co., Philadelphia, PA, 2006.

Hatcher, J.S., Jury, F.J., and Weller, J., Textbook of Pistols and Revolvers, Skyhorse Publishing, New York, NY, 2015.

Heard, B.E., Handbook of Firearms and Ballistics: Examining and Interpreting Forensic Evidence (Developments in Forensic Science), 2nd Edition, John Wiley & Sons, Hoboken, NJ, 2008.

Himmelwright, A.L.A., "Forensic or Legal Ballistics" Pistol and Revolver Shooting, Palladium Press, Birmingham, AL, 2003.

Mathews, J.H., Firearms Identification, Volumes I - III, University of Wisconsin Press, Madison, WI, 1962.

Mathews, J.H., Firearms Identification, Volume IV, The Laboratory Examination of Small Arms, Rifling Characteristics in Hand Guns and Notes on Automatic Pistols, Literary Licensing, LLC, Whitefish, MT, 2011.

NRA Staff, NRA Firearms Fact Book, 3rd Edition, National Rifle Association, Fairfax, VA, 1993.

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Thompson, R., Firearms Identification in the Forensic Science Laboratory, National District Attorneys Association, Alexandria, VA, 2010.

Walker, R.E., Cartridges and Firearm Identification (Advances in Materials Science and Engineering), CRC Press, Boca Raton, FL, 2013.

Principles/History/Developments

AFTE Criteria for Identification Committee Report, "Theory of Identification, Range of Stria Comparison Reports and Modified Glossary Definitions", AFTE Journal, 1992; 24(3):336-340.

American Institute of Applied Science, "Firearms Identification Lessons," AFTE Journal, 1982; 14(2): 17-86, 14(3):45-153, and 14(4):51-140.

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Barrett, M.R., “Microchip and the Bullet: A Vision of the Future,” AFTE Journal, 1991; 24(3): 876-883.

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Belveal, D.N., “Firearms Identification Based Upon Bullet Comparisons: Expertise or Guesswork,” California Attorneys for Criminal Justice Forum, 1977; 4(2): 17.

Berg, S.O., “Drama of Forensic Ballistics,” AFTE Journal, 1979; 11(3): 44-48.

Berg, S.O., “Firearms Evidence and the Kennedy Assassination,” AFTE Journal, 1970; 2(2): 3-5.

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Biasotti, A.A., “Firearms and Toolmark Identification: A Forensic Science Discipline,” AFTE Journal, 1980; 12(3):12-15.

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Biasotti, A.A., “Methods Applied to the Comparison of Class and Individual Characteristics in Firearms and Toolmark Identification,” AFTE Journal, 1989; 21(2): 260-263.

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Biasotti, A.A., “The Principles of Evidence Evaluation as Applied to Firearms and Tool Mark Identification,” Journal of Forensic Sciences, 1964; 9(4): 428-429.

Brackett, J. W., “A Study of Idealized Striated Marks and their Comparisons Using Models,” The Journal of Forensic Science Society, 1970; 10(1): 27-56.

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C. FIREARMS AND AMMUNITION DEVELOPMENT AND CURRENT TRENDS

1. Review the history of early firearms and ammunition development up to the advent of metallic cartridges, with particular emphasis on lock mechanisms, early rifling techniques, percussion systems, priming methods and pre-metallic cartridges. Prepare a chronological outline of this early development and discuss it with the Training Officer.

(*Use Training Assignment #3 to complete this objective.*)

Trainee	Trainer	Date

2. If possible, visit the firearm collection of a museum to observe examples of early firearms and ammunition development, paying close attention to firearms that are developmental benchmarks. Discuss this tour with the Training Officer.

(*Use Training Assignment #1 to complete this objective.*)

Trainee	Trainer	Date

3. If possible, tour a laboratory's firearms reference collection noting, in particular, commercial and military firearms since the development of metallic cartridges.

Trainee	Trainer	Date

4. Trace the evolution of the rimfire cartridge from the mid-nineteenth century to the current generation of modern 22 caliber rimfire cartridges.

(*Use Training Assignment #4 to complete this objective.*)

Trainee	Trainer	Date

5. Study the history of centerfire cartridge development starting with black powder cartridges to the current generation of modern centerfire cartridges. Note the chronological history of this development and discuss these with the Training Officer.

(*Use Training Assignment #5 to complete this objective.*)

Trainee	Trainer	Date

6. Study the firearm section Standard Ammunition File (SAF), noting in particular cartridges and shotshells that are representative of commercial and military ammunition development during the past three decades.

Trainee	Trainer	Date

7. Conduct an in-depth study of exterior bullet coatings. Prepare a report about how this technology could impact microscopic comparisons.

Trainee	Trainer	Date

8. Prepare a report listing trends you see unfolding in cartridge and bullet development and show any historical significance to these findings.

Trainee	Trainer	Date

9. Prepare an overview of the current development in handguns and how this information might be of significance to the firearm examiner.

Trainee	Trainer	Date

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REFERENCE MATERIALS
HISTORY OF BLACK POWDER AS A PROPELLANT

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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D. MANUFACTURE OF MODERN FIREARMS

Read this entire section before you begin. Be advised some areas require a general understanding or familiarization, where other areas require specific knowledge. Retain all training documentation. Learn and follow the firearm safety rules and procedures located in your Laboratory Procedures Manual, the AFTE Procedures Manual and/or the National Rifle Association (NRA) Firearm Safety Rules. When firearms are needed for an exercise, follow relevant procedures for removing a gun from your Laboratory Firearm Reference Collection.

1. Research and be able to explain the meaning of the terms: ballistics, chemistry, firearms identification, mechanical engineering, metallography, metallurgy, and physics.

_____	_____	_____
Trainee	Trainer	Date

2. Research some of the materials used to manufacture firearms. Gain a general understanding of molecular structure by reading about atoms, molecules, compounds and crystals. Define and be familiar with the general composition, qualities and limitations of these materials as they relate to firearms and tool marks. Include, but do not limit your study to the following:

a) Alloy
b) Aluminum
c) Bar stock
d) Barrel stock (chromium-molybdenum)
e) Carbon (as an element)
f) Ceramic (as used in molds)
g) Ferrous alloy
h) Iron (as an element)
i) Iron crystals
j) Iron ore
k) Pig iron
l) Polymer
m) Stainless steel
n) Steel
o) Tin
p) Titanium
q) Tungsten carbide
r) Zinc (as an element)
s) Zinc alloy (i.e. ZAMAK)

_____	_____	_____
Trainee	Trainer	Date

3. Select firearms from the laboratory Firearm Reference Collection (if available) to demonstrate each action listed below. Define each action and be familiar with any additional firearm actions found in the AFTE Glossary:

a) Automatic
b) Blowback
c) Bolt
d) Break-open
e) Double
f) Falling block
g) Hinged frame
h) Hybrid
i) Lever
j) Martini
k) Pump
l) Revolver
m) Rolling block
n) Semiautomatic
o) Single
p) Trap door

Trainee	Trainer	Date

4. Define each of the following types of firearms and explain in detail the cycle of fire. The operation of each type of firearm, including the loading of cartridges and the subsequent movement of the cartridge case and/or bullet after firing should be documented.

a) Single and double action revolvers
b) Single and double action semi-auto pistols
c) Single shot pistols (including derringers)
d) Bolt-action rifle
e) Gas operated semi-auto rifle
f) Pump-action rifle
g) Single shot rifles
h) Sub-machine guns (including blowback and delayed blowback)
i) Muzzle loading firearms
j) Percussion revolvers
k) Lever action rifles

(Use Training Assignment #11 to complete this objective.)

Trainee	Trainer	Date

5a. Explain the difference between manual, semi-automatic, and automatic operation of firearms. Give an example of each.

Trainee	Trainer	Date

5b. Explain the difference between a handgun and long gun.

Trainee	Trainer	Date

6. Define the following firearms parts:

a) Hammer
b) Trigger
c) Bolt
d) Sear
e) Extractor
f) Ejector
g) Barrel
h) Firing pin
i) Disconnector
j) Magazine
k) Grip
l) Frame
m) Butt
n) Forend
o) Slide

Trainee	Trainer	Date

7. Explain and illustrate the differences between the following types of actions:

a) Blowback
b) Delayed blowback
c) Gas-delayed blowback
d) Short recoil
e) Long recoil
f) Striker operated
g) Manual operation
h) Semi-automatic
i) Revolver
j) Bolt
k) Pump
l) Lever
m) Single action
n) Double action
o) Hammer operation
p) Double action only
q) Single action only
r) Gas-operated

(Use Training Assignment #12 to complete this objective.)

Trainee	Trainer	Date

8. Numerous manufacturing methods are used in the forming of modern firearm parts. Research, identify and briefly define the listed processes using the AFTE Glossary and other reliable references. Be familiar with the tool mark patterns (both striated and impressed) that some of these processes leave on the bearing surfaces of a firearm that are in direct contact with ammunition prior to and after discharge. In addition, you are encouraged to view on-line videos for these manufacturing processes, if available.
:

a) Abrasive machining
b) Annealing
c) Boring
d) Broaching (excluding barrel broaching)
e) Casting
f) Chamfering
g) Computer numeric control (CNC)
h) Cope and drag (as used in casting)
i) Drilling (excluding barrel/deep-hole drilling)
j) Electro chemical machining (ECM)
k) Electro discharge machining (EDM)
l) Extrusion
m) Filing
n) Fine-forming operations
o) Grinding
p) Hammer forging
q) Honing
r) Investment and die casting (parts)
s) Investment die casting (IC)
t) Lead lapping
u) Machine hammer forging
v) Metal injection molding (MIM)
w) Milling(include both face milling & peripheral or slab milling)
x) Molding
y) Planing
z) Powdered metal technology (PMT)
aa) Sacrificial wax & runners (as used in casting)
bb) Sanding
cc) Sawing
dd) Shaping
ee) Stamping
ff) Stoning
gg) Subcontract manufacturing
hh) Swaging
ii) Ballizing
jj) Turning
kk) Ultrasonic methods

(*Use Training Assignment #6 to complete this objective*.)

_____	_____	_____
Trainee	Trainer	Date

9. Review the chip formation phenomenon common to all machine tools.

_____	_____	_____
Trainee	Trainer	Date

10. Research in detail and briefly define the following terms as they pertain to barrel production and rifling methods. Prepare to explain how some tools and procedures were used in the past and identify the more common methods currently used. Consider how each method may affect the ammunition component(s) they may be in contact with.

a) Barrel deep-hole drilling
b) Barrel straightening
c) Burnishing
d) Chambering and throating
e) Contouring/profiling
f) Crowning
g) Cut rifling methods
h) Damascus barrel
i) Electro Chemical Machining (ECM)
j) Electro Discharge Machining (EDM)
k) Honing
l) Lead lapping
m) Mandrel
n) Drawn Over Mandrel (DOM)
o) Polygonal
p) Reaming
q) Single point tools(hook/scrape cutters)
r) Tungsten carbide swaging (microgroove rifling)

(*Use Training Assignment #8 to complete this objective.*)

Trainee	Trainer	Date

11. Research some of the common manufacturing tools (buttons, broaches, mandrels, etc.) used in rifling processes. Select firearms from the laboratory reference collection which were produced using each method (if possible). Examine the rifling of each firearm with a stereo scope and bore scope (if available) to observe the differences in the class characteristics produced by the various rifling methods. Test fire the firearms and examine the effects these rifling methods have on the bearing surfaces of fired bullets. Mark the test fired bullets with both the firearm and the rifling method.

a) Button rifling
b) ECM rifling
c) EDM rifling
d) Gang broach
e) Hammer forge
f) Microgroove
g) Single point (hook/scrape cutters)

(*Use Training Assignment #8 to complete this objective.*)

Trainee	Trainer	Date

12. Define the terms “class”, “individual”, and “subclass” characteristics using the AFTE Glossary. Identify and describe how, why or if there is a potential for each rifling method described previously to leave subclass characteristics in the rifling and on fired ammunition.

Trainee	Trainer	Date

13. Research AFTE Journal articles using the search key word “subclass” and “carry over”. Prepare a brief document summarizing at least five (5) articles. Have the Training Officer select one (1) of the articles to present to the class/section.

Trainee	Trainer	Date

14. Prepare and continue to update a personal repository/chart of firearms known to produce potential subclass characteristics from research published in AFTE Journals. Identify the article, the firearm(s) manufacturer, model, and caliber. Also identify the location, type and cause of the potential subclass characteristics identified in each article and initial and date each new entry.

Trainee	Trainer	Date

15. Identify, associate and explain how manufacturing processes may leave potential subclass characteristics on specific parts of a firearm other than the barrel (firing pin, extractor, ejector, breech face.)

Trainee	Trainer	Date

16. Research in detail the words “caliber” and “gauge” in relation to firearms. Learn how and where a caliber is measured in a rifled barrel. Be able to explain the origin of the word “gauge” with regard to shotguns and other firearms as well.

Trainee	Trainer	Date

17. Research and be familiar with the following part fabrication terms:

a) Final assembly
b) Final steps
c) Hand fitting assembly
d) Headspace
e) High-stress load parts
f) Low-stress load parts
g) Repeating mechanism components
h) Small pins, screws, and springs

Trainee	Trainer	Date

18. Research in detail and be able to explain the meaning of the word “headspace” and how it is measured in the chambers from all types of firearms. Learn the effects and safety concerns for an improper headspace.

Trainee	Trainer	Date

19. Research and be able to explain the significance of the following terms as they relate to firearms manufacture, accountability, and identification. Note their various general locations on firearms, air-guns, and flare-guns. Select ten firearms from your firearms reference collection and note the marks and location for each. Record the firearm(s) used and the location where this information was found:

a) Caliber
b) Firearm importer/ exporter names
c) Hidden serial number(s)
d) Manufacturers’ number
e) Manufacturers’ name
f) Model
g) Part-stamped numbers (as on German Luger pistols)
h) Proof marks
i) Serial number
j) Work-stamp numbers (as on S&W revolvers)

Trainee	Trainer	Date

20. Research the history and current significance of proof marks as they relate to the manufacture of firearms. Be familiar with the following and prepare a brief synopsis of each:

a) Birmingham Gun Barrel Proof House
b) Firearm Owners' Protection Act 1986
c) National Firearms Act 1934
d) Private Proof House
e) Sporting Arms and Ammunition Manufacturers' Institute, Inc. (SAAMI)
f) Test Firing Proof Rounds
g) The American National Standards Institute (ANSI)
h) Title II of the Gun Control Act (GCA) of 1968

(*Use Training Assignment #8 to complete this objective.*)

Trainee	Trainer	Date

21. Research and document how and why the following manufacturing processes or methods are used in the finishing process of firearms.

a) Anodizing
b) Barrel straightening
c) Bluing
d) Case hardening
e) Chrome plating
f) Cosmetic finish
g) Electroplating
h) Honing
i) Lead lapping
j) Microstamping
k) Nickel plating
l) Parkerizing
m) Patina
n) Polishing
o) Powdered metal technology

Trainee	Trainer	Date

22. Demonstrate knowledge of the basic nomenclature of handguns, rifles, and shotguns by defining the words and terms in the list below. Discuss the manufacturing methods that may have been used to fabricate and finish each part. Note the type of machining marks and/or marks produced from wear and abuse and each area that may leave impressions, striations or both on ammunition. Include, but do not restrict your study to the following:

a) Actions (see exercise 4)
b) Anvil
c) Barrel
d) Bolt
e) Bore
f) Breech bolt
g) Breechface
h) Butt
i) Chamber
j) Choke
k) Choke tubes
l) Clip
m) Comb
n) Crown
o) Cylinder
p) Ejection port
q) Ejector
r) En bloc clip
s) Extractor
t) Feed ramps
u) Firing pin
v) Firing pin aperture
w) Forcing cone
x) Frames
y) Grooves
z) Hammer
aa) Hammer spur
bb) Heel
cc) Lands
dd) Magazine
ee) Muzzle
ff) Percussion nipple
gg) Ramp
hh) Receiver
ii) Rifling type
jj) Safeties
kk) Sear
ll) Slides
mm) Stock pistol grip
nn) Stock types
oo) Stock wrist, heal and toe
pp) Striker
qq) Throat/leade
rr) Trigger
ss) Trigger bar
tt) Trigger guard

(*Use Training Assignment #7 to complete this objective*.)

Trainee _____ Trainer _____ Date _____

23. Research and be able to explain the various types of firing mechanics, specifically hammer and striker mechanisms found in open and closed bolt designs. Learn the internal safety mechanisms associated with these assemblies and how they function. Learn the manufacturer's nomenclature for these parts, when available, using the AFTE Glossary as needed.

Trainee	Trainer	Date

24. Research the evolution, purposes, and processes associated with the application of serial numbers on firearms. Prepare a brief history of the methods used to apply serial numbers to firearms.

Trainee	Trainer	Date

25. Identify the role of Small Arms and Ammunition Manufacturers Institute, Inc. (SAAMI) and the European Commission Internationale Permanente (CIP) on the firearm industries in the United States and Europe.

Trainee	Trainer	Date

26. Be familiar with the concept, practice, and reliability of "microstamping" and evaluate the pros and cons these markings may have on the discipline of firearms identification. If available, examine microstamped alphanumeric reliefs on gun parts and examine the marks they produce on fired cartridge cases.

Trainee	Trainer	Date

27. Select a firearm and identify how the following parts of that gun may have been made. Identify high stress and low stress parts paying close attention to those areas that are in direct contact with ammunition components during cycling and firing. Define the following:

a) Barrel
b) Barrel extension
c) Breechface
d) Chamber(s)
e) Crown
f) Ejection port
g) Ejector
h) Extractor
i) Feed ramp
j) Firing pin
k) Rifling
l) Throat/leade

Trainee	Trainer	Date

28. Research and be able to explain the difference between an ammunition magazine and an ammunition clip.

Trainee	Trainer	Date

29. Research relevant state penal laws and, at minimum, the legal definitions for the following words/terms. Define the following by state law and using the AFTE Glossary if needed:

a) Antique firearm
b) Assault weapon
c) Disguised gun
d) Firearm
e) Gun (discuss the meaning and use of the word in laboratory reports)
f) Imitation firearm
g) Replica firearm
h) Machinegun
i) Magazine/high capacity
j) Pistol
k) Revolver
l) Rifle
m) Semiautomatic
n) Shotgun
o) Silencer

Trainee	Trainer	Date

30. Demonstrate and explain the “cycle of fire” for each type of firearm action. Include loading, firing and unloading procedures. Attempt to use the manufacturers’ specific nomenclature for each step. Articulate the firearm information including make, model, caliber, action and serial number for each firearm utilized.

Trainee	Trainer	Date

31. Learn the meaning of the terms “field strip”, “detail strip” and “disassembly”. While in training, it is recommended that each firearm examined be field stripped.

Trainee	Trainer	Date

32. Research and define the following as they relate to firearm accessories and attachments:
    a) Bayonet lug
    b) Bipod
    c) Butt plate
    d) Flash suppressor
    e) Half-moon clip
    f) Moon clip
    g) Muzzle brake
    h) Pistol grip
    i) Rail systems (Picatinny, Weaver, etc.)
    j) Scope ring
    k) Sling
    l) Sling swivel
    m) Sound suppressor
    n) Stripper clip
    o) Threaded barrel

Trainee	Trainer	Date

33. Identify the various types of internal and external safety mechanisms found in pistols, revolvers, rifles, and shotguns. Learn the manufacturer’s nomenclature for each safety mechanism. The AFTE Glossary may be used when needed. Classify each safety as active or passive. Include the following:
    a) Cross bolt
    b) Firing pin block
    c) Grip
    d) Half cock
    e) Lever
    f) Magazine
    g) Sliding button
    h) Tang
    i) Thumb
    j) Transfer bar
    k) Trigger
    l) Trigger lock
    m) Wing

Trainee	Trainer	Date

34. Research and be able to comprehensively explain to a layman the manufacturing methods of common firearm parts that are in direct contact with ammunition during cycling and firing (barrel, breech face, chamber, extractor and ejector).

Trainee	Trainer	Date

35. If possible, tour the manufacturing facilities of at least six toolmakers, firearms and/or barrel manufacturers such as Wilson Barrels, Colt, Ruger, Smith & Wesson, Mossberg, Marlin, US Repeating Arms, etc. Document your experience and produce a written report of each visit. Emphasis should be placed on manufacturing and rifling techniques used by each manufacturer. Note the methods that may leave individual manufacturing tool marks on firearm parts which, in turn, produce individual microscopic marks on bullets and cartridge cases. Coordinate tours with the Training Officer.

Trainee	Trainer	Date

36. Explore some of the futuristic ideas and prototypes of new firearms. While these firearms may not be available for examination, attempt to evaluate any new manufacturing methods. Include in this research the use of 3-D printers to manufacture firearms. Discuss these concepts with the Training Officer.

Trainee	Trainer	Date

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REFERENCE MATERIALS
MODERN FIREARMS DEVELOPMENT AND OPERATING SYSTEMS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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Media

American Gunsmithing Institute (AGI) Armorer’s Course videotape series, including the following titles:

Colt 1911 .45 Auto Pistol
(111 min.)

Remington 1100 Shotguns
(120 min.)

Browning Hi-Power Pistol
(97 min.)

Remington 870 Shotguns
(95 min.)

AR-15 Rifles
(120 min.)

Winchester 94 Rifles
(120 min.)

SKS Rifles
(120 min.)

Ruger Standard Auto MKI/MKII
(90 min)

AKS/MAK 90 Type Rifles
(91 min.)

Ruger Mini-14 Rifles
(90 min.)

Glock 17,19,21,23 Pistols
(60 min.)

Makarov Pistols
(60 min.)

H&K Models 91, 93, 94 Rifles
(60 min.)

S&W, 1st, 2nd, 3rd, Generation Pistols
(105 min.)

S&W Revolvers
(120 min.)

M1 Garand/M1A Rifles
(90 min.)

Ruger 10/22 Rifles
(60 min.)

Mossberg 500 Shotgun
(90 min.)

Beretta 92/Taurus P-92 Pistols
(90 min.)

M1/M2 .30 Carbine
(90 min.)

FN FAL Rifles
(128 min.)

Hi-Standard Auto Pistols
(111 min.)

Lenny Magill Productions “Bill Wilson Presents” series including the following titles:

CZ-75
(72 min.)

Sig Sauer P226
(74 min.)

Lenny Magill productions under the following titles:

Mastering the AR-15
(120 min.)

Rock‘n Roll # 2
(50 minutes)

Center X M1A/M14
(120 min.)

Complete Sigma
(45 min.)

Mastering Revolvers
(70 min.)

U.S. Marines Firepower
(75 min.)

Rock’n Roll #1
(45 min.)

Complete Ruger .22 Pistol
(67 min.)

Complete Ruger P-Series
(45 min.)

Mastering the Mini-Glock
(110 min)

U.S. Government training films:

Thompson Sub-Machine Gun
(97 min.)

Fundamentals of Small Arms
(30 min.)

Infantry Weapons and Their Effects
(30 min.)

B.A.R.-Browning Automatic Rifle
(20 min.)

Weapons of the Infantry
(41 min.)

Videos from other sources marketed by Lenny Magill Productions under the following titles:

Firestorm (60 min.)	Shooting the Uzi the Israeli Way (70 min.)
Knob Creek Machine Gun Shoot (60 min.)	The Colt M-16 Rifle (20 min.)

Anite Productions, P.O. Box 375, Pinole, CA, videos under the following titles:

Deadly Force (100 min.)

Deadly Weapons (106 min.)

Deadly Effects (60 min.)

Dillon Productions, 8009 East Dillon's Way, Scottsdale, AZ. video:

Firestorm in the Desert - Machine Gun Magic (117 min.)

A & E Television Networks, 126 Fifth Avenue, New York, NY, video series:

The Story of the Gun, Vol. I-IV (50 min. each volume)

Magnum Research, Inc., 7110 University Avenue, N.E., Minneapolis, MN, video:

Desert Eagle Pistol and Friends (20 min.)

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E. MANUFACTURE OF MODERN AMMUNITION

1. For every assignment that follows, physically locate and examine the items mentioned where possible. To begin, refer to the AFTE Glossary and define the word "cartridge." Become familiar with other words and terms used and misused to refer to a unit of ammunition and discuss with your instructor.

_____	_____	_____
Trainee	Trainer	Date

2. Refer to the AFTE Glossary and reloading manuals. Identify and define the following words and terms with regard to cartridge case nomenclature/ manufacturing.

a) Cartridge case
b) Head
c) Headstamp
d) Bunter
e) Mouth
f) Web
g) Extractor groove
h) Shoulder
i) Neck
j) Primer pocket
k) Flash hole
l) Primer (types and sizes)
m) Cannelure

(Use Assignment #9 and Practical Exercise #1 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

3. Metallic cartridges are primarily constructed of brass and lead. Brass is an alloy of copper and zinc. Research and identify the percentage of each, copper and zinc, typically used to manufacture the following:

a) Bullet jacket
b) Cartridge case
c) Primer

_____	_____	_____
Trainee	Trainer	Date

4. Identify some common steel ammunition (cartridge cases, bullet jackets, and bullet cores) and their marketers. Record your findings by producing a list with headstamps and their associated marketers.

_____	_____	_____
Trainee	Trainer	Date

5. Military ammunitions often use color codes to identify bullet purpose and effect. Locate and examine three military ammunition color code charts and see how they may differ in this regard. Report some potential hazards when dealing with military ammunition in a laboratory.

_____	_____	_____
Trainee	Trainer	Date

6. Identify, define and assemble a collection of representative cartridges that best display these cartridge types. Discuss the significance of each with your instructor:
   a) Belted
   b) Bottleneck
   c) Rebated-rim
   d) Rimless
   e) Rimmed
   f) Semi-rimmed
   g) Centerfire
   h) Rimfire

(Use Assignment #9 and Practical Exercise #2 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

7. Identify the locations on each of the cartridges above where headspace in measured. Prepare a report, in your own words, to describe the measurable locations on each.

_____	_____	_____
Trainee	Trainer	Date

8. Define these words and terms. Be able to identify those areas on applicable bullets. Discuss with your Training Officer:

a) Meplat
b) Mold line/mold marks
c) Cannelure (types and purposes)
d) Ogive
e) Bearing surface
f) Diameter
g) Crimp
h) Core
i) Shank

(Use Assignment #9 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

9. Identify, define and assemble a collection of representative bullets that best displays each of the following bullet types. Discuss the purpose and effect of each bullet design with the Training Officer:

a) Full metal jacketed
b) Total metal jacketed
c) Jacketed round nose (Ball)
d) Semi-jacketed soft point
e) Hollow point
f) Jacketed hollow point
g) Wadcutter
h) Semi-wadcutter
i) Copper-coated lead
j) Brass-coated lead
k) Frangible
l) Truncated-nosed
m) Soft point
n) Nylon-coated lead
o) Nickel plated
p) Heel
q) Concave base
r) Lead round nose
s) Boattail
t) Spitzer

(Use Assignment #9 and Practical Exercise #3 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

10. Research commercial names and manufacturers for cartridges with unique bullet designs including but not limited to the following. Discuss with the Training Officer the problems involved with describing a fired bullet by the commercial name versus the bullet design.

a) Black Talon
b) Silvertip
c) Nyclad
d) Gold Dot
e) SXT
f) Golden Saber
g) Hydra-Shok
h) Lubaloy
i) RIP
j) Guard Dog

_____ _____ _____
Trainee Trainer Date

11. Research and list at least twenty cartridge commercial names and discuss why the designer/manufacturer may have chosen those names. For example: 30.06, 30-30, .308 Win, 40S&W, 38 SPL, 9mm Luger, .357 Magnum, 7.62 x39, .22 Long Rifle, etc. Reference the NRA Fact Book, Small Arms Ammunition, General Reference section.

_____ _____ _____
Trainee Trainer Date

12. Research and prepare a brief report describing the difference in composition between single base, double base and triple base smokeless powders.

_____ _____ _____
Trainee Trainer Date

13. Research and identify the purpose for various gunpowder grain shapes and coatings. Identify and list from slow burning to fast burning for each shape and discuss with your instructor.

(Use Practical Exercise #3 again to complete this objective.)

_____ _____ _____
Trainee Trainer Date

14. Identify and discuss with the Training Officer the difference between the measured caliber of a fired bullet and its inclusive caliber class of cartridges as listed in Table 8 of the AFTE Glossary.

_____	_____	_____
Trainee	Trainer	Date

15. Using a bullet puller and micrometer, measure and discuss the difference between the actual bullet caliber and casing length measured to its commercial cartridge name applicable to those measurements. Research why some cartridges are tapered. Prepare a list of at least five tapered cartridges by name, caliber and case length.

(Use Practical Exercise #4 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

16. Using magnification, examine each bullet pulled in the above assignment for any striated marks. Note the direction and depth of any striae and attempt to determine the cause. Discuss with the Training Officer what, if any, effect on firearm identification these striations may have when fired.

(Use Practical Exercise #3 again to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

17. Watch a variety of available ammunition manufacturing videos (in your lab library or online) and document the videos watched.

_____	_____	_____
Trainee	Trainer	Date

18. Based on previous tours/manufacturing videos outline the main steps in the modern manufacturing of each of the following:

a) Rimfire cartridges
b) Centerfire cartridges
c) Jacketed Bullets
d) Lead Bullets
e) Shotshells

_____ _____ _____
Trainee Trainer Date

19. From those ammunition manufacturing videos, assess the typical manufacturing procedures used to construct a cartridge. Identify those areas on new cartridges that may have manufacturing marks. Search AFTE Journal Articles for the key word "subclass" in relation to manufacturing marks on ammunition. Prepare a list of articles that specifically identify an area on cartridges where repeating manufacturing marks may be found.

_____ _____ _____
Trainee Trainer Date

20. Research and identify what is meant by the term "proof cartridge." Why is it different than a commercial cartridge? What is it used for? What authority governs the characteristics of a proof cartridge?

_____ _____ _____
Trainee Trainer Date

21. Identify the following words and terms with regard to the manufacture of lead bullets:

a) Swaging
b) Casting
c) Casting seam
d) Sprue
e) Cutter quill
f) Bullet sizing

(Use Assignment #9 to complete this objective.)

_____ _____ _____
Trainee Trainer Date

22. Research the typical terminology used when discussing shotgun ammunition. Use the AFTE Glossary to define and be able to identify shot shell nomenclature. Do not limit your research to only this list.

a) Shotshell
b) Battery cup
c) High brass
d) Low brass
e) Overpowder wad
f) Undershot wad
g) Overshot wad
h) Filler wad
i) Cup wad
j) Power Piston wad
k) Shot collar
l) Crimp
m) Shot size
n) Slug
o) Buckshot
p) Birdshot

(Use Assignment #9 and Practical Exercise #5 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

23. Research modern shot compositions, manufacturing methods, and preferred uses. Define and be able to explain the following words and terms.

a) Bliemeister method
b) Antimony
c) Arsenic, as related to shot
d) Chilled shot
e) "Rule of 17"
f) Dram equivalent
g) Bismuth shot
h) Tungsten shot

(Use Assignment #9 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

24. Prepare a list of common cartridge head stamps and identify their marketers. Research and group those marketers to further identify their past and present corporate owners. Discuss with the Training Officer why a cartridge head stamp may only represent the cartridge marketer and not necessarily the cartridge manufacturer.

_____	_____	_____
Trainee	Trainer	Date

25. Define and be able to explain the components of and differences between Berdan and Boxer primers. Research the differences in cartridge cases used with each and learn which can typically be reloaded and why.

(*Use Training Assignment #10 to complete this objective.*)

Trainee	Trainer	Date

26. Research and report the purpose and essential ingredients of priming mixtures used in modern cartridges. Include those that no longer use lead styphnate. Identify some ammunition manufacturers that employ lead free primers and compile a list of how they can be identified visually.

(*Use Training Assignment #10 to complete this objective.*)

Trainee	Trainer	Date

27. Define and discuss the difference between caliber and caliber family. Illustrate this difference by relating these terms to a discussion of the 22 caliber, 30 caliber and 38 caliber families of cartridges.

(*Use Training Assignment #10 and Practical Exercise #2 to complete this objective.*)

Trainee	Trainer	Date

28. If possible, visit at least one ammunition manufacturing facility such as Remington, Federal or Winchester. Observe the manufacture of the various components and the final assembly of rimfire and centerfire cartridges and shotshells. Take detailed notes of the manufacturing processes and generate a written report. Particular emphasis should be placed on the manufacture of pellets, bullets, shotshells, and cartridge cases and the steps involved in the assembly of cartridges and shotshells. Coordinate this visit with the Training Officer.

Trainee	Trainer	Date

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REFERENCE MATERIALS
MODERN AMMUNITION EVOLUTION AND MANUFACTURE

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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F. INSTRUMENTATION

1. Describe and differentiate between the following:

   a) Compound microscope
   b) Stereo microscope
   c) Comparison microscope

(*Use Training Assignment #30 to complete this objective.*)

Trainee	Trainer	Date

2. Study the instruction manuals for the various brands of stereo microscopes in the firearm section. If available, determine how to insert a reticle and conduct measurements.

(*Use Training Assignment #30 and Practical Exercise #7 to complete this objective.*)

Trainee	Trainer	Date

3. Familiarize yourself with the instruction manuals and the mechanical and optical aspects of the various makes/models of comparison microscopes in the firearm section. Note the differences and similarities of each, both mechanically and optically.

(*Use Training Assignment #30 and Practical Exercise #7 to complete this objective.*)

Trainee	Trainer	Date

4. Familiarize yourself with the following types of light sources that are used with comparison microscopes.

   a) Fluorescent
   b) Fiber optics (with and without filters)
   c) Light emitting diode (LED)

(***Use Training Assignment #30 and Practical Exercise #7 to complete this objective.***)

Trainee	Trainer	Date

5. Familiarize yourself with different types of light diffusers, both factory made and improvised. Discuss differences in quality and use with the Training Officer.

Use Training Assignment #30 and Practical Exercise #7 to complete this objective.

Trainee	Trainer	Date

6. If possible, use each of the light sources listed in Exercises 4 and 5 above with a stereo and comparison microscope. Observe the differences in the quality of each light source by examining specimens with various compositions to include: lead bullets, jacketed bullets, and cartridge cases. In addition, various types of substrates displaying impressed and striated tool marks, painted surfaces, fabric, paper, etc. should be evaluated. Vary the direction and if possible the intensity of the light sources. Repeat the exercise using a diffuser on at least one type of light source. Discuss this with the Training Officer.

(***Use Training Assignments #30 and #31 and Practical Exercises #7 and #8 to complete this objective.***)

Trainee	Trainer	Date

7. Familiarize yourself with a comparison microscope in the firearm and tool mark section and adjust the eyepieces and lighting. Become familiar with each of the objectives and the methods used to generate photomicrographs. Using each of the objective lenses, take photographs of the same object while varying the intensity and angle of the light sources. Calculate the magnification for each set of objective lenses on the comparison microscope.

(*Use Training Assignment #30 and Practical Exercise #7 to complete this objective.*)

_____	_____	_____
Trainee	Trainer	Date

8. Become familiar with and demonstrate the use of the following equipment, if available:

   a) Steel ruler
   b) Reticle in ocular lens of binocular microscope
   c) Balances and scales located in the firearm section
   d) Stage micrometer
   e) Digital (electronic) micrometer
   f) Non-digital and digital calipers
   g) Barrel/overall length measuring devices

(*Use Training Assignment #31 and Practical Exercise #8 to complete this objective.*)

_____	_____	_____
Trainee	Trainer	Date

9. Become familiar with and demonstrate use of the following equipment/software on the comparison microscope:

   a) Video camera (if applicable)
   b) Digital camera
   c) Digital photography software
   d) Other computer related equipment/software

_____	_____	_____
Trainee	Trainer	Date

10. Weigh bullets of varying calibers using a balance. Report results in both grams and grains.

Trainee	Trainer	Date

11. Become familiar with and demonstrate use of the following bullet recovery systems (if available):

    a) Water tank
    b) Cotton box
    c) Bullet trap
    d) Other systems available in laboratory

(*Use Training Assignment #39 to complete this objective*.)

Trainee	Trainer	Date

12. Become familiar with and demonstrate use of an inertia bullet puller.

Trainee	Trainer	Date

13. Become familiar with and demonstrate use of the following trigger pull devices (if available):

    a) Spring gauge
    b) Digital force gauge
    c) Standard trigger weights
    d) Trigger scan TriggerScan™

Trainee	Trainer	Date

14. Become familiar with the following tools (if available):

    a) Reloading press
    b) Chronograph
    c) Bore scope

Trainee	Trainer	Date

15. Become familiar with the preventative maintenance, performance and/or calibration checks (if applicable) required in your laboratory for the following:

    a) Stereoscope
    b) Comparison microscope
    c) Trigger pull devices
    d) Micrometers/calipers
    e) Chronograph
    f) Water tank
    g) Balance
    h) Rulers

Trainee	Trainer	Date

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REFERENCE MATERIALS
MICROSCOPY AND INSTRUMENTATION

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- to gain additional depth in particular subject areas.

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G. THEORY OF IDENTIFICATION AND RANGE OF CONCLUSIONS

1. Formulate answers to the following questions:

   a) Is the forensic science discipline of Firearm and Tool Mark Examination an art or a science?
   b) What are the types of conclusions that can be reached in Firearm and Tool Mark Examination comparisons?
   c) What is the basis for each of the above conclusions?
   d) Is it possible for experts in the Forensic Science discipline of Firearm and Tool Mark Examination to disagree regarding their conclusions? Why or why not?
   e) How does "probability" relate to Firearm and Tool Mark Examination?

   (*Use Training Assignment #2 to complete this objective.*)

_____	_____	_____
Trainee	Trainer	Date

2. Be able to describe the steps of the scientific method involved in the formation of a scientific theory.

_____	_____	_____
Trainee	Trainer	Date

3. Define the foundational premise of uniqueness behind the applied science of Tool Mark Identification. Include the following:

   a. Manufacturing processes
   b. Chip formation
   c. Working surfaces
   d. Tool wear
   e. Subclass characteristics

_____	_____	_____
Trainee	Trainer	Date

4. Read the following documents:
   a) AFTE Criteria for Identification Committee, “Theory of identification, range of striae comparison reports and modified glossary definitions”, AFTE Journal, 1992; 24(3): 336-340.
   b) AFTE Committee for the Advancement of the Science of Firearm and Toolmark Identification, “Theory of identification as it relates to toolmarks: revised,” AFTE Journal, 2011; 43(4):287.

Trainee	Trainer	Date

5. Discuss the AFTE Theory of Identification as it applies to impressed and striated tool marks, including Firearm Examination as a subset of Tool Mark Examination.

Trainee	Trainer	Date

6. With respect to the AFTE Theory of Identification, is a common source conclusion absolute? Why or why not? Discuss with the Training Officer.

Trainee	Trainer	Date

7. Formulate answers to the following questions:

   a) Is the forensic science discipline of Firearm and Tool Mark Examination an art or a science?
   b) What are the types of conclusions that can be reached in Firearm and Tool Mark Examination comparisons?
   c) What is the basis for each of the above conclusions?
   d) Is it possible for experts in the Forensic Science discipline of Firearm and Tool Mark Examination to disagree regarding their conclusions? Why or why not?
   e) How does "probability" relate to Firearm and Tool Mark Examination?

(Use Training Assignment #2 to complete this objective.)

Trainee	Trainer	Date

8. Be able to discuss the importance of studies involving consecutively manufactured tools/parts in relation to the validation of the AFTE Theory of Identification.

Trainee	Trainer	Date

9. Research and be able to discuss empirical and experimental studies of error rates in the field of Firearm and Tool Mark Identification.

Trainee	Trainer	Date

10. Define the following and discuss them in relation to examinations, observations and interpretations in relation to Firearm and Tool Mark Identification.
    a) Subjective
    b) Objective

Trainee	Trainer	Date

11. Define the following components of the AFTE Theory of Identification in your own words and discuss with the Training Officer:
    a) To what is “sufficient agreement” related?
    b) How is significance (with respect to “significant agreement”) determined?
    c) When is agreement deemed significant?
    d) What does “sufficient agreement” mean?

Trainee	Trainer	Date

12. Respond to the following critique of the AFTE Theory of Identification and discuss with the Training Officer.

"…the stated method [AFTE Theory of Identification] is circular. It declares that an examiner may state that two tool marks have a 'common origin' when their features are in 'sufficient agreement.' It then defines 'sufficient agreement' as occurring when the examiner considers it a 'practical impossibility' that the tool marks have different origins."

Trainee	Trainer	Date

13. Define the following conclusions within the AFTE Range of Conclusions in your own words and discuss with the Training Officer.
    a) Identification
    b) Elimination
    c) Inconclusive
    d) Unsuitable

Trainee	Trainer	Date

14. Research the issue of contextual and confirmation bias and respond to the following questions, discussing them with the Training Officer.
    a) Why is there a concern for the potential of contextual and confirmation bias, especially in the pattern matching disciplines?
    b) In what ways can examiners be influenced by bias?
    c) What are some of the precautions that can be taken to reduce bias?

Trainee	Trainer	Date

15. Be able to discuss how the AFTE Theory of Identification along with the Range of Conclusions provide a framework for structuring and articulating identification criteria and possible conclusions that may be reached.

Trainee	Trainer	Date

16. Research the concept of consecutive matching striations (CMS) and respond to the following questions, discussing them with your trainer.
    a) Define the concept of consecutive matching striations (CMS).
    b) For which type of tool marks can CMS be used?
    c) How do those who utilize CMS differentiate between two dimensional and three-dimensional tool marks?
    d) What is the minimum conservative quantitative criteria for three-dimensional striated tool marks?
    e) What is the minimum conservative quantitative criteria for two-dimensional striated tool marks?
    f) In what ways can the use of CMS and the minimum conservative quantitative criteria be used to bring a greater level of objectivity when identifying two tool marks as sharing a common source?

_____	_____	_____
Trainee	Trainer	Date

17. Research the range of conclusions used by the European Network of Forensic Science Institutes (ENFSI) and respond to the following questions, discussing them with your trainer.
    a) What is likelihood ratio?
    b) How are the range of conclusions used by ENFSI and the range of conclusions used by AFTE similar?
    c) How are the range of conclusions used by ENFSI and the range of conclusions used by AFTE different?

_____	_____	_____
Trainee	Trainer	Date

18. The AFTE Theory of Identification requires that in order to opine that two tool marks share a common source, the observed correspondence must exceed the best correspondence observed in tool marks from different sources and must be consistent with the range of correspondence expected in tool marks known to share the same source.

    Often individuals will describe the best-known non-match as when they compared tool marks from consecutively manufactured tools. It is important to know that while these are ***conditions*** under which the best-known non-match may be observed, this does not describe the best-known non-match. The best-known non-match must be described relative to the correspondence of marks observed in tool marks created by different tools.

Meanwhile, tool marks generated by the same tool can have a wide range of correspondence that extends from the level of correspondence observed in known non-matching conditions to almost perfect agreement.

To properly develop a personal criterion for identification, it is essential that the trainee not only examine and compare tool marks in known matching and known non-matching conditions but can articulate what the correspondence in those different conditions looks like. So, the remainder of the training with respect to the AFTE Range of Conclusions is in conjunction with the training involving the comparison of bullets, cartridge cases, shotshells and tool marks.

For ***each*** comparison of tool marks in a known matching condition, the trainee should be prepared to respond to the following:

a) Describe how the least amount of observed correspondence appeared.
b) Describe how the greatest amount of observed correspondence appeared.
c) Discuss the overall range of correspondence that was observed.
d) Discuss how the correspondence observed in this comparison compared with the range of correspondence in other known matching tool marks compared to this point.

For ***each*** comparison of tool marks in a known non-matching condition, the trainee should be prepared to respond to the following:

a) Describe how the best-known non-match correspondence appeared.
b) Discuss how the correspondence observed in this comparison compared with the correspondence observed in other known non-matching tool marks compared to this point.
c) Has your concept of the best-known non-match been adjusted?

_____	_____	_____
Trainee	Trainer	Date

19. After the different comparisons are completed, return to this section to respond to the following questions:
    a) What does your best-known non-match look like?
    b) What does the range of correspondence observed in known matching conditions look like?
    c) What is the certainty with which you can express opinions of common source?

Trainee	Trainer	Date

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REFERENCE MATERIALS
THEORY OF IDENTIFICATION AND RANGE OF CONCLUSIONS

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H. EXAMINATION OF FIREARMS

1. Using each type of firearm listed below, demonstrate how to render each in a safe condition, load and unload each using dummy ammunition, and safely handle each in a forensic environment.

    a) Single shot firearm
    b) Single action revolver
    c) Double action revolver
    d) Single action pistol
    e) Double action pistol
    f) Hybrid action pistol
    g) Manually operated rifle
    h) Semi-automatic rifle
    i) Automatic rifle
    j) Submachine gun
    k) Machine gun

2. Obtain Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS) for common brands of chemical reagents used during the examination of firearms in your laboratory. Review these documents and be familiar with the potential health hazards identified for each.

_____	_____	_____
Trainee	Trainer	Date

3. Examine the following types of magazines and identify their parts. Pay close attention to those areas that come into direct contact with ammunition. Determine the comparative value of marks left on cartridges by these magazines in firearms identification. Read related AFTE Journal Articles.

    a) Detachable box
    b) Drum
    c) Internal box
    d) Internal rotary
    e) Single stack
    f) Staggered column
    g) Tubular

_____	_____	_____
Trainee	Trainer	Date

4. Partially disassemble and reassemble the following revolvers (if available). Photograph and note the differences in their mechanisms. Identify the major parts by name and make appropriate notes.

a) Smith & Wesson double-action
b) Colt double-action
c) Ruger double-action
d) "Old style" Ruger single-action
e) "New style" Ruger single-action
f) Colt single-action

(*Use Training Assignment #15 to complete this objective.*)

Trainee	Trainer	Date

5. Field strip and reassemble the following pistols (if available). Photograph and note the differences in their mechanisms. Identify the major parts by name and make appropriate notes.

a) Browning Hi-Power
b) U.S. Pistol Model 1911A1
c) Steyr, GB
d) Glock Model 17
e) Beretta Model 92F
f) SIG-Sauer Model 226
g) Smith & Wesson Model 669
h) H&K P7
i) Desert Eagle
j) Walther P.38
k) Walther PPK
l) Arisaka Type 14
m) Luger P08
n) Hi-Point Model C9
o) Smith & Wesson Sigma

(*Use Training Assignments #16, #17, and #18 to complete this objective.*)

Trainee	Trainer	Date

6. Field strip and reassemble the following submachine guns (if available). Photograph and note the differences in their mechanisms. Identify the major parts by name and make appropriate notes.

a) RPB Industries, M10 (open & closed bolt)
b) SWD Inc. M11/Nine
c) Uzi
d) H&K MP5
e) US M3
f) Intratec TEC 9
g) Thompson

(*Use Training Assignment #19 to complete this objective.*)

_____ _____ _____
Trainee Trainer Date

7. Become familiar with the operation of each of the following firearms (if available). Photograph and note the differences in their mechanisms. Identify the major parts by name and make appropriate notes.

a) U.S. Rifle Model M1
b) U.S. Rifle Model M14
c) U.S. Rifle Model M16
d) Savage Model 99
e) Winchester Model 94
f) AK 47/74 and SKS
g) U.S. Rifle Model 1903

(*Use Training Assignments #21 and #22 to complete this objective.*)

_____ _____ _____
Trainee Trainer Date

8. Become familiar with the operation of each of the following shotguns (if available). Photograph and note the differences in their mechanisms. Identify the major parts by name and make appropriate notes.

a) Remington Model 870
b) Winchester Model 12
c) Ithaca Model 37
d) Browning Model A5
e) Remington Model 1100
f) Harrington & Richardson Topper Model 158
g) L.C. Smith, side-by-side double-barrel
h) Savage, Model 311, side-by-side double-barrel
i) Beretta, Silver Snipe, over-under double-barrel
j) Mossberg Model 500

(Use Training Assignment #23 and #24 to complete this objective.)

Trainee	Trainer	Date

9. Become familiar with the operation of each of the following 22 caliber firearms (if available). Photograph and note the differences in their mechanisms. Identify the major parts by name and make appropriate notes.

a) Browning Autoloading rifle
b) Winchester Model 62 rifle
c) Remington Model 582 rifle
d) Ruger Model 10/22 rifle
e) Ruger MKII pistol
f) Colt Woodsman pistol
g) Raven/Lorcin/Jennings pistol

(Use Training Assignment #25 to complete this objective.)

Trainee	Trainer	Date

10. Become familiar with the operation of each of the following 25 Auto pistols (if available). Photograph and note the differences in their mechanisms. Identify the major parts by name and make appropriate notes.

a) Raven Arms
b) Colt Jr.
c) Beretta
d) Bauer

(*Use Training Assignment #20 to complete this objective.*)

Trainee	Trainer	Date

11. Become familiar with the laboratory's firearm section range and safety rules. Demonstrate how to render firearms in a safe condition, handle and carry firearms in the laboratory, and safely test fire each of the different types of firearms.

(*Use Training Assignments #15, #16, #17, #18, #19, #20, #21, #22, #23, #24, and #25 to complete this objective.*)

Trainee	Trainer	Date

12. Detail how the following safety mechanisms function with emphasis on how the firing mechanisms are blocked, interrupted or otherwise stopped from operating:

a) Thumb
b) Grip
c) Magazine
d) Firing pin block
e) Transfer bar
f) Hammer block

(*Use Training Assignments #15 #16, #17, #18, #19, #20, #21, #22, #23, #24, #25, #26, #27, #28, and #29 and Practical Exercises #3, #4, #5, and #6 to complete this objective.*)

Trainee	Trainer	Date

13. Obtain a copy of and become familiar with your laboratory's firearm section standard operating procedures (technical procedures) for the examination of firearms.

Trainee	Trainer	Date

14. With the Training Officer, "detail strip" a variety of firearms and identify the trigger pull resistance factors (parts and springs) that contribute to the firearm's trigger pull weight measurement.

Trainee	Trainer	Date

15. Become familiar with your laboratory's policies and procedures regarding "measurement uncertainty" for trigger pull. If applicable, complete your laboratory's uncertainty of measurement training for trigger pull measurements. (This may be combined with #16 and #17 below.)

Trainee	Trainer	Date

16. Using trigger pull weights, spring gauges, digital force gauges, or other trigger pull equipment and your laboratory's trigger pull procedure, measure the trigger pull for a variety of firearms and record the results. If applicable, include your laboratory's uncertainty of measurement.
    a) Observe the range for both single action and double action trigger pull results measured for each chamber in the cylinder of a revolver.
    b) Research the manufacturer's trigger pull specifications for each model measured.
    c) Discuss with the Training Officer how and why manufacturer's specifications and actual measurements may differ.

Trainee	Trainer	Date

17. Determine the trigger pull on at least one semi-auto pistol, revolver (both double and single action), rifle, and shotgun, using various measuring methods and compare the results.

(Use Training Assignments #15 #16, #17, #18, #19, #20, #21, #22, #23, #24, #25, #26, #27, #28, and #29 and Practical Exercises #3, #4, #5, and #6 to complete this objective.)

Trainee	Trainer	Date

18. For each examination in the previous assignments, generate a report stating the conclusions you have reached based on the data collected. Use a standard format for the report as provided by the Training Officer.

Trainee	Trainer	Date

19. Discuss with the Training Officer the protocol to be used in determining whether a firearm can be made to fire without pulling the trigger.

(Use Training Assignments #15 #16, #17, #18, #19, #20, #21, #22, #23, #24, #25, #26, #27, #28, and #29 and Practical Exercises #3, #4, #5, and #6 to complete this objective.)

Trainee	Trainer	Date

20. Research, define, and/or determine the implications of the following terms as they relate to the safety of operating a firearm.

a) Excessive headspace
b) Barrel obstruction
c) Barrel bulge
d) Broken extractor
e) Push off
f) Trigger shoe
g) False half-cock
h) Slam-fire
i) Poor sear engagement
j) Defective safety
k) High primer
l) Rail splitting
m) Hairline cracks
n) Improper timing
o) Excessive pressure
p) Dented barrel
q) Jar-off
r) Hang fire/delayed fire
s) Dirty firearm
t) Loose-fitting parts
u) Broken/defective sear tip
v) Broken/defective sear notch
w) Subcaliber ammunition

(*Use Training Assignment #28 and Practical Exercise #5 to complete this objective.*)

Trainee	Trainer	Date

20a. Define the term “misfire”. Discuss with the Training Officer the causes of misfires, the actions to be taken in the event of a misfire, and when a firearm should be fired remotely.

Trainee	Trainer	Date

20b. Discuss with the Training Officer the use of a primed cartridge case/shotshells for testing the potential accidental/unintentional discharge of a firearm. Include the following in your notes:

a) Drop test and related problems
b) Jar off
c) Slam fire
d) Push off
e) Defective safety
f) False half cock
g) Broken parts
h) Loose fitting parts

Trainee	Trainer	Date

21. Discuss with the Training Officer how to test fire modified, damaged, or potentially unsafe firearms. Demonstrate using a safe firearm provided by the Training Officer.

(*Use Training Assignment #28 and Practical Exercise #5 to complete this objective.*)

Trainee	Trainer	Date

22. If possible, attend armorer training classes offered by various firearms manufacturers.

Trainee	Trainer	Date

23. Explore the possibility of restoring an inoperable firearm obtained in casework to an operable condition. Note the limitations and reservations which must be considered and discuss these with the Training Officer.

Trainee	Trainer	Date

24. Review and discuss the references in the firearm section library including: computer references, physical files, print media, and websites.

Trainee	Trainer	Date

25a. Visit websites for at least five major firearm manufacturers. Print out the available reference material and evaluate the value and limitations of the manufacturer's websites from a forensic perspective.

Trainee	Trainer	Date

25b. Visit the AFTE website and search the AFTE Journal Index to research a particular firearm.

Trainee	Trainer	Date

25c. Visit the current AFTE Recall/Safety Warning List on the AFTE website. Familiarize yourself with the structure of the list and the sources of the recalls and warnings.

Trainee	Trainer	Date

25d. Discuss with the Training Officer the significance of the following marks in the determination of the origin and/or source of a firearm or component.

a) Proof marks
b) Inspector marks
c) Factory numbers and markings
d) Serial numbers
e) Part numbers
f) Company logos

(Use Training Assignment #29 and Practical Exercise #6 to complete this objective.)

Trainee	Trainer	Date

26. Discuss the following topics with the Training Officer and become familiar with their uses and limitations:

a) Marking evidence firearms
b) Recognition, documentation, recovery, and retention of trace evidence from the bore of a firearm prior to test firing
c) Determining whether an evidence firearm has been "recently" fired
d) Determining the manufacturer of a firearm by examining a part from the firearm
e) Determining the manufacturer of a firearm from a photograph and comparing an evidence firearm to a photograph

(Use Training Assignment #29 and Practical Exercise #6 to complete this objective.)

Trainee	Trainer	Date

27. Investigate how to submit/store/examine evidence firearms when they have been recovered from water or are in a rusted condition. Become familiar with the methods, limitations, and reservations that must be considered when restoring these firearms to an operating condition in order to obtain test specimens.

Trainee	Trainer	Date

28. Discuss with the Training Officer how to examine a firearm to determine if it has been altered to fire full automatic. Examine a firearm that has been altered to fire full automatic (if available) and verbally report your findings.

Trainee	Trainer	Date

29. Discuss and document other types of trace evidence that may be present on a firearm when submitted. Discuss the laboratory's priority for processing evidence and the evidentiary potential of certain types of evidence over others when present.

a) Blood
b) Bone
c) Tissue
d) Glass
e) Bore residues
f) Cylinder halos
g) Hair
h) Fibers
i) Fingerprints
j) DNA
k) Paint
l) Impressions on breech block face

Trainee	Trainer	Date

30. Discuss with the Training Officer the following concerns regarding the security and tracking of firearms as physical evidence:

a) Marking of evidence and packaging
b) Chain of custody documentation
c) Proper packaging

Trainee	Trainer	Date

31. Review with the Training Officer your laboratory's firearm range safety guidelines, making sure to address the following:

a) Basic safety rules and guidelines for handling firearms
b) Receiving firearms from investigators
c) Secure storage of firearm upon receipt
d) Shipment and transportation of firearms
e) General preliminary examination procedures
f) Safety checks for all firearms
g) Test firing protocols and safety
h) Eye and ear protection
i) Bullet recovery tanks and traps
j) General range rules

Trainee	Trainer	Date

32. Using firearms provided by the Training Officer, generate images/photographs suitable for use in case documentation using the following equipment.
    a) Digital camera and lighting
    b) Computer, monitor, and printer

Trainee	Trainer	Date

33. Review with the Training Officer the firearm worksheet used for determining the functionality of firearms in the laboratory. Demonstrate the proper use of the worksheet using a firearm selected by the Training Officer.

Trainee	Trainer	Date

34. Discuss with the Training Officer the process of selecting the appropriate ammunition type for obtaining “known” or “test” specimens for a particular case or incident. Consider the possibility of cartridge interchangeability for both function testing and obtaining test specimens.

Trainee	Trainer	Date

35. Discuss with the Training Officer the procedure for indexing ammunition for orientation in the firearm and marking ammunition to record their sequence of firing. Make note of the action mode used for each test and if firing a revolver or derringer which chamber they were fired in.

Trainee	Trainer	Date

36. Become familiar with your laboratory’s policies and procedures regarding “measurement uncertainty” for overall and barrel length measurements. If applicable, complete your laboratory’s uncertainty of measurement training for overall and barrel length measurements. (This can be combined with #37 and #38 below.)

Trainee	Trainer	Date

37. Select five rifles/shotguns of differing lengths and measure the overall and barrel length using your laboratory's designated equipment and procedures. If applicable, include your laboratory's uncertainty of measurement. Research the manufacturer's specifications and measurements for each firearm. Discuss how and why manufacturer's specifications and actual measurements may differ.

Trainee	Trainer	Date

38. Select three pistols and three revolvers of differing lengths and measure the overall and barrel length using your laboratory's designated equipment and procedures. If applicable, include your laboratory's uncertainty of measurement. Research the manufacturer's specifications and measurements for each firearm. Discuss how and why manufacturer's specifications and actual measurements may differ.

Trainee	Trainer	Date

39. For each examination in the previous assignments, generate a report stating the conclusions you have reached based on the data collected. Use a standard format for the report as provided by the Training Officer.

Trainee	Trainer	Date

40. Examine a variety of firearms provided by the Training Officer using the laboratory's firearm worksheet. Test fire each using the different types of bullet recovery methods available in the laboratory. Properly obtain test specimens of fired bullets and cartridge cases and package them as you would in casework.

Trainee	Trainer	Date

41. Discuss with the Training Officer the uses and limitations of casting firearm parts in relation to casework. Using one of the previous firearms provided, cast both the barrel and the breechface using casting material available in the laboratory.

Trainee	Trainer	Date

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REFERENCE MATERIALS
EXAMINATION OF FIREARMS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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I. BULLET EXAMINATIONS AND COMPARISONS

1. Define class characteristics, subclass characteristics, and individual characteristics as they relate to the comparison of fired bullets.

_____	_____	_____
Trainee	Trainer	Date

2. Define what is meant by, or determine the significance of, the following words, terms or phrases as they relate to the examination and comparison of fired bullets. Discuss these with the Training Officer.

a) Slippage (skid marks)
b) Shaving
c) Obturation
d) Leading edge/trailing edge
e) Melting
f) Blow-by/gas cutting
g) Striation
h) Ogive
i) Bearing surface
j) General rifling characteristics
k) "Insufficient individual microscopic marks"
l) Corrosion
m) Leading
n) "Limited individual microscopic marks"
o) "Single-action" firing
p) "Double-action" firing
q) Knurled & grooved cannelures
r) Stab crimp
s) Boattail
t) Open base
u) Closed base
v) Recessed base
w) Skived tip/hollow point
x) Flared base
y) Trace evidence aspects (lacquers, sealants, painted tips, biological materials, paint, fibers, glass, etc.)

(*Use Training Assignment #32 to complete this objective*.)

_____	_____	_____
Trainee	Trainer	Date

3. Discuss the importance and limitations of each of the following as they relate to the examination and comparison of fired bullet/bullet fragments with the Training Officer:
    a) Weight
    b) Caliber
    c) Caliber type
    d) Manufacturer
    e) General rifling characteristics
    f) Pitch of rifling
    g) Depth of rifling
    h) Jacket construction/composition

(Use Training Assignment #33 and Practical Exercise #9 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

4. Obtain a copy of and become familiar with your laboratory's firearm section standard operating procedures (technical procedures) for the examination of fired bullets.

(Use Training Assignment #44 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

5. Review the AFTE Theory of Identification and AFTE Range of Conclusions. Determine what conclusions may be reached by the Firearm and Tool Mark Examiners from your laboratory in relation to bullet examinations and how conclusions are documented. Review conclusions in reports generated by examiners in the firearm section. Discuss these conclusions with the Training Officer.

_____	_____	_____
Trainee	Trainer	Date

6. Discuss the significance of trace evidence as it relates to the examination and comparison of fired bullets with the Training Officer.

Trainee	Trainer	Date

7. Discuss with the Training Officer how to “index” bullets for examination and comparison.

Trainee	Trainer	Date

8. Discuss lighting techniques as they relate to the comparison of fired bullets with the Training Officer. Demonstrate your proficiency in using these lighting techniques.

Trainee	Trainer	Date

9. If applicable, familiarize yourself with the laboratory Standard Ammunition File (SAF) or Ammunition Reference Collection. Learn how to search this file to determine the manufacturer of fired bullets. Demonstrate your proficiency in using this file to the Training Officer.

   Alternatively, examine different brands, styles, and calibers of ammunition available in your laboratory. Note the following about the bullets: composition, style, unique design features, and any manufacturing marks. Discuss these with the Training Officer.

   (*Use Training Assignment #33 and Practical Exercise #9 to complete this objective.*)

Trainee	Trainer	Date

10. If applicable, become familiar with the laboratory Known Specimen File (KSF) or Test Fire Reference Collection. Determine its location, composition, filing system, and uses as a reference file. Discuss this with the Training Officer.

(*Use Training Assignment #33 and Practical Exercise #9 to complete this objective.*)

Trainee	Trainer	Date

11. Become familiar with the AFTE General Rifling Characteristic (GRC) database.

Trainee	Trainer	Date

12. Become familiar with the FBI General Rifling Characteristic (GRC) database.

Trainee	Trainer	Date

13. Compile a list of possible firearms in a "no-gun case" using your laboratory procedures and a relevant GRC file. Demonstrate proficiency of use to the Training Officer.

(*Use Training Assignment #33 and Practical Exercise #9 to complete this objective.*)

Trainee	Trainer	Date

14. Using fired bullets and bullet fragments provided to you by the Training Officer, determine their caliber, caliber family, manufacturer, and general rifling characteristics. Using the KSF/Test Fire Reference Collection, SAF/Ammunition Reference Collection, and GRC files, generate a list of firearms that could have been used to fire these bullet/bullet fragments.

(*Use Training Assignment #34, #35 and Practical Exercises #8, #8a, and #10 to complete this objective.*)

Trainee	Trainer	Date

15. Determine the methods and techniques used to differentiate between lead bullets and bullet cores.

(*Use Training Assignment #42 and Practical Exercise #16*.)

Trainee	Trainer	Date

16. Determine the general rifling characteristics of two bullets fired from two different polygonally rifled barrels and produce a list of firearms that could have been used to fire each bullet using the GRC file.

(*Use Training Assignment #38 and Practical Exercise #13 to complete this objective*.)

Trainee	Trainer	Date

17. Become familiar with the ammunition storage areas and learn how to locate test ammunition. Discuss with the Training Officer the reasons for using substitute ammunition or downloading ammunition for test firing. Learn the proper procedure for downloading ammunition for test firing. Under the supervision of the Training Officer prepare and fire downloaded test ammunition.

(*Use Training Assignment #39 and Practical Exercise #14 to complete this objective*.)

Trainee	Trainer	Date

18. Microscopically compare bullets test fired from firearms with consecutively manufactured barrels. Observe the differences and similarities in the bullet stria and discuss this with the Training Officer.

(*Use Training Assignment #46 to complete this objective*.)

Trainee	Trainer	Date

19. Using the same .22 Long Rifle firearm, test fire two each of a variety of .22 Short, .22 Long, and .22 Long Rifle ammunition and compare the test fired bullets with each other. Be sure to include different brands and different bullet styles, such as lead, copper-coated lead, and brass-coated lead bullets. Discuss your observations with the Training Officer. Take appropriate photographs and notes.

(*Use Training Assignment #40 and Practical Exercise #15 to complete this objective.*)

Trainee	Trainer	Date

20. Using the same .357 Magnum revolver, test fire two each of a variety of .38 Special and .357 Magnum caliber ammunition and compare the test fired bullets with each other. Be sure to include different brands and different bullet styles, such as lead round nose, copper jacketed, Winchester brand Silvertip, and Federal brand Nyclad or Syntech. Discuss your observations with the Training Officer. Take appropriate photographs and notes.

(*Use Training Assignment #37 and Practical Exercise #12 to complete this objective.*)

Trainee	Trainer	Date

21. Using the same 9mm Luger pistol, test fire two each of a variety of 9mm Luger caliber ammunition and compare the test fired bullets with each other. Be sure to include different brands and different bullet styles, such as RIP brand, Federal brand Hydra-Shock, PMC brand Starfire, Winchester brand Silvertip and Ranger SXT, Federal brand Nyclad or Syntech, full metal jacketed, total metal jacketed, and frangible. Discuss your observations with the Training Officer. Take appropriate photographs and notes.

(*Use Training Assignment #36 and Practical Exercise #11 to complete this objective.*)

Trainee	Trainer	Date

22. Using a 22 caliber rifle, test fire and recover two test fired bullets and compare them with each other. Cut approximately three inches off of the muzzle of the barrel. Test fire and recover two additional test fired bullets using the same ammunition as above. Microscopically compare these bullets with each other and with the previously fired test fired bullets. Take appropriate photographs and notes. (Note: this exercise may be combined with #23 below.)

(*Use Training Assignment #43 to complete this objective.*)

Trainee	Trainer	Date

23. The AFTE Glossary defines bore slugging as "the process of driving a piece of lead through the bore of a rifled barrel…" Test fire a 22 caliber firearm and attempt to identify the bullets with each other. Using the same firearm, slug the barrel and compare the previously fired bullets with the lead bullet used to slug the barrel. Cut approximately three inches off of the muzzle end of the barrel and slug the barrel again. Compare the first set of slugged bullets to the subsequent slugged bullets. Discuss your observations with the Training Officer. (Note: this exercise may be combined with #22 above.)

(*Use Training Assignment #43 to complete this objective.*)

Trainee	Trainer	Date

24. Using a nominal 30 caliber rifle, test fire two each of a variety of ammunition and compare the test fired bullets with each other. Be sure to include jacketed soft point, copper jacketed, steel jacketed, and nickel plated bullets. Discuss your observations with the Training Officer. Take appropriate photographs and notes.

(*Use Training Assignment #45 to complete this objective.*)

Trainee	Trainer	Date

25. Using a .32 S&W revolver, test fire two each of .32 S&W and .32 Auto ammunition and compare the test fired bullets with each other. Discuss your observations with the Training Officer. Take appropriate photographs and notes.

(*Use Training Assignment #45 to complete this objective.*)

Trainee	Trainer	Date

26. Test fire three different polygonally rifled pistols, such as Glock, H&K, IMI, or Steyr, with two of the same cartridges. Compare the test fired bullets from each pistol with each other and with the test fires from the other pistols. Discuss your observations with the Training Officer. Take appropriate photographs and notes.

(*Use Training Assignment #45 to complete this objective.*)

Trainee	Trainer	Date

27. Discuss how potential subclass characteristics may be recognized and addressed during a microscopic bullet examination. Articulate the results using a photomicrograph representation of your findings.

Trainee	Trainer	Date

28. Compile a list of reasons why bullet identifications cannot be made in some cases, and why some barrels and bullets may preclude identifications. This list should include, but not be limited to, the results of the above exercises.

(*Use Training Assignment #43 to complete this objective.*)

Trainee	Trainer	Date

29. Discuss the significance of identifying manufacturing tool marks on a fired bullet from a shooting victim to those on unfired bullets from cartridges obtained from a suspect. Read the article in the April 1985 issue of the Crime Laboratory Digest concerning "*Manufacturing Toolmark Identification on the Base of Jacketed Bullets*." (Re-printed: Crum, R.A., "Manufacturing Toolmark Identification on the Base of Jacketed Bullets," 1987; 19(4):447-450).

(*Use Training Assignment #44 to complete this objective*.)

Trainee	Trainer	Date

30. Discuss the feasibility of determining caliber and/or general rifling characteristics from the examination of a bullet hole in metal.

(*Use Training Assignment #44 to complete this objective*.)

Trainee	Trainer	Date

31. Research Magnesium Smoking and determine when it could be of value in the examination and/or comparison of bullets. Ask the Training Officer if your firearm section has procedures and/or the materials needed to conduct Magnesium Smoking on bullets.

Trainee	Trainer	Date

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REFERENCE MATERIALS
BULLET EXAMINATIONS AND COMPARISONS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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J. CARTRIDGE/CARTRIDGE CASE EXAMINATIONS AND COMPARISONS

1. Define class characteristics, subclass characteristics, and individual characteristics as they relate to the comparison of cartridge cases.

Trainee	Trainer	Date

2. Determine the types of marks that may be left on a cartridge case or cartridge during chambering, extraction, and firing. View slow motion videos of firing sequences using semiautomatic firearms. Give examples of different class characteristics that are specific to particular firearms.

(*Use Training Assignment #47 to complete this objective.*)

Trainee	Trainer	Date

3. Obtain a copy of and become familiar with your laboratory's firearm section standard operating procedures (technical procedures) for the examination of cartridges and cartridge cases.

(*Use Training Assignment #47 to complete this objective.*)

Trainee	Trainer	Date

4. Read the following article from the spring 2001 issue of the AFTE Journal and discuss manufacturing marks with the Training Officer.
   a) "Overview of Manufacturing Marks on Center Fire Cartridges"

(*Use Training Assignment #47 to complete this objective.*)

Trainee	Trainer	Date

5. Review the AFTE Theory of Identification and Range of Conclusions. Determine what conclusions may be reached by the Firearm and Tool Mark Examiners from your laboratory in relation to cartridge case examinations and how conclusions are documented. Review conclusions in reports generated by examiners in the firearm section. Discuss these conclusions with the Training Officer.

Trainee	Trainer	Date

6. Determine the significance of trace evidence as it relates to the examination and comparison of cartridge cases. Discuss this with the Training Officer.

Trainee	Trainer	Date

7. Discuss with the Training Officer how to “index” cartridge cases for comparisons.

Trainee	Trainer	Date

8. Discuss lighting techniques as they relate to the comparison of fired cartridge cases with the Training Officer. Demonstrate your proficiency in using these lighting techniques.

Trainee	Trainer	Date

9. Test fire a variety of firearms spanning multiple makes, models, and calibers at least twice each. Be sure to include both centerfire and rimfire calibers. Examine markings imparted to the fired cartridge cases. Determine which part of the firearm produced these markings. Cycle at least two cartridges through each of the same firearms and examine the markings imparted to the unfired cartridges. Determine which part of the firearm produced these markings. This exercise may require the firearms to be field stripped or further disassembled to assess locations imparting markings.

(*Use Training Assignment #48 to complete this objective.*)

Trainee	Trainer	Date

10. Using the test fired cartridge cases and cartridges from Exercise 2, microscopically compare all markings to each other. Include the comparison of firing pin impressions, firing pin drag marks, breech face marks, chamber marks, anvil marks, extractor marks, ejector marks, feed ramp marks, slide drag marks, slide scuff marks, ejection port marks and magazine marks. Photograph the results of your comparisons.

(*Use Training Assignment #48 to complete this objective.*)

Trainee	Trainer	Date

11. Test fire .38 Special, .357 Magnum, 9mm Luger, and .22 Long Rifle revolvers and pistols at least twice using CCI, Remington, Federal, and Winchester ammunition with both nickel and brass primers. Microscopically examine and photograph the markings.

(*Use Training Assignment #49 to complete this objective.*)

Trainee	Trainer	Date

12. Test fire a .22 Long Rifle Smith & Wesson revolver using six 22 Long Rifle cartridges, six 22 Long cartridges, and six 22 Short cartridges by the same manufacturer. Mark each cartridge to signify which chamber of the cylinder it was fired in. Examine and photograph the markings imparted to the fired cartridge cases.

(*Use Training Assignment #50 to complete this exercise.*)

Trainee	Trainer	Date

13. Become familiar with the AFTE Class Characteristics Matrix database.

Trainee	Trainer	Date

14. Discuss the possibility of comparing and identifying reloading marks on cartridges/cartridge cases. Identify the various types of marks that may be indicative of reloaded ammunition. Become familiar with commonly used reloading equipment and the procedures used in reloading cartridges. If possible, reload several cartridges and compare any reloading marks observed.

(*Use Training Assignment #51 to complete this objective.*)

Trainee	Trainer	Date

15. Discuss the feasibility of comparing and identifying manufacturing tool marks such as bunter marks on a fired cartridge case from a crime scene with cartridges associated with a suspect. Identify the various types of manufacturing tool marks that may be present on cartridges or cartridge cases.

(*Use Training Assignment #51 to complete this objective.*)

Trainee	Trainer	Date

16. Test fire at least two cartridges from a .30 Carbine U.S., M1 Carbine rifle (if available) and compare all marks on the test fired cartridge cases to each other. Cycle at least two cartridges from this same firearm and compare all marks observed.

(*Use Training Assignment #52 to complete this objective.*)

Trainee	Trainer	Date

17. Compare test fires from various firearms prior to and after the breech and bore are cleaned.

(*Use Training Assignment #53 to complete this objective.*)

Trainee	Trainer	Date

18. Perform a series of examinations in a mock ongoing investigation that incorporates bullets, cartridge cases, firearms and the use of a comparison microscope.

(*Use Practical Exercises #18, 19, 21A or 21B, 22A or 22B, & 25A or 25B to complete this objective.*)

Trainee	Trainer	Date

19. Determine when Magnesium Smoking would be of value in examination and/or comparison of cartridge cases. Ask the Training Officer if your firearm section has procedures and/or the materials needed to conduct Magnesium Smoking on cartridge cases.

Trainee	Trainer	Date

20. Compare test fired cartridge cases from firearms with consecutively manufactured breech faces and/or firing pins. Observe the differences and similarities in the stria and discuss this with the Training Officer.

Trainee	Trainer	Date

21. Compile a list of common headstamps. Familiarize yourself with the AFTE Headstamp Gallery and commercially available headstamp guides. Discuss these with the Training Officer.

Trainee	Trainer	Date

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REFERENCE MATERIALS
CARTRIDGE AND CARTRIDGE CASE EXAMINATIONS AND COMPARISONS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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K. SHOTSHELL AND SHOTSHELL COMPONENT EXAMINATIONS AND COMPARISONS

1. Determine what types of examinations may be conducted and what conclusions can be reached from an examination of the following components.

    a) Shot, deformed and intact
    b) Fired cardboard, felt or fiber wads
    c) Fired plastic wads
    d) Fired shotshells
    e) Unfired shotshells
    f) Shot buffer material
    g) Shot collar and shot cup

    (*Use Training Assignment #55 and Practical Exercise #17 to complete this objective.*)

_____	_____	_____
Trainee	Trainer	Date

2. Become familiar with the use of the Standard Ammunition File (SAF) or laboratory ammunition reference collection regarding the determination of gauge and manufacturer of fired shotshell components. Learn the limitations regarding making such determinations. Demonstrate proficiency in using the SAF or your laboratory's ammunition reference collection to the Training Officer.

    (*Use Training Assignment #54 to complete this objective.*)

_____	_____	_____
Trainee	Trainer	Date

3. Test fire one or more sawed off shotguns using various types of ammunition with different wad designs to include Remington shotshells with Power Piston wads. Alternately, obtain test fired shotshell wads from a shotgun with a barrel that was sawed off with a hacksaw or similar tool. Microscopically compare marks observed on the test shotshell wads.

    (*Use Training Assignment #58 to complete this objective.*)

_____	_____	_____
Trainee	Trainer	Date

4. Test fire the following 12 Gauge shotguns or similar models using at least two shotshells from each shotgun. Microscopically compare the marks imparted to these fired shotshells to include the following types of marks: firing pin impressions, breech face marks (on primer, battery cup, and head), extractor marks, ejector marks, chamber marks, shell stop marks and any other mechanism marks. Photograph these marks and discuss the significance of identifying any of these types of marks with the Training Officer.

    a) Marlin Model 55 bolt action
    b) Remington Model 1100 semi-automatic
    c) Mossberg Model 500 pump action
    d) J.C. Higgins Model 1011 top-break single shot
    e) Stevens Model 311 side-by-side double barrel

(*Use Training Assignment #56 to complete this objective*.)

Trainee	Trainer	Date

5. Cycle three shotshells with a pump action 12 gauge shotgun. Microscopically compare the markings observed and determine whether the extractor, ejector, and any other marks are identifiable.

Trainee	Trainer	Date

6. Discuss with the Training Officer procedures for “sampling” when doing examinations of shotshell pellets.

Trainee	Trainer	Date

7. Using a 12 gauge Remington, Model 1100 shotgun, obtain at least two test fired shotshells with each of the following types of ammunition. Recover a representative number of fired shot pellets and fired shot wads from each type of ammunition. Compare marks observed on the test fired shotshells to each other. Compare fired components to unfired components of the same ammunition type. Discuss the significance of your findings with the Training Officer.

   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 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 Shotshot

   (***Use Training Assignment #57 to complete this exercise.***)

_____	_____	_____
Trainee	Trainer	Date

8. Discuss in detail the procedures used in reloading shotshells and become familiar with commonly used shotshell reloading equipment. Determine how to recognize reloaded shotshells from an examination of the fired shotshell and/or its components. Reload shotshells (if possible) or obtain reloaded shotshells and examine them for reloading marks.

   (***Use Training Assignment #59 to complete this objective.***)

_____	_____	_____
Trainee	Trainer	Date

9. Research the current U.S. shot sizes and weights and obtain a chart reflecting this data. Become familiar with the variations worldwide in shot size and composition. Learn the significance of the “Rule of 17" as it applies to shot size.

   (***Use Training Assignment #54 to complete this objective.***)

_____	_____	_____
Trainee	Trainer	Date

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REFERENCE MATERIALS
SHOTSHELL AND FIRED SHOTSHELL EXAMINATIONS AND COMPARISONS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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L. GUNSHOT RESIDUE EXAMINATIONS, DISTANCE DETERMINATIONS, SHOOTING SCENE RECONSTRUCTION

1. Describe the residues and debris that are projected from the muzzle of a firearm (or the cylinder gap of a revolver) when a cartridge is fired. Pay particular attention to the relative distance the different residues/materials travel.

_____	_____	_____
Trainee	Trainer	Date

2. Describe the following tests and methods. Include the specific circumstances in which each could be useful.

   a) Conventional Modified Griess test
   b) Reverse Griess test
   c) Sodium Rhodizonate test
   d) Bashinski transfer
   e) Blotting transfer
   f) Dithiooxamide test
   g) 2-Nitroso-1-Naphthol test
   h) Quantofix® test
   i) Diphenylamine test

_____	_____	_____
Trainee	Trainer	Date

3. Describe in detail the chemical reactions that take place in the burning of smokeless powder, the modified Griess test, and other tests from the above list as applicable in your laboratory.

(Use Training Assignment #60 to complete this objective.)

_____	_____	_____
Trainee	Trainer	Date

4. If applicable, prepare the chemicals and the test papers used in the following tests under the direction of the Training Officer (review the relevant Safety Data Sheets (SDS) before preparing reagents):

   a) Modified Griess test
   b) Sodium Rhodizonate test
   c) Dithiooxamide (DTO) test

(*Use Training Assignment #60 to complete this objective.*)

Trainee	Trainer	Date

5. Discuss with the Training Officer the interpretation and reporting of shot pattern distance determination testing results. Include in your discussion:

   a) The limitations of testing procedures
   b) The importance of using the same shotshells and firearm
   c) The behavior of buffers, wads, and shot cups
   d) The definition of and how to evaluate “flyers” on evidence or test materials

Trainee	Trainer	Date

6. Discuss with the Training Officer the interpretation and reporting of gunshot residue (GSR) distance determination testing results. Include in your discussion the limitations of testing procedures, importance of using the same ammunition and firearm, importance of test target material selection, and the difficulties of interpreting the distance based on the absence of GSR around a bullet hole.

Trainee	Trainer	Date

7. Successfully complete a GSR/distance determination class or workshop (if available). Coordinate this with the Training Officer.

(*Use Training Assignment #41 to complete this objective.*)

Trainee	Trainer	Date

8. Read the article entitled "Graphical Analysis of the Shotgun/Shotshell Performance Envelope in the Distance Determination Cases" in the AFTE Journal, October 1989 issue. Discuss this article with the Training Officer.

Trainee	Trainer	Date

9. Research and discuss the potential effects of the following on GSR testing and distance determinations:

a) Chokes
b) Barrel length
c) Rifled vs. smooth barrels
d) Intervening objects
e) Bloody garments
f) Effects of weather
g) Ammunition related phenomena
h) Use of different test panel materials
i) Use of different test papers for chemical testing

Trainee	Trainer	Date

10. Describe the use of infrared imaging techniques related to the visualization of GSR around bullet holes on dark fabrics. If available, use infrared imaging to document a GSR pattern on a dark garment. Discuss the advantages and disadvantages of the infrared imaging of GSR with the Training Officer.

Trainee	Trainer	Date

11. If possible, attend an autopsy or examine photographs/reports of shooting victim(s). Observe and note any indications of GSR, as well as the physical effects of projectile(s) on the body. Prepare a report on your observations and include any information obtained concerning distance determination, bullet effects, cause of death, direction of bullet travel, or other pertinent information.

Trainee	Trainer	Date

12. If applicable, demonstrate your proficiency in conducting the following tests and methods using your firearm section's procedures:

    a) Conventional Modified Griess test
    b) Reverse Griess test
    c) Sodium Rhodizonate test
    d) Bashinski transfer
    e) Blotting transfer
    f) Dithiooxamide test
    g) 2-Nitroso-1-Naphthol Test
    h) Quantofix test
    i) Diphenylamine test

_____	_____	_____
Trainee	Trainer	Date

13. Using specimens provided by the Training Officer, demonstrate proficiency in conducting "muzzle-to-target" distance determinations. Include note taking, test firing to produce test patterns, microscopic and chemical examinations, and accurately determining "muzzle-to-target" distances. Consideration should be made regarding the orientation of the firearm, various sources of GSR, and patterns of GSR (e.g., muzzle orthogonal vs. muzzle oblique, flash suppressors, sound suppressors, and revolver cylinder gap).

_____	_____	_____
Trainee	Trainer	Date

14. Discuss your laboratory's protocol regarding the potential value and limitations of cartridge case ejection pattern testing with the Training Officer.

_____	_____	_____
Trainee	Trainer	Date

15. Discuss and define the following words, terms and tools as they relate to shooting incident reconstruction:

a) Angle of departure
b) Angle of incidence
c) Ricochet angle
d) Deflection
e) Penetration
f) Perforation
g) Azimuth angle
h) Ballistic coefficient
i) Bow effect
j) Bullet wipe
k) Chisum trail
l) Cone fracture
m) Critical angle
n) Inclinometer
o) Zero-edge protractor
p) Plumb bob
q) Keyhole
r) Laminated glass
s) Tempered glass
t) Plate glass
u) Trajectory
v) Vertical angle/angle of elevation

Trainee	Trainer	Date

16. Conduct a series of examinations in a mock ongoing investigation that incorporate bullets, cartridge cases, firearms, distance determinations and use of a comparison microscope.

(Use Practical Exercises #23A or 23B & 24A or 24B to complete this objective.)

Trainee	Trainer	Date

17. If possible, attend a shooting incident reconstruction course and generate a written summary of the course. Emphasize your understanding of the available forensic capabilities and limitations concerning shooting incident reconstruction. If applicable, discuss your agency's specific procedures for shooting incident reconstruction with the Training Officer.

Trainee	Trainer	Date

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REFERENCE MATERIALS

TERMINAL BALLISTICS: GUNSHOT RESIDUES, SHOT PATTERNS, DISTANCE DETERMINATIONS, BULLET PATH ANALYSES, AND WOUND EFFECTS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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M. TOOL MARK/FRACTURE MATCH EXAMINATIONS AND COMPARISONS

1. Review the section entitled "Manufacture of Modern Firearms." (Section D) The machining methods described represent the same basis for tool mark identification as for firearm examination. Discuss with the Training Officer.

(*Use Training Assignment #64 to complete this objective.*)

Trainee	Trainer	Date

2. Define terms "tool" and "tool mark identification". Determine the range of conclusions that may be reached in tool mark identification and discuss the definitions and range of conclusions in detail with the Training Officer.

(*Use Training Assignment #64 to complete this objective.*)

Trainee	Trainer	Date

3. Discuss the significance of examining submitted tools first for trace evidence. List several types of trace evidence that may be encountered. Discuss with the Training Officer the potential evidentiary value of trace evidence observed on tools or evidence displaying tool marks, and the prioritization they should receive in forensic examinations.

(*Use Training Assignment #64 to complete this objective.*)

Trainee	Trainer	Date

4. In a case involving a tool mark examination where no tool is submitted, determine the types of conclusions that may be reached. Consider the type of tool, size of the tool, and the action employed by tool. Consider how the quality of the tool mark may impact the comparison results. By examining the tool mark, note any unusual tool characteristics or features. Discuss a "no tool" case with the Training Officer.

(*Use Training Assignment #64 to complete this objective.*)

Trainee	Trainer	Date

5. Define the following word/terms as they relate to tool mark examinations and give three examples of tools or maneuvers that could produce each category:
    a) Shearing action
    b) Pinching action
    c) Scraping action
    d) Slicing action
    e) Gripping action
    f) Prying action
    g) Crimping action
    h) Impressed tool mark
    i) Striated tool mark
    j) Fracture

(*Use Training Assignment #65 to complete this objective.*)

Trainee	Trainer	Date

6. Define "class characteristics" as it applies to tool mark identification. Considering the types of tool and tool actions from the exercises above, describe their respective class characteristics in detail.

Trainee	Trainer	Date

7. Obtain at least two tools representative of each tool action category listed in #5 above. Produce tool marks with each tool and determine the class characteristics of the tool marks. When generating tool marks, vary the angle and force applied with each tool. Evaluate and identify the working surface of each tool and potential for individual characteristics.

(*Use Training Assignment #65 to complete this objective.*)

Trainee	Trainer	Date

8. Discuss how subclass characteristics apply to the manufacture of different mechanical tools, what they might look like, and how they might affect comparisons.

Trainee	Trainer	Date

9. Using soft copper wire and lead wire with diameters of approximately 1/4-inches, make cuts with tools that employ a shearing, pinching and slicing action. Compare and attempt to identify the tool marks on the copper wire with those on the lead wire for each tool used. Support your conclusions with photographs and note any lighting considerations due to the reflective properties and color differences of the copper and lead wire.

Trainee	Trainer	Date

10. Select two flat-bladed tools such as a screwdriver and a pry bar. Make both impressed and striated marks on a piece of copper or brass sheeting, and on a piece of lead sheeting for each tool. Microscopically compare the tool marks on the brass or copper sheeting with the test marks in the lead sheeting. Attempt to identify the appropriate tool marks to the appropriate tools. Photograph your comparisons and document differences observed in the quality of the tool marks made by each tool.

Trainee	Trainer	Date

11. Discuss why the orientation of the tool might be important when making test marks. Using a flat-bladed screwdriver, produce striated test marks at varying 10 degree angles. Microscopically compare the test marks to each other and discuss your observations. Explain why the orientation of a tool may or may not be important for other types of tools.

Trainee	Trainer	Date

12. Obtain a doorknob that may be used to make test tool marks. Have the Training Officer produce impressed and striated marks with a tool that has a serrated jaw working surface to simulate a “break-in”. With the same tool, produce test marks in lead attempting to reproduce the marks using a similar tool pressure and orientation. Microscopically compare and attempt to identify the tool marks on the doorknob to those on the lead material.

_____	_____	_____
Trainee	Trainer	Date

13. Using a drive pin punch, produce impressions in a piece of brass sheeting and in a piece of lead sheeting. Compare and attempt to identify the tool marks on the two types of sheeting. Document your conclusions using photographs.

_____	_____	_____
Trainee	Trainer	Date

14. Using an ax blade with numerous defects intercompare and attempt to identify cuts made to a piece of seasoned wood, such as dowel rod. Ensure that your cuts are consistent with respect to the orientation of the ax to the wood and the direction of the grain. Document your conclusions with photographs.

_____	_____	_____
Trainee	Trainer	Date

15. Using the same ax as in exercise 16 above, make cuts in a section of large-diameter telephone cable. Examine the effects the slicing action has on multi-stranded cable. Note the quality and quantity of the microscopic marks on each wire strand, and the challenges involved in this type of comparison. Photograph the sliced end of the cable.

_____	_____	_____
Trainee	Trainer	Date

16. Describe the class characteristics of tool marks made by single versus double edged knives. Using a fixed blade knife, make multiple cuts and stabs into the sidewall of a used tire. Intercompare and attempt to identify the tool marks produced by the knife and document your conclusions with photographs and notes. Discuss with the Training Officer how the results of your examinations might be altered if the knife had been sharpened or used for an extended period of time between a questioned and a test cut.

Trainee	Trainer	Date

17. Discuss why saws, files and abrasive tools cannot be identified to the tool marks they produce when used conventionally. Cite any exceptions to this rule.

Trainee	Trainer	Date

18. Examine sets of tool marks produced by varying numbers of sandpaper grit on cut sections of film. To produce a known set: rub a piece of sandpaper lengthwise across a short piece of film to produce linear two-dimensional striated tool marks. Cut the piece of film in half and mark each half with grit and test number. Intercompare known matches and known non-matches and document total consecutive line count for each.

Trainee	Trainer	Date

19. Examine objects that may have been in contact with each other for an extended period of time (e.g.: a gun and a leather holster or a piece of metal and rust marks on concrete). Research several cases of this type and set these out in your notes. Discuss the value and limitations of this type of evidence.

(*Use Training Assignment #64 to complete this objective.*)

Trainee	Trainer	Date

20. Discuss with the Training Officer the difference between a metal rod fracturing under tension and a metal rod fracturing under torsion.

Trainee	Trainer	Date

21. Discuss with the Training Officer the different types and colors of casting material available. Demonstrate proficiency in making tool mark casts and discuss the advantages or disadvantages of different types and colors over another.

(*Use Training Assignment #64 to complete this objective*.)

Trainee	Trainer	Date

22. Learn the technique of reverse lighting. Obtain a piece of brittle material such as Plexiglass or pot metal and fracture it into two fragments. Compare the two fragments and attempt to identify them as having once been a single object. Document your conclusions with notes and photographs.

Trainee	Trainer	Date

23. Discuss how you would report the various range of conclusions possible on a tool mark examination.

Trainee	Trainer	Date

24. Perform a series of inter-comparisons between two known matches and two known non-matches of test standards for each of the tool classes. Document your observations.

Trainee	Trainer	Date

25. Discuss the term “fracture match” and describe what types of material this term might apply to. Discuss the various types of marks that may be observed on different materials in relation to a fracture match. Discuss how the range of results of a fracture match comparison would be reported.

Trainee	Trainer	Date

26. Describe other types of tool mark exams that may be encountered such as locks and keys, staplers, etc.

Trainee	Trainer	Date

27. Conduct examinations of tool mark evidence submitted from crime scenes that are part of a simulated “ongoing investigation”.

(*Use Practical Exercise #20 to complete this objective*.)

Trainee	Trainer	Date

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REFERENCE MATERIALS
TOOL MARK EXAMINATIONS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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N. SERIAL NUMBER RESTORATION

1. Read the Handbook of Methods for the Restoration of Obliterated Serial Numbers, by Treptow. Be prepared to discuss the theory behind serial number restoration.

(*Use Training Assignment #61 to complete this objective.*)

Trainee	Trainer	Date

2. Define in your notebook “serial number” and “serial number restoration”.

(*Use Training Assignment #61 to complete this objective.*)

Trainee	Trainer	Date

3. Obtain a stamped piece of metal from the Training Officer and sketch the entire stressed area above and below the indented marks. Describe what remains when the indented area is removed.

(*Use Training Assignment #61 to complete this objective.*)

Trainee	Trainer	Date

4. List the various methods used by manufacturers to mark products we commonly encounter as evidence items. This list should include but not be restricted to: casting, stamping, embossing, debossing, coining, vibratory pencil, pin stamping, laser and electrical discharge machining.
   a) Discuss with the Training Officer the effect each of these marking methods has on the subsurface of the marked area.
   b) Discuss with the Training Officer the marking methods used that can directly affect the ability of the examiner to restore obliterated markings and why.

(*Use Training Assignment #61 to complete this objective.*)

Trainee	Trainer	Date

5. Define the term "plastic deformation" of metal.

(*Use Training Assignment #61 to complete this objective.*)

Trainee	Trainer	Date

6. Briefly discuss with the Training Officer the difference between cold rolled steel and cast iron metal.

(*Use Training Assignment #61 to complete this objective.*)

Trainee	Trainer	Date

7. Discuss with the Training Officer the effect that the following types of alterations may have on the subsurface of marked items and how it may impact an examiner's results.

a) Grinding
b) Over stamping
c) Peening
d) Gouging
e) Heating
f) Puddling
g) Welding
h) Removal
i) Scratching/filing
j) Drilling
k) Painting
l) Combinations of the above

(*Use Training Assignment #61 to complete this objective.*)

Trainee	Trainer	Date

8. Discuss the selection of a specific approach to a restoration attempt based on distinct characteristics observed for various alteration methods.

(*Use Training Assignment #62 to complete this objective.*)

Trainee	Trainer	Date

9. Discuss various methods of surface preparation, such as sanding and polishing, and how they may affect the results in a restoration attempt.

(*Use Training Assignment #62 to complete this objective.*)

Trainee	Trainer	Date

10. Discuss with the Training Officer the use of various types of chemicals to restore serial numbers.

(*Use Training Assignment #62 to complete this objective.*)

Trainee	Trainer	Date

11. Determine whether the reaction rate of the stressed area is faster or slower than the etching rate of the remaining surface and explain why.

(*Use Training Assignment #62 to complete this objective.*)

Trainee	Trainer	Date

12. Discuss with the Training Officer the technique known as Magnetic Particle Inspection (MPI) and why the method is nondestructive. Explain what types of firearms this method may be used on.

(Use Training Assignment #62 to complete this objective.)

Trainee	Trainer	Date

13. Discuss with the Training Officer the restoration methods of an obliterated Barcode 39 serial number using chemical processing, manual decryption and automatic decoding.

Trainee	Trainer	Date

14. Research relevant peer reviewed journals to determine the best techniques to use in the restoration of obliterated serial numbers in plastic.

Trainee	Trainer	Date

15. Research the effect of direct current (DC) electricity on the reaction time of the different chemical reagents available. Include the proper polarity and voltage for enhanced etching/development of obliterated characters and conduct restorations using this method.

Trainee	Trainer	Date

16. Discuss with the Training Officer any additional equipment that might be used for serial number restoration.

(Use Training Assignment #62 to complete this objective.)

Trainee	Trainer	Date

17. Discuss with the Training Officer the different types of lighting available (e.g., incandescent, infrared (IR), ultraviolet (UV), and fluorescent) and how they may improve or enhance restoration results. Be prepared to explain how the angle of incidence of these lighting techniques might vary the results.

(Use Training Assignment #62 to complete this objective.)

Trainee	Trainer	Date

18. Discuss with the Training Officer the appropriate documentation, photography techniques and procedures to be used before, during, and after attempting to restore obliterated serial numbers.

(Use Training Assignment #62 to complete this objective.)

Trainee	Trainer	Date

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

(*Use Training Assignment #62 to complete this objective.*)

Trainee	Trainer	Date

20. Become familiar with the following chemicals:

a) $CuNH_4Cl_2$
b) $CuCl_2$
c) NaOH
d) HCl
e) HNO_3
f) H_3PO_4
g) Aqua Regia
h) H_2SO_4
i) $FeCl_3$
j) HF

(*Use Training Assignment #62 to complete this objective.*)

Trainee	Trainer	Date

21. Obtain the proper personal protective equipment (e.g. eyewear, masks, gloves, and lab coats) before attempting any chemical/mechanical restorations. Review the chemical hygiene policies to ensure proper safety precautions are used.

Trainee	Trainer	Date

22. Record in your notebook how to prepare each of these reagents/solutions (include any other reagents/solutions utilized in your laboratory) as well as what types of metal they should be used on:

a) Fry's reagent
b) Ferric chloride solution
c) Turner's reagent
d) Davis' reagent
e) Acidic ferric chloride solution
f) Nitric acid 25% solution
g) Sodium hydroxide 10% solution

(*Use Training Assignment #63 to complete this objective.*)

Trainee	Trainer	Date

23. Become familiar with the numbering systems and methods used by manufacturers of frequently encountered firearms including, but not limited to, Colt, Ruger, Smith & Wesson, Glock, Hi-Point, Beretta, Winchester and Remington.

(*Use Training Assignment #63 to complete this objective.*)

Trainee	Trainer	Date

24. Determine the most suitable chemicals and techniques to use in an attempted serial number restoration for the following firearms:

a) Colt pistol
b) Smith & Wesson revolver
c) RG Industries revolver
d) Ruger stainless steel revolver
e) Shotgun alloy receiver
f) Chrome/nickel pistol
g) Winchester rifle
h) Shotgun case hardened receiver

(*Use Training Assignment #63 to complete this objective.*)

Trainee	Trainer	Date

25. Obtain several firearms with serial numbers or stamped pieces of metal from the Training Officer. Alter the serial numbers using different methods and then attempt to restore them. Document your results and conclusions with notes and photographs.

(*Use Training Assignment #63 to complete this objective.*)

Trainee	Trainer	Date

26. Be prepared to discuss with the Training Officer the methods used and lessons learned during the restoration processes.

(*Use Training Assignment #63 to complete this objective.*)

Trainee	Trainer	Date

27. Discuss with the Training Officer how the combination of a brief application of $CuNH_4Cl_2$ followed by a normal application of NaOH can shorten the processing time on aluminum.

(*Use Training Assignment #63 to complete this objective.*)

Trainee	Trainer	Date

28. Discuss with the Training Officer why alternating HNO_3 and HCl may be very effective in restoring serial numbers on chrome or nickel-plated firearms.

(*Use Training Assignment #63 to complete this objective.*)

Trainee	Trainer	Date

29. Discuss with the Training Officer the advantages of maintaining a database/notebook to record the various manufacturer's serial number structures in casework.

(*Use Training Assignment #63 to complete this objective.*)

Trainee	Trainer	Date

30. Become familiar with the AFTE Serial Number Search database and the ATF Serial Number Structure Guide. Discuss with your trainer the importance of utilizing the laboratory's Firearms Reference Collection to research serial number structures and font types.

Trainee	Trainer	Date

31. Obtain a selection of firearms or other pieces of metal with altered serial numbers from the Training Officer. Determine the appropriate technique(s) and equipment that will be utilized and attempt to restore the altered serial numbers. Provide documentation (laboratory notes and/or photographs) of the restoration attempts and discuss the results with the Training Officer.

Trainee	Trainer	Date

32. Research the location and format of secondary or "hidden" serial numbers that may be present on various makes and models of firearms. Discuss with the Training Officer.

Trainee	Trainer	Date

33. If possible, attend a serial number restoration course/workshop. Discuss any differences with the training versus your agency's specific procedures for serial number restoration with the Training Officer.

Trainee	Trainer	Date

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REFERENCE MATERIALS
RESTORATION OF OBLITERATED MARKINGS

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

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O. RESEARCH PROJECT, REPORT WRITING, EXPERT TESTIMONY, AND EXTERNAL LABORATORY REVIEW AND TOURS

1. Develop a system for the administration of your cases. Formulate a method for taking and maintaining case notes, documenting essential data on which you base your conclusions, and maintaining chain of custody. Discuss the importance of effective case management, case documentation, and chain of custody documentation with the Training Officer.

Trainee	Trainer	Date

2. Read through case reports generated by at least two examiners from the section. Note the various report formats and wording for the different categories of testing within the field of Firearm and Tool Mark Examination (e.g. firearm examination, bullet/cartridge case examination, cartridge case/bullet comparisons, serial number restoration, distance determination etc.) Discuss with the Training Officer.

Trainee	Trainer	Date

3. Witness the testimony of other examiners (in any forensic discipline) and evaluate their strengths and weaknesses regarding courtroom demeanor, professionalism, and efficiency of communication. Discuss with the Training Officer. (This may be combined with #7 below.)

Trainee	Trainer	Date

4. Review court transcripts of expert witness testimony in the Firearm and Tool Mark discipline from at least two examiners. If possible, discuss these transcripts with each examiner.

(*Use Training Assignment #66 to complete this objective*.)

_____ _____
Examiner Date

_____ _____
Examiner Date

_____ _____ _____
Trainee Trainer Date

5. Define the following terms or phrases as they apply to Firearm and Tool Mark testimony. Discuss their meanings with the Training Officer.

a) Expert witness
b) "Reasonable degree of scientific certainty"
c) Absolute certainty
d) Practical certainty
e) Hearsay
f) Opinion
g) Voir dire
h) Sustained
i) Overruled
j) Prosecution
k) Defense

_____ _____ _____
Trainee Trainer Date

6. Prepare a list of "qualification questions" which can be used by a prosecutor to qualify an examiner as an expert witness in court. Formulate responses to questions pertaining to accreditation, certification, proficiency testing, training, technical review, administrative review, procedures etc. Discuss these with the Training Officer.

_____ _____ _____
Trainee Trainer Date

7. Witness at least two Firearm and Tool Mark examiners testify as an expert witness in a firearm or tool mark case. Discuss their testimonies with each examiner. Coordinate this with the Training Officer.

_____ _____
Examiner Date

_____ _____
Examiner Date

_____ _____ _____
Trainee Trainer Date

8. Prepare a list of metaphors/analogies to assist in explaining the following technical concepts to a jury. Other examiners in the field may be consulted for this exercise. Discuss these metaphors/analogies with the Training Officer.
   a) Comparison microscope
   b) Class characteristics
   c) Subclass characteristics
   d) Individual characteristics
   e) Cycle of fire
   f) Firearm actions
   g) Trigger pull
   h) Uncertainty of measurement

_____ _____ _____
Trainee Trainer Date

9. Complete moot court exercises that encompass the different categories of testing within the field of Firearm and Tool Mark Examination (e.g. firearm and tool mark examination, bullet/cartridge case examination, cartridge case/bullet comparisons, serial number restoration, distance determination etc.). Consult with other Firearm and Tool Mark Examiners regarding personal recommendations or advice for courtroom testimony. These discussions should be in-depth and cover all aspects of courtroom testimony.

(*Use Training Assignment #66 to complete this objective*.)

_____ _____ _____
Trainee Trainer Date

10. Become familiar with the AFTE Code of Ethics and your laboratory's accrediting body's Code of Ethics. Discuss these with the Training Officer.

_____	_____	_____
Trainee	Trainer	Date

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REFERENCE MATERIALS
RESEARCH PROJECT

The following reference materials serve several purposes:

- to provide a wider range of additional resources should a particular interest arise in a given topic.
- to provide reference materials for future professional use.
- to gain additional depth in particular subject areas.

Should you encounter other references in this category, you are encouraged to make additional notes about them at the end of this listing.

General

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The following reference materials serve several purposes:

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REFERENCE MATERIALS
EXTERNAL LABORATORY REVIEW AND TOURS

The following reference materials serve several purposes:

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General

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TRAINING ASSIGNMENT

Student	Assignment 1	Date Assigned	Date Due

The following areas will be the topics of a short discussion session (*Date & Time*).

You will need to know the procedures for the transfer of evidence within your laboratory and evidence handling procedures including evidence that may carry Hepatitis, the Human Immunodeficiency Virus (HIV) or other infectious biological agents. See Reference Materials Administrative Matters – Biohazards.

Obtain a copy of your Firearm & Tool Mark Section policy and procedures manual and familiarize yourself with the contents, including safety rules and procedures.

The following two areas are written assignments which should be completed and turned in by (*Date & Time*). Your answers should be concise and complete.

Define the following terms:

a) Firearm and Tool Mark Examination
b) Ballistics
c) Interior Ballistics
d) Exterior Ballistics
e) Terminal Ballistics

Read the applicable sections from the references and prepare an outline for a future report concerning the history, principles, evolution and scope of Firearm and Tool Mark Examination in its broadest sense. Begin to accumulate documentation in your notebook for this report.

References:

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Gunther, J.D., and Gunther, C.O., The Identification of Firearms From Ammunition Fired Therein With an Analysis of Legal Authorities, Skyhorse Publishing, New York, NY, 2015.

The (*museum firearm collection or other firearm training related tour*) is scheduled for (*date & time*). You will need to prepare a report on your tour. The report will be due *(date & time*). You need to keep comprehensive notes on what you observe and learn on the tour. You will be provided with an outline of what is required in the report.

This will complete Section A #7 and #9, B #1 and begin Section B #2 and C #2 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 2	Date Assigned	Date Due

The following areas will be the topics of a discussion session next (*Date & Time*).

Formulate an answer to each of the following questions:

a) Is the forensic science discipline of Firearm and Tool Mark Examination an art or a science?

b) What are the types of conclusions that can be reached in Firearm and Tool Mark Examination comparisons?

c) What is the basis for each of the above conclusions?

d) Is it possible for experts in the Forensic Science discipline of Firearm and Tool Mark Examination to disagree regarding their conclusions? Why or why not?

e) How does "probability" relate to Firearm and Tool Mark Examination?

This will complete Section G #1 of your training manual.

Continue to work on your report concerning the history, principles, evolution and scope of firearms identification with an anticipated completion date of (*Date & Time*).

References:

Mathews, J.H., Firearms Identification, Volumes I - III, University of Wisconsin Press, Madison, WI, 1962.

Hatcher, J.S., Jury, F.J., and Weller, J., Firearms Investigation, Identification and Evidence, Ray Rifling Arms Books Co., Philadelphia, PA, 2006.

Burrard, G., The Identification of Firearms and Forensic Ballistics, 5th Edition, Wolfe Publishing Co., NY, 1990.

Gunther, J.D., and Gunther, C.O., The Identification of Firearms From Ammunition Fired Therein With an Analysis of Legal Authorities, Skyhorse Publishing, New York, NY, 2015.

This will complete Section B #2 of your training manual.

Continue to work on your list of definitions. You will have a written test on these during the week of (*Date & Time*)

This will complete Section B #1 of your training manual.

If applicable, bring in your notes concerning the museum tour. Be prepared to discuss your findings.

This will complete Section C #2 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 3	Date Assigned	Date Due

1. Be able to discuss the early development of gunpowder.

2. Prepare an outline of early firearms and ammunition development up to the advent of metallic cartridges, with particular emphasis on lock mechanisms, early rifling techniques, percussion systems, priming methods and pre-metallic cartridges. The listing should be in proper chronological order. Be prepared to discuss how each new system was an improvement over the previous system.

   Areas of consideration:

   - What features of these early firearms are still in use today?
   - What were the advantages of each of these systems?
   - What were the disadvantages of each of these systems?
   - Was there a common disadvantage to all these systems?
   - What was it and how was it overcome?

DIRECTIONS:

The chronological outline should include a brief description of each type of action. It does not need to be elaborate but complete. Be prepared to answer questions concerning firearm and ammunition development on (*day & date*).

READING LIST:

Book of Rifles by W. H. B. Smith. Pages 3 through 43.

Book of Pistols & Revolvers by W. H. B. Smith. Pages 6 through 20.

Small Arms of the World 8th Edition by Smith & Smith. Pages 15 through 38

Firearms Investigation, Identification and Evidence by Hatcher, Jury & Weller. Chapter 2, pages 23 through 39

United States Martial Pistols and Revolvers by Gluckman. Part I pages 13 through 22.

Guns through the Ages by Boothroyd. Chapters 1 through 4 pages 15 through 37.

Encyclopedia of Firearms by H.L. Peterson.

American Rifleman 1960 March, April, May & June "The Development of Firearms" by H.L. Peterson.

This will complete Section C #1 of your training manual.

Optional but recommended assignment: Be prepared to discuss your selection of a topic for a research project. This will be a preliminary look and will be designed to be completed by (*Day & Date*) for presentation to the (*location for presentation to be given by student to the section and/or at the next AFTE meeting*). Think of something that has caught your interest or curiosity.

This will begin Section B #9 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 4	Date Assigned	Date Due

1. Trace the evolution of the rimfire cartridge from the mid-nineteenth century to the current generation of modern 22 caliber rimfire cartridges. Be able to discuss this topic.

2. Prepare a chronological outline of rimfire ammunition development including firearms types that were developed for this ammunition. It should be in proper historical order. Be prepared to discuss how each type of development was an improvement over the previous system.

   Areas of consideration:

- What features of these early ammunition/firearms are still in use today?
- What were the advantages of each of these systems?
- What were the disadvantages of each of these systems?
- Was there a common disadvantage to all these systems?
- What was it and how was it overcome?

DIRECTIONS:

The chronological outline should be in written form similar to previous assignments. It does not need to be elaborate but complete.

Be prepared to answer questions concerning these areas on (*Day & Date*).

This will complete Section C #4 of your training manual.

A test on the vocabulary list you received (firearm terminology from the AFTE Glossary) will be given (*Day, Date & Time*).

This will complete Section B #8 of your training manual.

Training Officer	Date Completed

TRAINING ASSIGNMENT

Student	Assignment 5	Date Assigned	Date Due

1. Trace the evolution of the center fire cartridge from the mid-nineteenth century to the present. Pay particular attention to the transition from black powder to smokeless powder. Include any information developed concerning caseless ammunition. Be able to discuss this topic.

2. Prepare a chronological outline of center fire ammunition development including firearms types that were developed for this type ammunition. It should be in proper historical order. Be prepared to discuss how each type of development was an improvement over the previous system.

   Areas of consideration:

   - What features of these early firearms are no longer in use today?
   - What were the advantages of each of the systems?
   - What were the disadvantages of each of the systems?
   - What areas are still open to improvement to any of these systems?

DIRECTIONS:

The chronological outline should be in written form similar to previous assignments. It does not need to be elaborate but complete.

Be prepared to answer questions concerning these areas on (*Date & Time*).

This will complete Section C #5 of your training manual.

A test on the vocabulary list you received (firearm terminology from the AFTE Glossary) will be given (*Day, Date & Time*).

This will complete Section B #8 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 6	Date Assigned	Date Due

Research in detail these processes and prepare a short, written definition of each term listed below. The definitions should be concise and complete. You should also have an understanding of how these different procedures apply to firearms manufacturing.

a) Abrasive machining
b) Annealing
c) Boring
d) Broaching (excluding barrel broaching)
e) Casting
f) Chamfering
g) Computer numeric control (CNC)
h) Cope and drag (as used in casting)
i) Drilling (excluding barrel/deep-hole drilling)
j) Electro chemical machining (ECM)
k) Electro discharge machining (EDM)
l) Extrusion
m) Filing
n) Fine-forming operations
o) Grinding
p) Hammer forging
q) Honing
r) Investment and die casting (parts)
s) Investment die casting (IC)
t) Lead lapping

u) Machine hammer forging
v) Metal injection molding (MIM)
w) Milling (include both face milling & peripheral or slab milling)
x) Molding
y) Planing
z) Powdered metal technology (PMT)
aa) Sacrificial wax & runners (as used in casting)
bb) Sanding
cc) Sawing
dd) Shaping
ee) Stamping
ff) Stoning
gg) Subcontract manufacturing
hh) Swaging
ii) Ballizing
jj) Turning
kk) Ultrasonic methods

This will complete Section D #8 of your training manual.

Training Officer	Date Completed

TRAINING ASSIGNMENT

Student	Assignment 7	Date Assigned	Date Due

This assignment is designed to demonstrate your knowledge of the basic nomenclature of handguns, rifles, and shotguns.

1. Obtain the following firearms from the Firearms Reference Collection:

    a) rifle (bolt action; semiautomatic; lever)
    b) semiautomatic pistol (blowback & recoil)
    c) revolver (single-action & double-action)

2. Be able to point out the following parts on these firearms:

    breechface, breech bolt, bolt, bolt face, extractor, ejector, firing pin, rifling, barrel, lands, grooves, ramp, magazine, clip, ejection port, receiver

3. Be able to describe the cycle of fire for each firearm.

4. 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.

5. Point out any marks produced by wear or abuse which could contribute to the uniqueness of each part.

6. Identify areas that show machining marks that could carry over to another firearm.

Be prepared to give a short talk on one of each type of firearm you have examined. This talk should last no more than approximately five minutes per firearm and include the cycle of fire and nomenclature. This presentation will be for the entire section.

This will complete Section D #22 of your training manual.

Training Officer	Date Completed

TRAINING ASSIGNMENT

Student	Assignment 8	Date Assigned	Date Due

Research in detail the following manufacturing tools used for rifling:

a) Button rifling
b) ECM rifling
c) EDM rifling
d) Gang broach
e) Hammer forge
f) Microgroove
g) Single point (hook/scrape cutters)

Prepare a short paper discussing the differences in these rifling techniques including the advantages and disadvantages for each as viewed by industry and the firearms examiner.

If possible, obtain broaches and buttons for study from your Training Officer. Determine the difference between barrels which have been button rifled and those which have been broach rifled. Be able to discuss these items with your Training Officer and other examiners on (*Date & Time*).

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

a) Barrel deep-hole drilling
b) Barrel straightening
c) Burnishing
d) Chambering and throating

e) Contouring/profiling
f) Crowning
g) Cut rifling methods
h) Damascus barrel
i) Electro Chemical Machining (ECM)
j) Electro Discharge Machining (EDM)
k) Honing
l) Lead lapping
m) Mandrel
n) Drawn Over Mandrel (DOM)
o) Polygonal
p) Reaming
q) Single point tools (hook/scrape cutters)
r) Tungsten carbide swaging (microgroove rifling)

Research the history and current significance of proof marks as they relate to the manufacture of firearms. You need to understand how these will be helpful in firearms identification and where to obtain necessary information.

You will have a comprehensive examination covering Sections B, C, and D during (*Day, Date, Time*). It will involve multiple choice and essay type questions. You should have all the information needed in your notebook.

This will complete Sections D #10, 11, and 20 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 9	Date Assigned	Date Due

Define the following terms as they relate to modern ammunition and its manufacture. Prepare a brief written outline of these terms for your notebook. These terms coincide with the practical exercise which is attached. Ensure that you understand these terms and use them often.

Section E #2

a) Cartridge case
b) Head
c) Headstamp
d) Bunter
e) Mouth
f) Web
g) Extractor groove
h) Shoulder
i) Neck
j) Primer pocket
k) Flash hole
l) Primer (types and sizes)
m) Cannelure

Section E #6

a) Belted
b) Bottleneck
c) Rebated-rim
d) Rimless
e) Rimmed
f) Semi-rimmed
g) Centerfire
h) Rimfire

Section E #8

a) Meplat
b) Mold line/mold marks
c) Cannelure (types & purposes)
d) Ogive
e) Bearing surface
f) Diameter
g) Crimp
h) Core
i) Shank

Section E #9

a) Full metal jacketed
b) Total metal jacketed
c) Jacketed round nose (Ball)
d) Semi-jacketed soft point
e) Hollow point
f) Jacketed hollow point
g) Wadcutter
h) Semi-wadcutter
i) Copper-coated lead
j) Brass-coated lead
k) Frangible
l) Truncated-nosed
m) Soft point
n) Nylon-coated lead
o) Nickel plated

p) Heel
q) Concave base
r) Lead round nose
s) Boattail
t) Spitzer

Section E #21

a) Swaging
b) Casting
c) Casting seam
d) Sprue
e) Cutter quill
f) Bullet sizing

Section E #22

a) Shotshell
b) Battery cup
c) High brass
d) Low brass
e) Overpowder wad
f) Undershot wad
g) Overshot wad
h) Filler wad
i) Cup wad
j) Power Piston wad
k) Shot collar
l) Crimp
m) Shot size
n) Slug
o) Buckshot
p) Birdshot

Section E #23

a) Bliemeister method
b) Antimony
c) Arsenic, as related to shot
d) Chilled shot
e) "Rule of 17"
f) Dram equivalent
g) Bismuth shot
h) Tungsten shot

As part of this week's assignments, you are to complete Practical Exercise #1.

This will complete Sections E #2, 6, 8, 9, 21, 22, and 23 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 10	Date Assigned	Date Due

Be prepared to discuss in detail Berdan and Boxer primer. Prepare a cross-section sketch of both the Berdan and Boxer primers, showing their relationship to the head of the cartridge and illustrating how each functions.

Be prepared to discuss the purpose and essential ingredients of priming mixture used in modern cartridges.

Define and discuss the difference between caliber and caliber family. To accomplish this assignment, obtain as many different cartridges from the following caliber families: 22 caliber, 30 caliber and 38 caliber. Identify each one as to caliber designation and be able to explain and demonstrate the differences between the different caliber families.

This should be as complete as possible and will require you to research the ammunition files and standards, obtain different examples and disassemble them for presentation. You need to take into account different cartridge case sizes and shapes within the caliber family and also the variations in bullets (*weight, jacketing, design, cannelures, etc.*). Your examples should be such that you and other members of the unit can use them in the future for references.

Practical Exercise #2 is required for completion of this assignment.

This will complete Sections E #25, 26, and 27 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 11	Date Assigned	Date Due

Define each of the following types of firearms and explain in detail the operation of each type to include the loading of cartridges and the subsequent movement of the cartridge case and/or bullet after firing. Be able to understand and explain the cycle of fire for each general type of firearm listed below.

a) Single and double action revolvers
b) Single and double action semi-auto pistols
c) Single shot pistols (including derringers)
d) Bolt-action rifle
e) Gas operated semi-auto rifle
f) Pump-action rifle
g) Single shot rifles
h) Submachine guns (including blowback and delayed blowback)
i) Muzzle loading firearms
j) Percussion revolvers
k) Lever action rifles

This will complete Section D #4 of your training manual.

Training Officer	Date Completed

TRAINING ASSIGNMENT

Student	Assignment 12	Date Assigned	Date Due

Using shotguns from the Firearms Reference Collection (FRC), explain and illustrate the differences between a gas-operated and a recoil-operated auto loading shotgun.

Using firearms from the FRC, explain and illustrate the differences between the following types of auto loading pistols:

a) blowback action
b) delayed blowback action
c) gas-delayed blowback action
d) short recoil action
e) long recoil action

This will complete Section D #7 of your training manual.

Training Officer	Date Completed

TRAINING ASSIGNMENT

Student	Assignment 13	Date Assigned	Date Due

For the next two weeks you will be assigned to work with (*name of qualified Firearm and Toolmark Examiner*). While working with this examiner you can observe procedures and techniques which will successfully reach appropriate conclusions, in solving the problems associated with examination of various types of evidence submitted to our laboratory. You will need to keep a record of the following areas concerning cases worked:

- Record the case numbers.
- Brief description of the type of evidence involved.
- Discussion of the methods used during the examinations observed.
- The results of the examinations and conclusions reached based on these results.
- Include copies of photographs and notes that *you* have prepared.

This information should be maintained in a loose-leaf binder which will be reviewed at the conclusion of the assignment.

You need to be proactive in this exercise. Don't sit back and wait for an invitation to get involved. Ask questions, don't assume anything, if you are not sure of what is taking place, ask for an explanation. There is a huge amount of information and experience available and a limited amount of time to gather this information, so don't waste any of the opportunity.

Training Officer	Date Completed

TRAINING ASSIGNMENT

Student	Assignment 14	Date Assigned	Date Due

Please note: this assignment is only applicable if a NIBIN/IBIS system is available.

During this week you will be involved in training using the 'NIBIN\IBIS' system. You will receive the necessary training from Forensic Technology Inc. and/or Firearm Section personnel. After successful completion of the training, you will be assigned a login/password for the system and you will be expected to make entries and review correlations on test fires in the "*Training\Demonstration*" database. You will need to keep a record of the entries made including "case numbers", exhibit numbers, and correlation results.

This information should be maintained in a loose-leaf binder which will be reviewed at the conclusion of the assignment.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 15	Date Assigned	Date Due

Partially disassemble (*field strip*) and reassemble the following revolvers (if available). Obtain a copy of an exploded drawing of each one of the revolvers listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences in their mechanisms and identify each part by name.

a) Smith & Wesson double-action
b) Colt double-action
c) Ruger double-action
d) "Old style" Ruger single-action
e) "New style" Ruger single-action
f) Colt single-action

Use the following references:

Firearms Assembly, NRA #4
Firearms Assembly/Disassembly Part II Revolvers
Exploded Firearms Drawings 3rd Edition
Manufacturers' information

This will complete Sections H #4, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 16	Date Assigned	Date Due

Disassemble and reassemble the following pistols from the Firearm Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the pistols listed below. Ensure that the drawing identifies all of the parts of the firearm. Learn the names of the major components and how they interact. Be able to describe the differences in their mechanisms and identify each part by name. Observe the evolution of firearm development between the Browning and Walther designed firearms.

a) Browning Hi-Power
b) US Pistol Model 1911A1
c) Walther P38
d) Walther PPK

Use the following references:

Firearms Assembly, NRA #2
Firearms Assembly/Disassembly Part I Automatic Pistols
Exploded Gun Drawings, 3rd Edition
Manufacturers' information

This will complete a portion of Sections H #5, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 17	Date Assigned	Date Due

Partially disassemble (field strip) and reassemble the following pistols from the Firearms Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the pistols listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences in their mechanisms and identify each part by name.

a) Luger P08
b) Arisaka Type 14
c) Smith & Wesson Sigma
d) Desert Eagle

Use the following references:

Firearms Assembly, NRA #2
Firearms Assembly/Disassembly Part I Automatic Pistols
Exploded Firearms Drawings 3rd Edition
Manufacturers' information

This will complete a portion of Sections H #5, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 18	Date Assigned	Date Due

Partially disassemble (field strip) and reassemble the following pistols from the Firearms Reference Collection if available. Obtain a copy of an exploded drawing of each of the pistols listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences in their mechanisms and identify each part by name.

a) Glock Model 17

b) SIG-Sauer Model 226

c) Heckler & Koch P7

d) Hi-Point Model C9

If you are having any problems with field stripping/reassembly please contact your Training Officer.

Use the following references:

Firearms Assembly, NRA #2
Firearms Assembly/Disassembly Part I Automatic Pistols
Exploded Firearms Drawings 3rd Edition
Manufacturers' information

This will complete a portion of Sections G #5, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 19	Date Assigned	Date Due

Disassemble and reassemble the following submachine guns from the Firearm Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the pistols listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences in their mechanisms and identify each part by name.

a) US M3
b) Intratec, TEC 9
c) Thompson
d) SWD Inc., M11/Nine

You will need to contact your Training Officer if you have difficulty locating these firearms.

Use the following references:

Firearms Assembly/Disassembly Part VI Law Enforcement Weapons Manufacturers' information

This will complete Section H #6, 12, 13, 17, and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 20	Date Assigned	Date Due

Disassemble and reassemble the following 25 Auto pistols from the Firearm Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the pistols listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences in their mechanisms and identify each part by name.

a) Raven Arms
b) Colt Jr.
c) Beretta
d) Bauer

You will need to contact your Training Officer if you have difficulty locating these firearms.

This will complete Sections H #10, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 21	Date Assigned	Date Due

Disassemble and reassemble the following rifles from the Firearm Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the rifles listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences in their mechanisms and identify each part by name.

a) Lee Enfield
b) U. S. Rifle 1898
c) U.S. Rifle Model M1
d) U. S. Rifle Model 1903

You will need to contact your Training Officer if you have difficulty locating these firearms.

Record the tag numbers of the firearms that you use for this assignment.

This will complete Sections H #7, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 22	Date Assigned	Date Due

Disassemble and reassemble the following rifles from the Firearm Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the rifles listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences in their mechanisms and identify each part by name.

a) U.S. Rifle Model M14
b) U.S. Rifle Model M16
c) Savage Model 99
d) Winchester Model 94
e) AK 47/74
f) SKS

You will need to contact your Training Officer if you have difficulty locating these firearms.

Record the tag numbers of the firearms that you use for this assignment.

This will complete Sections H #7, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 23	Date Assigned	Date Due

Disassemble (field strip) and reassemble the following shotguns from the Firearm Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the rifles listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences and similarities of their mechanisms and identify each part by name.

a) Remington Model 870
b) Winchester Model 12
c) Ithaca Model 37
d) Browning Model A5
e) Remington Model 1100

Research the historical derivation of the various shotgun gauges and define gauge. Prepare a chart concerning the diameter of various modern gauges you might encounter. Define any differences in foreign and domestic shotgun gauges.

You will need to contact the training officers if you have difficulty locating these firearms.

This will complete Sections H #8, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 24	Date Assigned	Date Due

Disassemble (field strip) and reassemble the following shotguns from the Firearm Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the rifles listed below. Ensure that the drawing identifies all of the parts of the firearm. Be able to describe the differences and similarities of their mechanisms and identify each part by name.

a) Harrington & Richardson, Topper Model 158
b) L.C. Smith, side-by-side, double-barrel
c) Savage Model 311, side-by-side, double-barrel
d) Beretta Silver Snipe, over-under, double-barrel

Define the purpose of a choke on a shotgun. Name the various chokes and break them down into their dimensions and geometry. Sketch the interior of barrels in cross section showing the dimensions and names.

You will need to contact your Training Officer if you have difficulty locating these firearms.

This will complete Sections H #8, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 25	Date Assigned	Date Due

Partially disassemble (field strip) and reassemble the following 22 caliber firearms from the Firearm Reference Collection (FRC) if available. Obtain a copy of an exploded drawing of each of the firearms listed below. Ensure that the drawing identifies all parts of the firearm. Be able to describe the differences in their mechanisms and identify each part by name.

a) Browning auto loading rifle
b) Winchester Model 62 rifle
c) Remington Model 582 rifle
d) Ruger Model 10/22 rifle
e) Ruger MKII pistol
f) Colt Woodsman pistol
g) Raven/Lorcin/Jennings pistol

You will need to contact the training officers if you have difficulty locating these firearms.

This will complete Sections H #9, 11, 12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 26	Date Assigned	Date Due

You have been assigned Practical Exercise #3 as your weekly assignment. Practical exercises are to be treated as casework and evidence (except for marking the actual firearm). Follow the directions carefully and if you have any questions please do not hesitate to ask.

You will need PRACTICAL EXERCISE #3 to complete this assignment.

This will complete Sections H #12, 17 and 19 of your training manual.

Training Officer	Date Completed

TRAINING ASSIGNMENT

Student	Assignment 27	Date Assigned	Date Due

You have been assigned Practical Exercise #4 as your weekly assignment. Practical exercises are to be treated as casework and evidence (except for marking the actual firearm). Follow the directions carefully and if you have any questions please do not hesitate to ask.

You will need PRACTICAL EXERCISE #4 to complete this assignment.

This will complete Sections H #12, 17 and 19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 28	Date Assigned	Date Due

You have been assigned Practical Exercise #5 as part of your weekly assignment. Practical exercises are to be treated as casework and evidence (except for marking the actual firearm). Follow the directions carefully and if you have any questions please do not hesitate to ask.

Research, define, and determine the implications of the following terms as they relate to safety in the operation of a firearm.

a) Excessive headspace
b) Barrel obstruction
c) Barrel bulge
d) Broken extractor
e) Push off
f) Trigger shoe
g) False half-cock
h) Slam-fire
i) Poor sear engagement
j) Defective safety
k) High primer
l) Rail splitting
m) Hairline cracks
n) Improper timing
o) Excessive pressure
p) Dented barrel
q) Jar-off
r) Hang-fire/delayed fire
s) Dirty firearm
t) Loose-fitting parts
u) Broken/defective sear tip
v) Broken/defective sear notch
w) Subcaliber ammunition

Become familiar with the Firearm Section firearms range including its physical dimensions, construction of walls and backstop, and bullet velocity/test firing limitations. Know how to test fire firearms thought to be possibly unsafe. Become familiar with the use of all the equipment on the range. Know the range rules and emergency procedures.

You will need PRACTICAL EXERCISE #5 to complete this assignment.

This will complete Sections H #12, 17, 19 and 20 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 29	Date Assigned	Date Due

You have been assigned Practical Exercise #6 as part of your weekly assignment. Practical exercises are to be treated as casework and evidence (except for marking the actual firearm). Follow the directions carefully and if you have any questions please do not hesitate to ask.

Research, define, and determine the implications of the following terms as they relate to identifying the manufacturer and/or source of a firearm:

a) Proof marks
b) Inspector marks
c) Factory numbers and markings
d) Serial numbers
e) Part numbers
f) Company logos

Discuss the following topics with your Training Officer and become familiar with the capabilities and limitations of the Firearm Section in regard to these areas:

a) Marking evidence firearms
b) Recognition, documentation, recovery, and retention of trace evidence from the bore of a firearm prior to test firing
c) Determining whether an evidence firearm has been "recently" fired
d) Determining the manufacturer of a firearm by examining of a part from a firearm
e) Determining the manufacturer of a firearm from a photograph and comparing an evidence firearm to a photograph

You will need PRACTICAL EXERCISE #6 to complete this assignment.

This will complete Sections H #12, 17, 19, 25d and 26 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 30	Date Assigned	Date Due

You have been assigned Practical Exercise #7 as part of your weekly assignment. This is your initial introduction to the available microscopes and you should take your time learning everything you can about the Firearms Section's instrument(s). Be ready to demonstrate what you have learned to the Training Officer and if you have any questions do not hesitate to ask. It would be prudent to obtain copies of all the literature you can find concerning the microscopes. Look up proper procedures to calibrate the comparison microscope(s).

Differentiate between the following:

a) Compound microscope
b) Stereo microscope
c) Comparison microscope

Study the instruction manual for the various brands of stereo microscopes available in the Firearms Section. If available, determine how to insert a reticule and conduct measurements.

You will need PRACTICAL EXERCISE #7 to complete this assignment.

This will complete Sections F #1, 2, 3, 4, 5, 6 and 7 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 31	Date Assigned	Date Due

You have been assigned Practical Exercise #8 as part of your weekly assignment.

Become familiar with and demonstrate the use of the following equipment:

a) Steel ruler
b) Reticle in ocular lens of binocular microscope
c) Balances and scales located in the firearm section
d) Stage micrometer
e) Digital (electronic) micrometer
f) Non-digital and digital calipers
g) Barrel/overall length measuring devices

You will need PRACTICAL EXERCISE #8 to complete this assignment.

This will complete Sections F #6 and 8 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 32	Date Assigned	Date Due

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. Prepare written answers concerning these items.

a) Slippage (skid marks)
b) Shaving
c) Obturation
d) Leading edge/trailing edge
e) Melting
f) Blow-by/gas cutting
g) Striation
h) Ogive
i) Bearing surface
j) General rifling characteristics
k) "Insufficient individual microscopic marks"
l) Corrosion
m) Leading
n) "Limited individual microscopic marks"
o) "Single-action" firing
p) "Double-action" firing
q) Knurled & grooved cannelures
r) Stab crimp
s) Boattail
t) Open base
u) Closed base
v) Recessed base
w) Skived tip/hollow point
x) Flared base
y) Trace evidence aspects (lacquers, sealants, painted tips, biological materials, paint, fibers, glass, etc.)

This will complete Section I #2 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 33	Date Assigned	Date Due

Discuss the importance of and limitations of each of the following as they relate to the examination and comparison of fired bullet/bullet fragments with the Training Officer:

a) Weight
b) Caliber
c) Caliber type
d) Manufacturer
e) General rifling characteristics
f) Pitch of rifling
g) Depth of rifling
h) Jacket construction/composition

Write a short descriptive answer describing how these terms apply to firearms examination.

If applicable, familiarize yourself with the laboratory Standard Ammunition File (SAF) or Ammunition Reference Collection. Learn how to search this file to determine the manufacturer of fired bullets. Discuss the potential problems encountered when using this file and possible solutions.

If applicable, become familiar with the laboratory Known Specimen File (KSF) or Test Fire Reference Collection. If not available, discuss the feasibility of developing this type of file with your Training Officer.

Familiarize yourself with both the AFTE and FBI General Rifling Characteristics (*GRC*) databases. Learn how to use these databases to compile a list of firearms in a "no-gun case." Demonstrate your proficiency in using your laboratory procedures and the relevant GRC file while working on Practical Exercise #9 which is being assigned as part of this assignment.

PRACTICAL EXERCISE #9 is required for completion of this assignment.

This will complete Sections I #3, 9, 10 and 13 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 34	Date Assigned	Date Due

You have been assigned Practical Exercise #8a as part of your weekly assignment. This assignment is self-explanatory.

You will need PRACTICAL EXERCISE #8a to complete this assignment.

This will be a part of Section I #14 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 35	Date Assigned	Date Due

You have been assigned Practical Exercise #10 as your weekly assignment. This exercise is self-explanatory.

You will need PRACTICAL EXERCISE #10 to complete this assignment.

This will complete Section I #14 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 36	Date Assigned	Date Due

You have been assigned Practical Exercise #11 as part of your weekly assignment.

Using one of the 9mm Luger pistols included with your practical exercise, test fire two each of the following cartridges and attempt to identify the test bullets with each other. Take appropriate photographs and notes.

a) 9mm Luger Federal Hydra-shok
b) 9mm Luger PMC Starfire
c) 9mm Luger Remington full metal jacket
d) 9mm Luger Winchester Silvertip
e) 9mm Luger CCI Total Metal Jacket (may substitute Federal TMJ)
f) 9mm Luger Black Talon/Ranger SXT
g) 9mm Luger Federal Nyclad
h) 9mm Luger Tulammo full metal jacket
i) 9mm Luger DRT full metal jacket compressed copper core

You will need PRACTICAL EXERCISE #11 to complete this assignment.

This will complete Section I #21 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 37	Date Assigned	Date Due

You have been assigned Practical Exercise #12 as part of your weekly assignment.

Using one of the 357 magnum revolvers included with your practical exercise, test fire two each of the following cartridges and attempt to identify the test bullets with each other. Take appropriate photographs and notes.

a) .38 Special caliber Remington lead round-nosed bullet
b) .38 Special caliber Remington jacketed bullet
c) .357 Magnum caliber Remington jacketed bullet
d) .357 Magnum caliber Winchester “Silvertip” bullet
e) .357 Magnum caliber Federal Nyclad bullet

You will need PRACTICAL EXERCISE #12 to complete this assignment.

This will complete Section I #20 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 38	Date Assigned	Date Due

You have been assigned Practical Exercise #13 as part of your weekly assignment.

Using the attached test bullets fired from polygonally rifled barrels, demonstrate your proficiency in accurately determining the rifling characteristics of these fired bullets. Compile a list of firearms which could have been used to fire these bullets using the GRC file and make microscopic inter-comparisons of the bullets to determine if any have been fired through the same barrel.

Write a short paper concerning how polygonal rifling may affect microscopic comparisons. Do you have any recommendations concerning these types of firearms?

You will need PRACTICAL EXERCISE #13 to complete this assignment.

This will complete Section I #16 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 39	Date Assigned	Date Due

Become knowledgeable about the facilities in the firearm section for the recovery of fired test bullets. Learn when and how to use the available bullet recovery systems and their limitations. Test fire a 357 Magnum revolver into each of the recovery systems and observe the difference between the recovered bullets.

Use the following types of ammunition:

.38 Special with round nose lead bullet
.38 +P Special with jacketed hollow-point bullet
.38 Special with full metal jacketed bullet
.357 Magnum with jacketed soft-point bullet

Observe all relevant laboratory safety rules.

Familiarize yourself with the ammunition storage areas in the Firearm Section. Know how to locate test ammunition after correctly selecting test ammunition using the Standard Ammunition File (SAF)/ laboratory ammunition reference collection. Discuss with the Training Officer the reasons for using substitute ammunition or down-loading ammunition for test firing. Learn the proper procedure for down-loading ammunition for test firing. Under supervision of the Training Officer prepare and fire down-loaded test ammunition.

You will need Practical Exercise #14 to complete this assignment.

This will complete Sections F #11 and I #17 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 40	Date Assigned	Date Due

You have been assigned Practical Exercise #15 as part of your weekly assignment.

Using one of the .22 Long Rifle revolvers from PE#15, test fire two each of the following cartridges and attempt to identify the test bullets with each other. Take appropriate photographs and notes.

a) Remington .22 Long Rifle with lead bullets
b) Winchester .22 Long Rifle with lead bullets
c) Remington .22 Long Rifle with brass-coated lead bullets
d) Winchester .22 Long Rifle with copper-coated lead bullets
e) Remington .22 Long with lead bullets
f) Winchester .22 Short with lead bullets

You will need PRACTICAL EXERCISE #15 to complete this assignment.

This will complete Section I #19 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 41	Date Assigned	Date Due

You have been registered to attend a GSR/distance determination class or workshop at the (*Place and Time this is scheduled*). You will need to prepare a report on the class upon your completion of the training.

This will complete Section L #7 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 42	Date Assigned	Date Due

You have received a plastic bag containing damaged bullets, bullet fragments and bullet cores of various calibers. Determine the methods and techniques used to differentiate between the lead bullets and bullet cores. Identify each of the items present in the assignment bag. Be as complete and thorough as possible. Prepare appropriate notes and photographs of your findings.

You will need PRACTICAL EXERCISE #16 to complete this assignment.

This will complete Section I #15 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 43	Date Assigned	Date Due

Using a 22 caliber rifle, test fire and recover two test fired bullets and compare them with each other. Using this same firearm, slug the barrel and compare the previously-fired test bullets with the bullets used to slug the barrel. Cut off approximately three inches of the muzzle of the barrel. Test fire and recover two test bullets using the same ammunition as above. Slug this portion of the barrel and compare these tests with the previous test slugged bullets. Microscopically compare these bullets with each other and with the previously-fired test bullets. Contact (*Name of Person*) to obtain a firearm for this assignment.

Compile a list of reasons as to why bullet identifications cannot be made in 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 testing you have conducted on the various assignments and practical exercises.

This will complete Sections I #22, 23 and 28 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 44	Date Assigned	Date Due

Obtain a copy of and become familiar with your laboratory's firearm section standard operating procedures (technical procedures) for the examination of fired bullets.

Obtain different types of mediums to use in testing. These should include aluminum, sheet metal similar to that used in automobiles, different types of plastic and glass (tempered, plate and laminated). Using several different calibers (22, 25, 9mm and 38) fire different firearms into each of the test mediums. Determine the feasibility of determining caliber and/or the rifling characteristics of the firearm from an examination of these bullet holes. Be prepared to discuss how much information you could provide to an investigator from your examination of these holes. Also change the angles of the shots to determine if this would potentially change your findings.

Discuss the significance of identifying manufacturing tool marks on a fired bullet from a shooting victim to those on unfired bullets from cartridges obtained from a suspect. Read the article in the April 1985 issue of the Crime Laboratory Digest concerning "Manufacturing Toolmark Identification on the Base of Jacketed Bullets."

This will complete Section I #4, 29 and 30 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 45	Date Assigned	Date Due

Using a 30 caliber rifle, test fire two each of the following cartridges and compare the test fired bullets with each other. Discuss your plans and procedures with your Training Officer before conducting any tests. Prepare notes and a report on your findings. All comparisons should be verified by the Training Officer.

a) 30 caliber jacketed soft-point bullets
b) 30 caliber nickel plated bullets
c) 30 caliber steel jacketed bullets
d) 30 caliber copper jacketed bullets

Using a .32 S&W revolver, test fire two each of .32 S&W and .32 Auto ammunition and compare the test fired bullets with each other. Prepare notes and a report on your findings. All comparisons should be verified by the Training Officer.

Obtain at least four different polygonally rifled pistols in the same caliber. Test fire each of these pistols. Compare the test fired bullets from each pistol with each other and with the test fires from the other pistols. Prepare notes and a report on your findings. All comparisons should be verified by the Training Officer.

This will complete Section I #24, 25 and 26 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 46	Date Assigned	Date Due

For this assignment you will either obtain test fires by test firing firearms with consecutively manufactured barrels and/or you will be given bullets test fired from firearms with consecutively manufactured barrels. Conduct microscopic comparisons between each set of consecutively manufactured barrels. (intercompare test fires from consecutively manufactured barrels and intracompare test fires from the same barrel) Observe the differences and similarities in the individual striations observed and prepare a written report discussing your findings and observations.

This will complete Section I #18 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 47	Date Assigned	Date Due

Obtain a copy of and become familiar with your laboratory's firearm section standard operating procedures (technical procedures) for the examination of cartridges and cartridge cases.

Define class characteristics as the term applies to markings on an unfired cartridge or a fired cartridge case. Determine the types of marks which can be left on a cartridge/cartridge case during chambering, extraction and firing. Prepare a written report concerning your findings and conclusions.

Read the following article from the spring 2001 issue of the AFTE Journal and discuss manufacturing marks with the Training Officer.

a) "Overview of Manufacturing Marks on Center Fire Cartridges"

This will complete Section J #2, 3 and 4 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 48	Date Assigned	Date Due

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., M11/Nine, submachine gun
b) 9mm Glock pistol
c) .45 Auto caliber U.S. Pistol, Model 1911A1
d) 9mm H&K, P7, pistol
e) .22 Long Rifle caliber Ruger, MKII, pistol
f) .22 Long Rifle caliber Ruger, 10/22, rifle

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

This will complete Section J #9 and 10 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 49	Date Assigned	Date Due

Test fire the following listed firearms, using comparable CCI, Remington, Federal, and Winchester ammunition of the appropriate caliber for each firearm. Select ammunition with both nickel and brass primers. Test fire each firearm at least twice using each brand of ammunition.

a) Smith & Wesson Model 10 .38 Special revolver
b) Smith & Wesson Model 19 .357 Magnum revolver
c) Smith & Wesson Model 39 9mm Luger pistol
d) Colt Woodsman .22 Long Rifle pistol

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

This will complete Section J #11 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 50	Date Assigned	Date Due

Test fire a .22 Long Rifle Smith and Wesson revolver using six .22 Long Rifle cartridges; six .22 Long cartridges; and six .22 Short cartridges with the same manufacturer. Mark each cartridge to note the chamber in which it is fired.

Using the test cartridge cases from the above, microscopically examine all the markings with each other. Include the following types of markings in your microscopic comparisons: firing pin impression, breech face marks, chamber marks, anvil marks. Photograph the results of your comparisons.

This will complete Section I #12 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 51	Date Assigned	Date Due

Prepare a written report concerning comparing and identifying reloading marks on cartridges and/or cartridge cases. Identify the various types of marks that may be indicative of reloaded ammunition.

Become familiar with the reloading equipment in the firearm section and the procedures used in reloading cartridges. If possible, reload several cartridges and compare reloading marks on these cartridges with each other. Photograph the results of your comparisons.

Research the feasibility of comparing and identifying manufacturing tool marks such as bunter marks on a fired cartridge case from a crime scene with cartridges associated with a suspect. Prepare a written report on your findings and cite your references. Obtain samples and examples of these toolmarks. Conduct microscopic comparison of these various types of manufacturing toolmarks which may be present on cartridges or cartridge cases.

This will complete Section J #14 and 15 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 52	Date Assigned	Date Due

Test fire at least two cartridges from a .30 Carbine U.S., M1 Carbine rifle (if available) and compare all marks on the test fired cartridge cases to each other. Evaluate all marks imparted to the fired cartridge cases. Load and extract cartridges from this same firearm. Note and compare all marks imparted to the test cartridges. Note any different or unusual markings. Make microscopic comparisons of these areas and photograph the results.

Obtain test fired cartridge cases from a Heckler & Koch rifle. Discuss the chamber marks produced by this type of firearm. Document your findings with photographs.

This will complete Section J #16 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 53	Date Assigned	Date Due

Test fire the following types of firearms, collect test fired cartridge cases and bullets, and then thoroughly clean the breech and bore areas of each firearm. Test fire the firearms again and compare the bullets and cartridge cases. Note and photograph your observations and any differences.

a) Semiautomatic centerfire pistol
b) Semiautomatic rimfire pistol
c) Centerfire revolvers
d) Rimfire revolvers
e) Semiautomatic centerfire rifle (gas operated)

This will complete Section J #17 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 54	Date Assigned	Date Due

Familiarize yourself with the use of the Standard Ammunition File (SAF) or laboratory ammunition reference collection regarding the determination of gauge and manufacturer of fired shotshell components. Learn the limitations regarding making such determinations. Demonstrate your proficiency in using the SAF or your laboratory's ammunition reference collection to conduct this type of search to your Training Officer.

Research the current U. S. shot sizes and weights. Obtain a chart reflecting this data. Familiarize yourself with the variations worldwide in shot sizes and composition. Learn the significance of the "Rule of 17" as it applies to shot size.

This will complete Section K #2 and 9 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 55	Date Assigned	Date Due

Determine what type of examinations can be conducted and what conclusions can be reached from an examination of the following components. Prepare a written report concerning your findings and obtain examples of each. Photograph areas of interest and perform microscopic examinations where applicable.

a) Shot, deformed and intact
b) Fired card or fiber wads
c) Fired plastic wads
d) Fired shotshells
e) Unfired shotshells
f) Shot buffer material
g) Shot collar and shot cup

As part of this week assignments, you are to complete PRACTICAL EXERCISE #17.

This will complete Section K #1 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 56	Date Assigned	Date Due

Test fire the following shotguns or similar models using at least two test shotshells from each shotgun and microscopically examine the marks imparted to these fired shotshells. Include in your examinations the following types of marks: firing pin impression, breech face marks (primer, battery cup, and head), extractor marks, ejector marks, chamber marks, and any other mechanism marks. Photograph these marks and discuss the significance of identifying any of these types of marks with the Training Officer.

a) Marlin Model 55 bolt action
b) Remington Model 1100 semi-automatic
c) Mossberg Model 500 pump action
d) J.C. Higgins Model 1011 top-break single shot
e) Stevens Model 311 side-by-side double barrel

This will complete Section K #4 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 57	Date Assigned	Date Due

Using a 12 gauge Remington Model 1100 shotgun from the Firearm Reference Collection (FRC), obtain at least two test fired shotshells with each of the following types of ammunition. Recover a representative number of the fired shot pellets and fired shot wads from each type of ammunition. Compare marks observed on the test fired shotshells to each other. Compare fired components to unfired components of the same ammunition type. Discuss the significance of your findings with the Training Officer.

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 1/2 shot

This will complete Section K #7 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 58	Date Assigned	Date Due

Obtain one or more sawed off shotguns from the Firearm Reference Collection (FRC). Test fire these using various types of ammunition in order to recover the wads. Include both plastic wads and fiber wads in your test ammunition. Alternately, obtain test fired shotshell wads from a shotgun with a barrel that was sawed off with a hacksaw or similar tool. Conduct microscopic examinations of the recovered wads. Photograph the results of your examinations.

This will complete Section K #3 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 59	Date Assigned	Date Due

Prepare a report which discusses in detail the procedures used in reloading shotshells. List your references.

Determine how to recognize reloaded shotshells from an examination of the fired shotshell and/or its components. Demonstrate your results to the Training Officer.

Familiarize yourself with the shotshell reloading equipment available in the firearm section.

If possible, reload shotshells using the shotshell reloading equipment in the firearm section, if not obtain reloaded shotshells. Make microscopic examinations of the marks produced by the reloading equipment. Photograph the results of your examinations.

This will complete Section K #8 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 60	Date Assigned	Date Due

If applicable, prepare the chemicals and the test papers used in the following tests under the direction of the Training Officer (review the relevant Safety Data Sheets (SDS) before preparing reagents):

Prepare a written report which describes in detail the chemical reactions that take place in the burning of smokeless powder, the modified Griess test, and other tests from the above list as applicable in your laboratory.

This will complete Section L #3 and 4 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 61	Date Assigned	Date Due

Read the Handbook of Methods for the Restoration of Obliterated Serial Numbers, by Treptow. Be prepared to discuss the theory behind serial number restoration.

Define in your notebook “serial number” and “serial number restoration”.

Obtain a stamped piece of metal from the Training Officer and sketch the entire stressed area above and below the indented marks. Describe what remains when the indented area is removed.

List the various methods used by manufacturers to mark products we commonly encounter as evidence items. This list should include but not be restricted to: casting, stamping, embossing, debossing, coining, vibratory pencil, pin stamping, laser and electrical discharge machining.

Prepare a written report which covers the following areas:

a) The effect each of the above methods of marking techniques has on the subsurface of the marked area.
b) How and why each of the above marking methods will affect the ability of the examiner to restore any obliterated markings.

Define in your notebook the term "plastic deformation" of metal and briefly discuss the difference between cold rolled steel and cast iron metal.

Prepare a short oral presentation discussing the effect that the following types of alterations will have on the subsurface of the marked item and how it may impact an examiner’s results.

a) Grinding
b) Over stamping
c) Peening

d) Gouging
e) Heating
f) Puddling
g) Welding
h) Removal
i) Scratching/filing
j) Drilling
k) Painting
l) Combinations of the above

This will complete Section N #1 through 7 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 62	Date Assigned	Date Due

Discuss the selection of a specific approach to a restoration attempt based on distinct characteristics observed for various alteration methods.

Be prepared to discuss the different types of lighting (e.g., incandescent, infrared, UV, and fluorescent) and how they can improve or enhance the restoration results.

Prepare a short written paper discussing various methods of surface preparation, such as sanding and polishing, and how they may affect the results in a restoration attempt.

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.

Become familiar with the following chemicals:

a) $CuNH_4Cl_2$
b) $CuCl_2$
c) NaOH
d) HCl
e) HNO_3
f) H3PO4
g) Aqua Regia
h) H_2SO_4
i) $FeCl_3$
j) HF

Be prepared to discuss the following areas:

If the reaction rate for a stressed area is faster or slower than the etching rate of the rest of the surface and why.

Specialized equipment that may be used in serial number restorations. The technique known as Magnetic Particle Inspection (MPI), what firearms it may be used on, and why the method is nondestructive.

The appropriate documentation, photography techniques and procedures to be used before, during, and after restoring obliterated serial numbers.

The various kinds of magnifying and enhancing equipment used for number restoration and when and why each would be used.

This will complete Section N #8 through 12 & 16 through 20 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 63	Date Assigned	Date Due

Obtain a copy of the chemical hygiene policies of the Firearm Section. Know where the proper safety equipment (e.g. eyewear, masks, gloves, and lab coats) is maintained.

Record in your notebook how to prepare each of these reagents/solutions (include any other reagents/solutions utilized in your laboratory) as well as what types of metal they should be used on:

a) Fry's reagent
b) Ferric chloride solution
c) Turner's reagent
d) Davis' reagent
e) Acidic ferric chloride solution
f) Nitric acid 25% solution
g) Sodium hydroxide 10% solution

Determine the types of files contained in NCIC and how they might assist the examiner in number restoration.

Become familiar with the numbering systems and methods used by manufacturers of frequently encountered firearms including, but not limited to, Colt, Ruger, Smith & Wesson, Glock, Hi-Point, Beretta, Winchester and Remington.

Determine the most suitable chemicals and techniques to use in an attempted serial number restoration for the following firearms:

a) Colt pistol
b) Smith & Wesson revolver
c) RG Industries revolver
d) Ruger stainless steel revolver
e) Shotgun alloy receiver
f) Chrome/nickel pistol
g) Winchester rifle
h) Shotgun case hardened receiver

Be prepared to discuss with your Training Officer the following subjects:

How the combination of brief application of $CuNH_4Cl_2$ followed by normal NaOH application can shorten the processing time on aluminum.

Why alternating HNO_3 and HCl can work so well on chrome or nickel plated firearms.

The advantages of maintaining databases pertaining to restored serial number in casework.

Obtain several firearms with serial numbers or stamped pieces of metal from the Training Officer. Alter the serial numbers using different methods and then attempt to restore them. Document your results and conclusions with notes and photographs.

Research the effect of electricity on the reaction time of the different chemical techniques you have learned. Be prepared to discuss and demonstrate this method.

This will complete Section N #22 through 29 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 64	Date Assigned	Date Due

Review your notes in reference to Section D: Manufacture of Modern Firearms. The machining methods described represent the same basis for tool mark identification as for firearm examination. Discuss with the Training Officer.

Define the terms "tool" and “tool mark identification”. Determine the range of conclusions that may be reached in tool mark identification and discuss the definitions and range of conclusions in detail with the Training Officer.

Discuss the significance of examining submitted tools first for trace evidence. List several types of trace evidence that may be encountered. Discuss with the Training Officer the potential evidentiary value of trace evidence observed on tools or evidence displaying tool marks, and the prioritization they should receive in forensic examinations.

Produce a written report concerning cases involving a toolmark examination wherein no tool is submitted. Include the types of conclusions which can be reached. Also include such things as the type of tool, size of the tool, action employed by tool, value of toolmark for comparison purposes, and unusual tool features.

Investigate pressure/contact examinations in regard to objects which may have been in contact with each other for an extended time. Research several cases of this type and set these out in your notes.

Discuss and demonstrate the casting of toolmarks using various casting materials. Also discuss the potential of such casts and of photographs alone in making toolmarks identifications.

This will complete Section M #1 through 4, 19 and 21 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 65	Date Assigned	Date Due

Prepare a written report defining the following terms as they relate to tool mark examinations. Give three examples of tools or methods which could produce each category:

a) Shearing action
b) Pinching action
c) Scraping action
d) Slicing action
e) Gripping action
f) Prying action
g) Crimping action
h) Impressed tool mark
i) Striated tool mark
j) Fracture

Be prepared to discuss the term "class characteristics" as it applies to tool mark examinations. Using the tools or methods selected as examples in the paragraph above, describe their respective class characteristics in detail.

Select at least two tools which are representative of each tool action category in the above paragraph. Produce tool marks with each tool and observe the class characteristics of the toolmark. When generating tool marks, vary the angle and force applied with each tool. Evaluate and identify the working surface of each tool and potential for individual characteristics.

This will complete Section M #5 and 7 of your training manual.

Training Officer Date Completed

TRAINING ASSIGNMENT

Student	Assignment 66	Date Assigned	Date Due

As you prepare for mock trials and subsequent courtroom testimony, the following areas will be the topics of a discussion *(Date & Time).*

Formulate answers to each of the following questions:

a) What is Frye vs. United States (1923)?

b) What is FRE 702?

c) What is Daubert vs. Merrell Dow Pharmaceuticals (1993) and what are the five prongs of Daubert?

Examine the SWGGUN Admissibility Resource Kit (ARK) and prepare an outline of some of the landmark court cases involving the admissibility of Firearm and Tool Mark Identification testimony and the supportive or dissenting decisions reached in those cases. Be prepared to discuss your findings.

Become familiar with the thirteen recommendations of the 2009 National Academy of Science Report 'Strengthening Forensic Science in the United States: A Path Forward.' Discuss these recommendations with your Training Officer and the effects of the NAS report on the future of Forensic Science.

Read and discuss the responses of the following organizations to the 2009 NAS Report:

a) AFTE

b) ASCLD

c) SWGGUN

The importance of being able to defend the science of Firearm and Tool Mark Identification in the courtroom cannot be understated. Examine the following arguments of some of Firearm and Tool Mark Identifications' biggest critics and provide support against such arguments. Be prepared to discuss your findings.

a) Subclass and individual characteristics are indistinguishable.

b) Toolmarks are non-permanent and change over time.

c) Individual characteristics are a combination of non-unique marks.
d) Pattern matching is subjective.
e) Firearms Identification is plagued by examiner bias.
f) Firearms Identification lacks statistics.

Read and become familiar with the September 2016 President's Council of Advisors on Science and Technology (PCAST) Report 'Ensuring Scientific Validity of Feature-Comparison Methods.' What is a 'Black-Box Study' as defined in the PCAST Report? Read and discuss the following organization responses to the PCAST Report with your Training Officer.

a) OSAC Firearm and Tool Mark Subcommittee
b) AFTE
c) ASCLD LAB
d) FBI
e) National District Attorney's Association (NDAA)
f) BATFE
g) IAI

This will complete Section N #4 and 9 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 1	Date Assigned	Date Due

You have received a plastic bag which contains ammunition and ammunition components. These items are to be used in this exercise. Each term listed below is represented in at least one of the items of ammunition or ammunition components in the bag. You need to mark the items with the proper letter by the term. Use a permanent marker. Some of the items will have more than one applicable term and each will have at least one.

a) Cartridge
b) Cartridge case
c) Primer
d) Shotshell
e) Shotshell casing
f) Bottleneck cartridge
g) Rebated-rim cartridge
h) Rimless cartridge
i) Rimmed cartridge
j) Semi-rimmed cartridge
k) Shoulder
l) Neck
m) Mouth
n) Head
o) Headstamp
p) Brass-coated lead bullet
q) Tapered cartridge
r) Extractor groove
s) "Silvertip" bullet
t) Bullet
u) Round-nosed bullet
v) Hollow-point bullet
x) Jacketed bullet
y) Wadcutter bullet
z) Semi-wadcutter bullet
aa) Soft point bullet
bb) Spitzer bullet
cc) Cast lead bullet
dd) Truncated-nosed bullet
ee) Cannelure
ff) Ogive
gg) Copper-coated lead bullet
hh) Nylon-coated lead bullet
ii) Crimp
jj) Lubaloy
kk) Wadding
ll) Berdan primer
mm) Battery cup
nn) Boxer primer

Make sure the marks are legible.

This will complete Section E #2 of your training manual.

Training Officer	Date Completed

PRACTICAL EXERCISE

Student	Exercise 2	Date Assigned	Date Due

Purpose: The purpose of this assignment is to build an easily accessible and readily searchable ammunition reference file for shared use at the laboratory bench. This abbreviated reference file will contain examples of a particular caliber type typically examined in firearm section casework, such as .22 Long Rifle, .38 Special, 9mm Luger, .357 Magnum and others, but it will not take the place of the Firearm Section Standard Ammunition File.

Procedure:

1. Each trainee will meet with the training officers to select a caliber type for this project. This coordination will preclude any duplication of effort.

2. Prepare partially drilled wooden display blocks or obtain ammunition boxes to accommodate the specimens. Blocks/boxes should accommodate an unfired specimen paired with a pulled bullet as a set for each example of ammunition.

3. Survey the ammunition storeroom for examples to be included, consisting of common brands and their variations as far as cartridge case and bullet types within a given caliber type.

4. Number the various cartridge/pulled bullet pairs sets and organize a typed index on paper so that copies can be distributed to the unit to facilitate shared use.

5. Coordinate with the training officers and other trainees to attain a degree of uniformity in the appearance of these boards/boxes and index sheets.

This will complete Section E #6 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 3	Date Assigned	Date Due

Purpose: This exercise is designed to introduce the student to proper techniques in conducting examinations of revolvers submitted as evidence. The exercise is designed to familiarize the student with the proper unit forms used in note taking, proper methodology for determining operability, trigger pull and safety feature testing.

Procedure:

1. The trainee will receive three double-action revolvers.

2. The trainee will use the Firearm Section firearm worksheet and prepare a worksheet on each firearm examined.

3. The trigger pull in both single and double action modes should be determined on each of the submitted revolvers.

4. Test fire each revolver three times in the single-action mode and three times in the double-action mode. Keep the single-action test fires and double-action test fires separate. These will be used in a later practical exercise.

5. Prepare a written report concerning each of the submitted revolvers using Firearm Section standard terminology and style.

6. Upon completion of the above activities provide your reports, work sheets, notes, test fires and revolvers to the training officers for a critique of your work.

This will complete Section E #9, 13 and 16 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 4	Date Assigned	Date Due

Purpose: This exercise is designed to provide the student with an opportunity to develop proper techniques conducting examinations of revolvers submitted as evidence. The exercise is designed to familiarize the student with revolvers that may be damaged, dirty, rusted or unusual in design.

Procedure:

1. The trainee will receive three double-action type revolvers.

2. The trainee will use the Firearm Section firearm worksheet and prepare a worksheet on each firearm examined.

3. The trigger pull in both single and double action modes should be determined on each of the submitted revolvers.

4. Test fire each revolver three times and retain test fires.

5. Prepare a written report concerning each of the submitted revolvers using Firearm Section standard terminology and style.

6. Upon completion of the above activities provide your reports, work sheets, notes, test fires and revolvers to the training officers for a critique of your work.

This will complete Section E #15 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 5	Date Assigned	Date Due

Purpose: This exercise is designed to provide the student with an opportunity to develop proper techniques conducting examinations of handguns submitted as evidence. The exercise is designed to familiarize the student with different types of handguns that may have safety problems.

Procedure:

1. The trainee will receive three handguns.

2. The trainee will use the Firearm Section Firearm Work Sheet and prepare a work sheet on each firearm examined.

3. The trigger pull in both single and/or double action modes should be determined on each of the submitted handguns.

4. Test fire each handgun three times and retain the test fires.

5. Prepare a written report concerning each of the submitted revolvers using Firearm Section standard terminology and style.

6. Upon completion of the above activities provide your reports, work sheets, notes, test fires and revolvers to the training officers for a critique of your work.

This will complete Section E #22, H #20 and 21 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 6	Date Assigned	Date Due

Purpose: This exercise is designed to provide the student with an opportunity to develop proper techniques conducting examinations of handguns submitted as evidence. The exercise is designed to familiarize the student with semiautomatic pistols that may have been altered.

Procedure:

1. The trainee will receive three pistols.

2. The trainee will use the Firearm Section firearm worksheet and prepare a worksheet on each firearm examined.

3. The trigger pull should be determined on each of the submitted handguns.

4. Test fire each handgun three times and retain the test fires. Also test each firearm to determine if it would meet the elements of proof to be classified as a machine gun.

5. Prepare a written report concerning each of the submitted revolvers using Firearm Section standard terminology and style.

6. Upon completion of the above activities provide your reports, work sheets, notes, test fires and revolvers to the training officers for a critique of your work.

This will complete Section H #25D and 26 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 7	Date Assigned	Date Due

Purpose: The purpose of this assignment is to acquaint the student with the comparison microscope. This exercise is designed to familiarize the student with the controls and capabilities of the comparison microscopes located in the firearm section. It is not designed to test the student's ability to make comparative examinations.

Procedure: 1. Each trainee will receive two cartridge cases that have been fired from the same firearm.

2. The student will use each of the different brands of comparison microscopes present in the laboratory.

3. Learn and understand all of the control mechanisms that are present on each of the comparison microscopes. Be able to discuss each of these controls and how they function.

4. Ascertain if there are other lighting methods available within the laboratory. If there are different light sources available use these with the different microscopes and record your findings.

5. Observe the comparison with each of the objectives present on the nose pieces. Note the differences in depth of field, field of view and individual stria comparison at each objective size. Also adjust the aperture and observe the difference in light and depth of field produced by constricting the opening.

6. Take photographs of the cartridge cases showing the comparison of the breech face impression and also of the firing pin impression. Use automatic features if available as well as manual methods to obtain different type of images. Keep all of your photographs for discussion and be able to discuss problems encountered in photographing comparisons through the comparison microscope.

7. Demonstrate to the training officers your ability to calibrate one of the comparison microscopes. (Review laboratory procedures to obtain the proper microscope calibration protocols.)

This will complete Sections F #2 through 7 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 8	Date Assigned	Date Due

Purpose: The purpose of this assignment is to acquaint the student with the capabilities of the comparison microscope. This exercise is designed to familiarize the student with various types of evidence which will be examined with the comparison microscopes located in the firearm section. The student's ability to make comparative examinations is also a part of this assignment.

Procedure: 1. Each trainee will receive a plastic bag containing four items. Each item contains three bullets.

Item 1	full metal jacketed bullets
Item 2	coated lead bullets
Item 3	Nyclad bullets
Item 4	plain lead bullets

2. The student should conduct microscopic comparisons of each individual bullet within an item to determine if they have been fired from the same firearm. Proper notes and photographs should be made. Before proceeding, have all comparisons verified by one of the training officers.

3. After the microscopic comparisons have been completed on each individual item you should attempt to inter-compare one item to another to determine how many firearms might have been used to discharge these bullets.

4. Prepare a written report indicating your findings on the differences encountered with the different bearing surfaces that you have examined. Detail those areas that seemed easier for comparison and those that were harder. What are your findings concerning the inter-comparison of different bullet types? What are some of the pitfalls that might be present during these types of examinations?

This will complete Section F #8 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 8a	Date Assigned	Date Due

Purpose: The purpose of this assignment is to acquaint the student with the capabilities of the comparison microscope. This exercise is designed to familiarize the student with various types of evidence which will be examined with the comparison microscopes located in the firearm section. The student's ability to make comparative examinations is also a part of this assignment.

Procedure: 1. Each trainee will receive a plastic bag containing four items. Each item contains three bullets.

Item A	three (3) full metal jacketed bullets
Item B	three (3) plain lead bullets
Item C	three (3) coated lead bullets
Item D	three (3) 'Silvertip' jacketed bullets

2. The student should conduct microscopic comparisons of each individual bullet within an item to determine if they have been fired from the same firearm. Proper notes and photographs should be made. Before proceeding make sure all comparisons have been verified by the Training Officer.

3. After the microscopic comparisons have been completed on each individual item, you should attempt to compare one item to another to determine how many firearms may have been used to discharge these bullets.

4. Prepare a written report indicating your findings on the differences encountered with the different bearing surfaces that you have examined. Detail those areas that seemed easier for comparison and those that were harder. What are your findings concerning the comparison of different type bullets? What are some of the pitfalls that might be present during these types of examinations?

5. Determine the type and brand of firearm(s) that could have been used to fire these bullets.

This will complete Section I #14 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 9	Date Assigned	Date Due

Purpose: The purpose of this assignment is to acquaint the student with the capabilities of the laboratory reference material concerning "no gun cases." This exercise is designed to familiarize the student with the Standard Ammunition File (SAF)/Ammunition Reference Collection, the Known Specimen File (KSF)/Test Fire Reference Collection and the General Rifling Characteristics (GRC) in the firearm section, if available.

Procedure: 1. Each trainee will receive a plastic bag containing seven bullets.

2. The student should determine the weight, diameter, number of lands and grooves, and direction of twist. Measure the land and groove impressions for use with the GRC files. Use the forms that are currently in use by firearm section examiners.

3. Prepare a written report indicating your findings as to the caliber, brand and type of bullet of each exhibit. Prepare a GRC print-out listing the possible guns that could have fired each bullet. Include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain chain of custody records.

This will complete Section I #3, 9, 10 and 13 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 10	Date Assigned	Date Due

Purpose: The purpose of this assignment is to acquaint the student with the capabilities of the laboratory reference material concerning "no gun cases." This exercise is designed to familiarize the student with the Standard Ammunition File (SAF)/Ammunition Reference Collection, the Known Specimen File (KSF)/Test Fire Reference Collection and the General Rifling Characteristics (GRC) in the firearm section, if available.

Procedure: 1. Each trainee will receive a plastic bag containing six bullets.

2. The student should determine the weight, diameter, number of lands and grooves, and direction of twist. Measure the land and groove impressions for use with the GRC file(s). Use the procedures and forms that are currently in use by section examiners.

3. Prepare a written report indicating your findings as to the caliber, brand and type of bullet of each exhibit. Prepare a listing of the possible guns that could have fired each bullet. Include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain chain of custody records.

This will complete Section I #14 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 11	Date Assigned	Date Due

Purpose: The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to consult with examiners for assistance.

Procedure: 1. The student will receive the following items of evidence:

Item #1	full metal jacketed bullet
Item #2	cartridge case
Item #3	Browning semi-auto pistol, 9mm Luger, SN:
Item #3A	three (3) cartridges from Item 3
Item #4	Browning semi-auto pistol, 9mm Luger, SN:
Item #4A	three (3) cartridges from Item 4

2. The student should examine all the evidence involved in this "case" and determine if the bullet (Item #1) and the cartridge case (Item #2) were fired by either submitted pistol.

3. Prepare a written report indicating your findings. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain chain of custody records.

This will complete Section I #21 of your training manual.

Training Officer	Date Completed

PRACTICAL EXERCISE

Student	Exercise 12	Date Assigned	Date Due

Purpose: The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to consult with other examiners for assistance.

Procedure: 1. The student will receive the following items of evidence:

Item #1	full metal jacketed bullet
Item #2	cartridge case
Item #3	round nose lead bullet
Item #4	three (3) cartridge cases from Item 5
Item #5	Ruger, double-action revolver, 357 Magnum

2. The student should examine all the evidence involved in this "case" and determine if the bullets (Item #1 and Item #3) and the cartridge cases (Item #2 and Item #4) were fired by the revolver (Item 5).

3. Prepare a written report indicating your findings. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain custody records.

This will complete Section I #20 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 13	Date Assigned	Date Due

Purpose: The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to consult with other examiners for assistance.

Procedure: 1. The student will receive the following items of evidence:

Item #1 full metal jacketed bullet
Item #2 cartridge case
Item #3 Ruger, double-action revolver, 357 Magnum SN:
Item #4 Ruger, double-action revolver, 357 Magnum SN:

2. The student should examine all the evidence involved in this "case" and determine if the bullet (Item #1) and the cartridge case (Item #2) were fired by either revolver submitted.

3. Prepare a written report indicating your findings. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain chain of custody records.

This will complete Section I #16 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 14	Date Assigned	Date Due

Purpose: The purpose of this assignment is to begin development of casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to consult with other examiners for assistance before completion of this assignment.

Procedure: 1. The student will receive the following items of evidence:

Item #1	full metal jacketed bullet
Item #2	round nose lead bullet
Item #3	round nose lead bullet
Item #4	full metal jacketed bullet
Item #5	cartridge case
Item #6	cartridge case
Item #7	H & R revolver
Item #8	Walther pistol

2. The student should examine all the evidence involved in this "case" and determine which (if any) of the bullets and cartridge cases were fired by either firearm submitted.

3. Prepare a written report indicating your findings. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain custody records.

This will complete Section I #17 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 15	Date Assigned	Date Due

Purpose: The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to consult other examiners for assistance.

Procedure: 1. The student will receive the following items of evidence:

Item #1	three lead bullets
Item #2	Smith & Wesson revolver SN:
Item #3	three cartridge cases
Item #4	three lead bullets
Item #5	Smith & Wesson revolver SN:
Item #6	three cartridge cases

2. The student should examine all the evidence involved in this "case" and determine which (if any) of the bullets and cartridge cases were fired by either firearm submitted.

3. Prepare a written report indicating your findings. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain custody records.

This will complete Section I #19 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 16	Date Assigned	Date Due

Purpose: The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and cartridge case comparisons. This practical exercise is to be considered as an examination. You may ask the Training Officer for guidance, but all conclusions will be made by the trainee without benefit of verification. In addition, the student needs to prepare for moot court concerning this evidence. There will be an open completion date. This will enable the student to work the practical exercise as a "real" case, however any unreasonable delays will have to be explained and accepted by the Training Officer. Unlike casework the "no conclusion" answer is not an acceptable response on this exercise.

Procedure: 1. The student will receive the following items of evidence:

Item #1	Caliber .45 Auto pistol
Item #2	Caliber .45 Auto pistol
Item #3	Caliber .45 Auto pistol
Item #4	Caliber .45 Auto pistol
Item #5	Caliber .45 Auto pistol
Item #6	cartridge case
Item #7	cartridge case
Item #8	cartridge case
Item #9	cartridge case
Item #10	cartridge case
Item #11	bullet
Item #12	bullet
Item #13	bullet
Item #14	bullet
Item #15	bullet

2. The student should examine all the evidence involved in this "case" and determine which (if any) of the bullets and cartridge cases were fired by the firearms submitted.

3. Prepare a written report indicating your findings. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain chain of custody records.

This will complete Section I #15 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 17	Date Assigned	Date Due

Purpose: The purpose of this assignment is to observe the differences and similarities in fired shotshells and determine the potential for identification by microscopic examination.

Procedure: 1. Each trainee will receive a plastic bag containing seven (7) fired shotshells.

2. The student should conduct all suitable examinations to determine how many firearms were involved and identify which (if any) of the fired shotshells were fired from the same firearm. Use the forms that are currently in use by firearm section examiners.

3. Prepare a written report indicating your findings concerning each exhibit. Prepare a listing of the possible types of guns that could have fired each shotshell. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises, treat this as a case. Remember to mark your evidence and maintain custody records.

This will complete Section K #1 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 18	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. The receipt of bullets and cartridge cases will be the first phase of this exercise. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Procedure: 1. The trainee will receive a plastic bag containing six (6) fired bullets and cartridge cases.

2. The student should conduct all suitable examinations to determine how many firearms were involved and identify which (if any) of the bullets and cartridge cases were fired from the same firearm. Use the forms that are currently in use by unit examiners.

3. Prepare a written report indicating your findings concerning each exhibit. Prepare a listing of the possible types of guns that could have fired the bullets and cartridge cases. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain chain of custody records.

This will complete Section J #18 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 19	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. The receipt of three suspect firearms will be the second phase of this exercise. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Procedure: 1. The trainee will receive a plastic bag containing three firearms.

2. The student should conduct all suitable examinations to determine if any of these firearms were used to fire any of the bullets and cartridge cases received in Practical Exercise #18. Use the forms that are currently in use by unit examiners.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain custody records.

This will complete Section J #18 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 20	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of tool mark evidence submitted from “crime scenes” that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Procedure: 1. The trainee will receive a paper bag containing three items, bolt cutters and two plastic bags with lead items that contain questioned toolmarks.

2. The student should conduct all suitable examinations to determine if any of these questioned toolmarks were made by the submitted bolt cutters. Use the forms that are currently in use by unit examiners.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain chain of custody records.

This will complete Section M #27 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 21A	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from "crime scenes" that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: A shooting occurred involving at least two individuals. Suspect #1 (the owner of the .380 Automatic pistol) claims suspect #2 (the owner of the .22 caliber rifle) fired first from across a street and he returned fire in self-defense.

Procedure: 1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain chain of custody records.

Evidence
Item 1 Marlin brand 22 caliber rifle
Item 2 three (3) lead bullets
Item 3 three (3) cartridge cases
Item 4 Semiautomatic pistol caliber 380 automatic
Item 5 three (3) jacketed bullets
Item 6 three (3) cartridge cases
Item 7 piece of shirt from suspect #2

This will complete Section J #18 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 21B	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: A shooting occurred involving at least two individuals. Suspect #1 (the owner of the 9mm Glock pistol) claims suspect #2 (the owner of the .25 caliber pistol) fired first from across a street and he returned fire in self-defense.

Procedure:

1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain custody records.

Evidence

Item 1	25 automatic caliber pistol
Item 2	three (3) jacketed bullets
Item 3	three (3) cartridge cases
Item 4	9mm Luger Glock pistol
Item 5	three (3) jacketed bullets
Item 6	three (3) cartridge cases
Item 7	piece of shirt from suspect #2

This will complete Section J #18 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 22A	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: Several drive-by shootings have occurred in residential areas. No suspects have been developed, but the detectives think that the three different shootings are related to the same gang.

Procedure: 1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain custody records.

Evidence

Item #1	three (3) cartridge cases from crime scene #1
Item #2	two (2) jacketed bullets from crime scene #1
Item #3	three (3) cartridge cases from crime scene #2
Item #4	one (1) jacketed bullet from crime scene #2
Item #5	four cartridge cases from crime scene #3
Item #6	three (3) jacketed bullets from crime scene #3

This will complete Section J #18 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 22B	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from crime scenes that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: Several drive-by shootings have occurred in residential areas. No suspects have been developed, but the detectives think that the three different shootings are related to the same gang.

Procedure: 1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain chain of custody records.

Evidence

Item #1	four (4) cartridge cases from crime scene #1
Item #2	one (1) jacketed bullet from crime scene #1
Item #3	three (3) cartridge cases from crime scene #2
Item #4	two (2) jacketed bullets from crime scene #2
Item #5	three (3) cartridge cases from crime scene #3
Item #6	three (3) jacketed bullets from crime scene #3

This will complete Section J #18 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 23A	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: A homicide occurred in an apartment. The suspect claims he was cleaning the firearm when it went off accidentally and struck his wife in the chest. He says she was standing in the doorway about six (6) feet from him when the shot was fired.

Procedure:

1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain chain of custody records.

Evidence

Item #1	cartridge case from crime scene
Item #2	revolver from crime scene
Item #3	portion of shirt from victim
Item #4	bullet from victim

This will complete Section L #16 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 23B	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from crime scenes that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: A homicide occurred in an apartment. The suspect claims he was cleaning the firearm when it went off accidentally and struck his wife in the chest. He says she was standing in the doorway about six (6) feet from him when the shot was fired.

Procedure: 1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain chain of custody records.

Evidence

Item #1	two cartridge cases from crime scene
Item #2	revolver from crime scene
Item #3	portion of shirt from victim
Item #4	bullet from victim
Item #5	bullet from crime scene

This will complete Section L #16 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 24A	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: Police received a call from a person who indicated his roommate had committed suicide while he was alone in his bedroom.

Procedure: 1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain custody records.

Evidence

Item #1	cartridge case
Item #2	revolver from crime scene
Item #3	portion of shirt from victim
Item #4	bullet from victim

This will complete Section L #16 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 24B	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: Police received a call from a person who indicated his roommate had committed suicide while he was alone in his bedroom.

Procedure: 1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain custody records.

Evidence

Item #1	two cartridge cases
Item #2	revolver from crime scene
Item #3	portion of shirt from victim
Item #4	bullet from victim

This will complete Section L #16 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 25A	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: A service station was robbed and the clerk was shot several times. Two suspects were apprehended. Each suspect claims they did not fire their weapon and are willing to testify against the other suspect.

Procedure: 1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain chain of custody records.

Evidence

Item #1	pistol from suspect #1 (Colt SN---------)
Item #2	pistol from suspect #2 (Colt SN---------)
Item #3	two cartridge cases
Item #4	two bullets from victim

This will complete Section J #18 of your training manual.

Training Officer Date Completed

PRACTICAL EXERCISE

Student	Exercise 25B	Date Assigned	Date Due

Purpose: The purpose of this assignment is to conduct examinations of evidence submitted from “crime scenes” that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Scenario: A service station was robbed and the clerk was shot several times. Two suspects were apprehended. Each suspect claims they did not fire their weapon and are willing to testify against the other suspect.

Procedure: 1. The student will receive a paper bag containing the evidence listed below.

2. The student should conduct all suitable examinations on all submitted evidence.

3. Prepare a written report indicating your findings concerning each exhibit. Also, include your notes when you turn in the assignment.

4. As with all Practical Exercises treat this as a case. Remember to mark your evidence and maintain custody records.

Evidence		
	Item #1	pistol from suspect #1 (Browning SN------)
	Item #2	pistol from suspect #2 (Browning SN -----)
	Item #3	two cartridge cases
	Item #4	two bullets from victim

This will complete Section J #18 of your training manual.

Training Officer Date Completed

INDEX OF PRACTICAL EXERCISES

PE #1	You have received a plastic bag which contains ammunition and ammunition components. These items are to be used in this exercise. Each term listed below is represented in at least one of the items of ammunition or ammunition components in the bag. You need to mark the items with the proper letter by the term. Use a permanent marker. Some of the items will have more than one applicable term and each will have at least one.
PE#2	The purpose of this assignment is to build an easily accessible and readily searchable ammunition reference file for shared use at the laboratory bench. This abbreviated reference file will contain examples of a particular caliber type typically examined in firearm section casework, such as .22 Long Rifle, .38 Special, 9mm Luger, .357 Magnum and others, but it will not serve to take the place of the Firearm Section Standard Ammunition File.
PE#3	This exercise is designed to introduce the student to proper techniques in conducting examinations of revolvers submitted as evidence. The exercise is designed to familiarize the student with the proper unit forms used in note taking, proper methodology for determining operability, trigger pull and safety feature testing.
PE#4	This exercise is designed to provide the student with an opportunity to develop proper techniques conducting examinations of revolvers submitted as evidence. The exercise is designed to familiarize the student with revolvers that may be damaged, dirty, rusted or unusual in design.
PE#5	This exercise is designed to provide the student with an opportunity to develop proper techniques conducting examinations of handguns submitted as evidence. The exercise is designed to familiarize the student with different types of handguns that may have safety problems.
PE#6	This exercise is designed to provide the student with an opportunity to develop proper techniques conducting examinations of handguns submitted as evidence. The exercise is designed to familiarize the student with semiautomatic pistols that may have been altered.
PE#7	The purpose of this assignment is to acquaint the student with the comparison microscope. This exercise is designed to familiarize the student with the controls and capabilities of the comparison microscopes located in the firearm section. It is not designed to test the student's ability to make comparative examinations.
PE#8	The purpose of this assignment is to acquaint the student with the capabilities of the comparison microscope. This exercise is designed to familiarize the student with various types of evidence which will be examined with the comparison microscopes located in the Firearm Section. The student's ability to make comparative examinations is also a part of this assignment.
PE#8A	The purpose of this assignment is to acquaint the student with the capabilities of the

comparison microscope. This exercise is designed to familiarize the student with various types of evidence which will be examined with the comparison microscopes located in the firearm section. The student's ability to make comparative examinations is also a part of this assignment.

PE#9 The purpose of this assignment is to acquaint the student with the capabilities of the laboratory reference material concerning "no gun cases." This exercise is designed to familiarize the student with the Standard Ammunition File (SAF)/Ammunition Reference Collection, the Known Specimen File (KSF)/Test Fire Reference Collection and the General Rifling Characteristics (GRC) in the firearm section, if available.

PE#10 The purpose of this assignment is to acquaint the student with the capabilities of the laboratory reference material concerning "no gun cases." This exercise is designed to familiarize the student with the Standard Ammunition File (SAF)/Ammunition Reference Collection, the Known Specimen File (KSF)/Test Fire Reference Collection and the General Rifling Characteristics (GRC) in the firearm section, if available.

PE#11 The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to consult with examiners for assistance.

PE#12 The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to consult with other examiners for assistance.

PE#13 The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to consult with other examiners for assistance.

PE#14 The purpose of this assignment is to begin development of casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no longer be able to ask another qualified examiner for assistance.

PE#15 The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and limited microscopic cartridge case comparisons. In addition, the student will no

longer be able to consult other examiners for assistance.

PE#16 The purpose of this assignment is to begin development of the trainee's use of laboratory casework procedures and "real" case scenarios. The student will be provided with several items of evidence which will require firearm examinations, microscopic bullet comparisons and cartridge case comparisons. This practical exercise is to be considered as an examination. You may ask the Training Officer for guidance, but all conclusions will be made by the trainee without benefit of verification. In addition, the student needs to prepare for moot court concerning this evidence. There will be an open completion date. This will enable the student to work the practical exercise as a "real" case, however any unreasonable delays will have to be explained and accepted by the Training Officer. Unlike casework the "no conclusion" answer is not an acceptable response on this exercise.

PE#17 The purpose of this assignment is to observe the differences and similarities in fired shotshells and determine the potential for identification by microscopic examination.

PE#18 The purpose of this assignment is to conduct examinations of evidence submitted from "crime scenes" that are part of an ongoing investigation. The receipt of bullets and cartridge cases will be the first phase of this exercise. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

PE#19 The purpose of this assignment is to conduct examinations of evidence submitted from "crime scenes" that are part of an ongoing investigation. The receipt of three suspect firearms will be the second phase of this exercise. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

PE#20 The purpose of this assignment is to conduct examinations of tool mark evidence submitted from "crime scenes" that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

PE#21A The purpose of this assignment is to conduct examinations of evidence submitted from "crime scenes" that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence		
	Item 1	Marlin brand 22 caliber rifle
	Item 2	three (3) lead bullets
	Item 3	three (3) cartridge cases
	Item 4	Semiautomatic pistol caliber 380 automatic
	Item 5	three (3) jacketed bullets
	Item 6	three (3) cartridge cases
	Item 7	piece of shirt from suspect #2

PE#21B The purpose of this assignment is to conduct examinations of evidence submitted from

"crime scenes" that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item 1	25 automatic caliber pistol
	Item 2	three (3) jacketed bullets
	Item 3	three (3) cartridge cases
	Item 4	9mm Luger Glock pistol
	Item 5	three (3) jacketed bullets
	Item 6	three (3) cartridge cases
	Item 7	piece of shirt from suspect #2

PE#22A The purpose of this assignment is to conduct examinations of evidence submitted from "crime scenes" that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item #1	three (3) cartridge cases from crime scene #1
	Item #2	two (2) jacketed bullets from crime scene #1
	Item #3	three (3) cartridge cases from crime scene #2
	Item #4	one (1) jacketed bullet from crime scene #2
	Item #5	four cartridge cases from crime scene #3
	Item #6	three (3) jacketed bullets from crime scene #3

PE#22B The purpose of this assignment is to conduct examinations of evidence submitted from crime scenes that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item #1	four (4) cartridge cases from crime scene #1
	Item #2	one (1) jacketed bullet from crime scene #1
	Item #3	three (3) cartridge cases from crime scene #2
	Item #4	two (2) jacketed bullets from crime scene #2
	Item #5	three (3) cartridge cases from crime scene #3
	Item #6	three (3) jacketed bullets from crime scene #3

PE#23A The purpose of this assignment is to conduct examinations of evidence submitted from "crime scenes" that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item #1	cartridge case from crime scene
	Item #2	revolver from crime scene
	Item #3	portion of shirt from victim
	Item #4	bullet from victim

PE#23B The purpose of this assignment is to conduct examinations of evidence submitted from

crime scenes that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item #1	two cartridge cases from crime scene
	Item #2	revolver from crime scene
	Item #3	portion of shirt from victim
	Item #4	bullet from victim
	Item #5	bullet from crime scene

PE#24A The purpose of this assignment is to conduct examinations of evidence submitted from crime scenes that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item #1	cartridge case
	Item #2	revolver from crime scene
	Item #3	portion of shirt from victim
	Item #4	bullet from victim

PE#24B The purpose of this assignment is to conduct examinations of evidence submitted from crime scenes that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item #1	two cartridge cases
	Item #2	revolver from crime scene
	Item #3	portion of shirt from victim
	Item #4	bullet from victim

PE#25A The purpose of this assignment is to conduct examinations of evidence submitted from crime scenes that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item #1	pistol from suspect #1 (Colt SN---------)
	Item #2	pistol from suspect #2 (Colt SN---------)
	Item #3	two cartridge cases
	Item #4	two bullets from victim

PE#25B The purpose of this assignment is to conduct examinations of evidence submitted from crime scenes that are part of an ongoing investigation. Conduct all examinations as if it were a real case and prepare the proper notes and reports that might be required.

Evidence	Item #1	pistol from suspect #1 (Browning SN------)
	Item #2	pistol from suspect #2 (Browning SN -----)
	Item #3	two cartridge cases
	Item #4	two bullets from victim