SCIENTIFIC WORKING GROUP for FIREARMS and TOOLMARKS

FORENSIC EXAMINATION GUIDELINES FOR SILENCERS

1.0 Objective/Introduction

The objective of the following guidelines is to identify the essential elements suggested for use in the forensic examination of silencers.

1.1 Establish procedures to reliably determine if a device is constructed or fabricated to reduce, suppress, attenuate or diminish the report of a firearm.

1.2 Review and/or validate established silencer examination protocols.

2.0 Definitions/Terminology

Standard terminology from sources such as the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) Federal Firearms Regulations Reference Guide, Association of Firearm and Tool Mark Examiners (AFTE) Procedures Manual and the AFTE Glossary should be used in the documentation of silencer examinations.

2.1 Commonly used terms may include:

- 2.1.1 Suppressor
- 2.1.2 Firearm muffler
- 2.1.3 Decibel
- 2.1.4 Sound meter
- 2.1.5 Sound pressure level
- 2.1.6 Report
- 2.1.7 Muzzle blast
- 2.1.8 Internal components, e.g., baffle, ported tube, wipes, end caps, bleed holes

3.0 Equipment/Supplies

Proper equipment should be used and checked for acceptable accuracy when appropriate.

3.1 Equipment and supplies may include:

- 3.1.1 Sound meter
- 3.1.2 Microphone
- 3.1.3 X-ray apparatus
- 3.1.4 Optical aids – borescope, stereoscope, magnifier
- 3.1.5 Safety equipment – ear muffs, eye protection

3.1.6 Chemicals for gunshot residue examinations (GSR)

3.1.7 Various tools for disassembly

3.1.8 Remote firing devices

3.1.9 Range or shooting facility

3.1.10 Distances measuring devices

4.0 Concepts

4.1 Muzzle blast is the most significant portion of the report of a firearm.

4.2 Muzzle blast is caused by high pressure of hot gases suddenly escaping from the front end of the barrel into the atmosphere as the bullet exits.

4.3 Reducing the pressure results in less sound generated.

4.4 Reduce gas temperature (cooling).

4.5 Delaying gas exit through trapping and turbulence or by a combination of above.

4.6 The functioning of the device or a portion of the device may not be the sole determining factor in the legal classification.

4.7 The evaluation of the design and configuration of a device may be a determining factor in the legal classification.

4.8 Quantitative and/or qualitative testing can be conducted.

5.0 Safety Considerations

General laboratory safety protocols should be followed accordingly.

5.1 Safe firearm handling

5.2 Range test firing safety procedures

5.3 Safe firing of suspect device

5.3.1 Structural integrity

5.3.2 Proper attachment

5.3.3 Proper alignment

5.3.4 Proper bore clearance

5.3.4.1 Clear of any extraneous obstructions

6.0 Procedures/Methods

6.1 Inspection – components and material used to fabricate.

6.1.1 Documentation of visible characteristics, which include external and internal examination.

6.1.1.1 An internal exam may include the use of specialized equipment.

6.1.1.2 Disassembly of the device may be required, but should be conducted only after a function test has been conducted.

6.1.2 Chemical and/or trace analysis can be utilized to detect gunshot residue.

6.1.2.1 Copper residue testing, e.g., dithiooxamide

6.1.2.2 Lead residue testing, e.g., sodium rhodizonate

6.1.2.3 Nitrite testing

6.1.2.4 Gunpowder

6.2 Function testing

6.2.1 Refer to Section 5.0 for safety considerations

6.2.2 Qualitative

6.2.2.1.1 A reduction in sound is noted when shots are fired with and without the device attached.

6.2.3 Quantitative

6.2.3.1.1 A firearm report is recorded and calculated with a sound measuring instrument(s) when multiple shots are fired with and without the device attached.

6.2.4 If a silencer is permanently attached to a firearm, every effort should be taken into consideration to closely replicate the evidence firearm without the silencer i.e. make, model, caliber and barrel length.

6.3 Operations and Controls

6.3.1 Controls

6.3.1.1 When conducting function testing, every effort should be made to standardize ammunition, position of equipment, firearm firing position and environment.

6.3.2 Quantitative Operations

6.3.2.1 A decibel meter or other sound level measuring equipment using the appropriate microphone should be utilized following the manufacturer's suggested protocols.

6.3.2.2 When conducting testing, the position of the firearm, sound level meter and microphone must remain constant.

6.3.2.2.1 The microphone should be positioned approximately 90 degrees from the muzzle of the firearm to optimize sound pressure level recordings, while maintaining maximum safety.

6.3.2.3 Measurements should be recorded as to the spatial relationship of the firearm to the sound level meter.

6.3.2.4 The environment must remain relatively constant throughout the testing.

6.3.2.5 Ammunition utilized should be from the same lot and/or box.

7.0 Documentation

7.1 Sketching

7.2 Narrative description

7.3 Photographic

7.4 Audio or video recording

7.5 Measurements

7.6 Computer assisted programs

8.0 Training / Qualification of Personnel

Training covering a broad range of topics may be required to conduct silencer examination.

8.1 Training may include the following:

8.1.1 Study of published materials and/or general procedure manuals

8.1.2 Equipment use, particularly the sound level manufacturer's protocols

8.1.3 Study under the guidance of experienced examiner

8.1.4 Report writing and testimony preparation

8.1.5 Mock casework and testimony presentation.

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