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**LAPD SWAT
TAKES FIRE
FROM THE
BRASS**

**Does
SWAT Need
Suppressors?**

**ARE YOU REALLY
FIT FOR DUTY?**

SHOOTING THE DPMS
MINI SASS RIFLE



Law enforcement tactical team makes entry into a vehicle using suppressed Heckler & Koch subguns.

The loud report of a weapon discharged next to an unprotected ear can deafen a tactical officer and give bad guys an advantage. But there's a simple solution to this problem that few entry teams use.

LAWRENCE HEISKELL, MD, FACEP, FAAFP

NOISE IS AN ENEMY OF HEARING, and it really does not take a lot of noise to damage your hearing. When the ears are exposed to extremely loud noise, inner ear structures can be damaged, sometimes permanently. This medical condition is called Noise Induced Hearing Loss (NIHL).

Noise is also the enemy of communications and tactical awareness. So to improve the performance of law enforcement tactical units and protect the hearing of their highly trained operators, it's time for agencies nationwide to invest in suppressors for the weapons used by their entry teams.

Current law enforcement tactics require that tactical team members be in very close proximity to one another as they search a structure for suspects. That means that weapons are typically held a few inches away from the ears of team members as each threat area is searched and cleared.

During such an operation, the immediate threat area is often flooded with multiple team members, carrying pistols, submachine guns, and assault weapons. A discharge of any of these firearms to engage or neutralize a threat is more than sufficient to produce a devastating irreversible noise injury to the hearing of the officers involved, especially those officers whose ears are inches away from the weapon. Repeated shots fired will inflict further damage on officers' hearing.

This devastatingly painful sound also has tactical implications. It disorients, distracts, and impairs the ability of the tactical operator to make split-second decisions. What that means is that when shots are fired, the team has been essentially "flash-banged," giving its opponent a tactical advantage. Think about the implications of what the team is facing if a motivated shooter (or shooters) understands and uses the effects of noise on their opponents.

While the tactical officer is focused on recovering from the noise injury, he is at a disadvantage and has lost his ability to focus on the threat. In addition, when multiple shots are fired in a close environment, there is always the risk of contagious fire and the sympathetic response from other startled officers to pull the trigger and inadvertently discharge their weapons.

Today, most entry teams do very little to protect their hearing should shots be fired. Some operators wear radio ear pieces on one of their ears, but this offers little protection against the report of any weapon at close range. Typically, the operators leave their non-radio ears unprotected to enhance their tactical awareness.

Some agencies require that tactical officers wear some form of hearing protection in the ear opposite the radio earbud. That may preserve an officer's hearing, but it diminishes tactical awareness, and the quality of protection that it offers can vary widely.

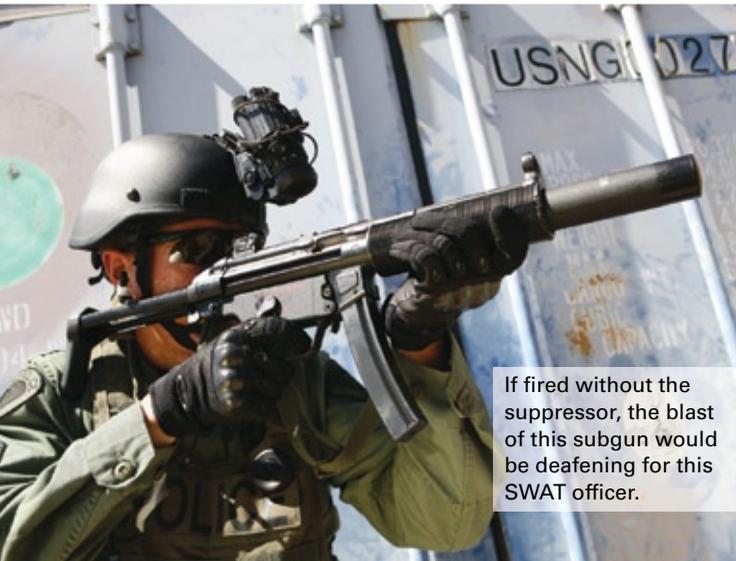
I believe that a better solution to this problem is to fit the primary weapons used by entry team members with suppressors.

The best suppressors can reduce the report of a weapon by more than 30 decibels (dB). That may not seem to be a significant difference. However, the decibel measurement of sound is logarithmic, which means that a 30 dB drop is actually a 1,000-percent reduction in sound.

When mounted on pistols and submachine guns using subsonic (slower than the speed of sound) ammunition, a good suppressor can reduce the sound to roughly comparable to a staple gun. Often the sound of the gun's bolt cycling is louder than the actual report.

A good example is the Heckler & Koch MP5SD. This integrally suppressed submachine gun used by many law enforcement agencies drops the bullet's speed to approximately 850 feet per second and eliminates the supersonic crack, as the bullet does not exceed the speed of sound at approximately 1,150 feet per second.

**DANGEROUS
DECIBELS**



If fired without the suppressor, the blast of this subgun would be deafening for this SWAT officer.

Suppressors are particularly useful in enclosed spaces where the sound, flash, and pressure effects of a weapon being fired are amplified, such as in a close quarter battle (CQB) in a mobile home or in tubular assaults (buses, trains, and planes). Such effects will disorient the shooter, affecting concentration and accuracy, and can permanently damage hearing very quickly.

Some of the newer suppressors on the market can even improve minute-of-angle accuracy and may increase bullet velocity by as much as 30 to 50 feet per second.

There is also a further tactical benefit. A suppressor eliminates the muzzle flash, depending on the specific ammunition fired. This could be a very important advantage during tactical

HOW YOU HEAR

Sounds are collected by the external ear (auricle) and transmitted down the external ear canal to set the eardrum in motion. The eardrum separates the canal from the middle ear with three very small bones called the auditory ossicles: the malleus (hammer), incus (anvil), and stapes (stirrup). The eardrum's vibrations are picked up and amplified by the ossicles and conducted to the cochlea (the organ of hearing). The whole system, from the auricle to the stapes, is the conducting apparatus of the ear.

EXPLOSIVE HEARING DAMAGE

At higher intensity, noise becomes explosive and causes a blast-type injury to the ear. It may rupture the eardrum, causing a conductive hearing loss. If no further damage has been done, the hearing loss may be temporary.

Unfortunately, the noise pressure can also damage or dislocate the ossicles (small bones) of the middle ear, causing a conductive hearing loss that may be permanent unless the ear is successfully operated upon. The blast may also tear the sensitive part of the cochlea (the organ of Corti) from its moorings, causing a sensorineural hearing loss that is permanent and irreparable. Any combination of these injuries may occur, so that the hearing loss may be conductive, sensorineural, or mixed.

operations under low-light conditions, since some well-trained criminals know to identify and shoot at muzzle flashes. Another reason to reduce muzzle flash is to minimize explosion danger during warrant service in a location that is suspected of being a clandestine drug lab. A muzzle flash in this environment can be catastrophic for everyone in the room or even the building.

Suppressors are very affordable. Professional military and law enforcement suppressors can range from \$750 and up.

Today's suppressors are smaller, lighter, and have a longer projected lifespan than their predecessors. One manufacturer is now producing suppressors that have a projected life span of more than 30,000 rounds.

NOISE-INDUCED HEARING LOSS

Rock concerts, iPods, gunshots, jet engines they can all lead you down the road to a hearing aid.

Hearing loss from excessive noise—noise-induced hearing loss (NIHL)—affects about one-third of the nearly 40 million Americans who suffer from hearing loss.

NIHL is caused by exposure to either a sudden, loud noise or exposure to loud noises. A dangerous sound is anything that reaches 85 dB sound pressure level (SPL) or higher. Small arms fire ranges from 120 to 170 dB, depending on the weapon and caliber fired.

Pitch is another measurement of noise. It is the frequency of sound vibrations per second. The lower the pitch the fewer vibrations per second. Pitch is measured in hertz (Hz), which means cycles per second. When hearing loss begins, a person will, generally, first have trouble hearing high-pitched sounds.

Most people lose their hearing slowly over a 15- to 20-year period because of regular and repeated noise exposure that damages the complicated and intricate hair cells of the inner ear that interpret sound vibrations as words, music, or other sounds. Unlike the hairs on top of your head, which can be sheared off and grown back, hearing hair cells can't grow back because they are such highly developed, end stage cells.

Prolonged exposure to noise can actually change the structure of the hair cells in the inner ear, resulting in hearing loss. Tinnitus, which is the sound of ringing, roaring, buzzing, or clicking inside the head, often occurs with prolonged noise exposure damage, as well.

Hearing loss from noise can be permanent or temporary. If the hearing loss is temporary, hearing usually recovers within 16 hours of loud noise exposure.

There is a clear tendency for the ear to be more tolerant of noise at the low frequencies, as opposed to the middle and higher frequencies. The ear appears to be particularly vulnerable to frequencies in the range of 2,000 to 4,000 Hz, or even 6,000 Hz. These frequencies are likely to be generated by gunfire, explosions, and some types of aircraft noise.

Regardless of frequency, continued exposure to noise above 85 dB over time will cause hearing loss. According to the National Institute for Occupational Safety and Health (NIOSH), the maximum exposure time on a single episode at 85 dB is eight hours and at 110 dB it is 90 seconds. Noise levels above 140 dB can cause immediate irreversible hearing damage.

Heckler & Koch and SIG Sauer produce handguns with factory threaded barrels ready for suppressor attachment. There are also several manufacturers that produce threaded barrels so that almost any handgun can be fitted with a suppressor. So most agencies will not have to spend a lot of money retrofitting their weapons to accept suppressors.

As for long guns, many law enforcement agencies are switching to the Colt M4 or some variant of the AR-15 carbine as their primary tactical team weapon. Several companies are producing suppressors for these weapons. Long gone are the days of screwing on suppressors to these guns after removing the bird cage flash hider. Today's suppressors have quick attach/detach designs that allow the operator to attach and remove the suppressor from the weapon in a matter of seconds.

With the current climate of litigation and liability for workplace injuries, it makes good sense for law enforcement agencies to become proactive and take steps to mitigate increased disability payments and prevent the early retirement of tactical officers because of noise-induced hearing loss. The amount of money saved by city and county governments could easily be \$15,000 to \$30,000 per year for each officer who could be out on early retirement or disability from hearing loss.

SECONDS COUNT

Very loud noises, over 85 decibels (dB), can cause permanent damage to your hearing. And the louder and sharper the sound, such as a gunshot, the more seconds count.

Accepted standards for recommended permissible exposure time for continuous time weighted average noise, according to NIOSH and CDC, 2002. For every 3 dBs over 85 dB, the permissible exposure time before possible damage can occur is cut in half.

Permissible Exposure Time	Continuous dB
8 hours	85 dB
4 hours	88 dB
2 hours	91 dB
1 hour	94 dB
30 minutes	97 dB
15 minutes	100 dB
7.5 minutes	103 dB
3.75 min	106 dB
1.875 min	109 dB
.9375 min (less than 1 min)	112 dB
.46875 min (less than 30 sec)	115 dB

FEDERAL NOISE STANDARDS

Because noise-induced hearing loss (NIHL) is not immediately apparent, many law enforcement professionals leaving or retiring from their agencies are unaware of the full extent of their hearing damage. Some agencies are now just beginning to understand the link between law enforcement service and NIHL.

It may take some time and unfortunately lawsuits before law enforcement agencies and city and county governments recognize the need to suppress all weapons used on entry teams.

Enter the U.S. Department of Labor Occupational Safety and Health Administration (OSHA). These are the Federal standards and regulations for Occupational Noise Exposure:

Permissible Noise Exposures Duration Per Day (hours)	Sound Level (dBA)
8	90
6	92
4	95
3	97
2	100
1 ½	102
1	105
½	110
¼ or less	115

1910.95: Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in this table when measured on the A scale of a standard sound level meter at slow response.

1910.95 (b) (1): When employees are subjected to sound exceeding those listed in the table, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels detailed in the table, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

1910.95(b) (2) If the variations in noise level involve maxima at intervals of one second or less, it is to be considered continuous.

HOW LOUD ARE YOUR WEAPONS?



SHOTGUNS

.410 Bore 28-inch barrel.....	150 dB
.410 26-inch barrel.....	150 dB
.410 18-inch barrel.....	156 dB
20 Gauge 28-inch barrel.....	152 dB
20 Gauge 22-inch barrel.....	154 dB
12 Gauge 28-inch barrel.....	151 dB
12 Gauge 26-inch barrel.....	156 dB
12 Gauge 18-inch barrel.....	161 dB



CENTERFIRE RIFLES

.223, 55-grain commercial load 18-inch barrel.....	155 dB
.243 in 22-inch barrel.....	155 dB
.30-30 in 20-inch barrel.....	156 dB
7mm Magnum in 20-inch barrel.....	157 dB
.308 in 24-inch barrel.....	156 dB
.30-06 in 24-inch barrel.....	158 dB
.30-06 in 18-inch barrel.....	163 dB
.375 18-inch barrel with muzzle brake.....	170 dB



PISTOLS

.44 caliber.....	170 dB
.45 ACP.....	165 dB
9mm.....	165 dB
.40 S&W.....	165 dB
.357 Magnum.....	160 dB
.38 Special.....	150 dB
.22 caliber.....	145 dB

These values can vary based on the specific type of sound measurement instrument used, sound measurement technique, humidity, wind, and ambient temperature. These values may vary plus or minus three decibels (dB).

DANGEROUS DECIBELS

The few dollars invested to retrofit the teams' weapons will pay huge dividends in the long term. Law enforcement agencies need to wake up and recognize that suppressors are not assassination tools but should be mandatory hearing protection safety equipment. ☉

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SureFire makes a wide variety of suppressors for law enforcement and military applications.

DON'T CALL IT A "SILENCER"

A suppressor is a device that when attached to a firearm reduces the amount of noise and eliminates the flash generated by firing the weapon. It generally takes the form of a cylindrically shaped metal tube that is fitted onto the barrel of the firearm. Inside the suppressor are various internal mechanisms such as baffles that slow the escaping propellant gas and thereby slow the bullet.

A suppressor is meant to reduce the report to a more comfortable level for the shooter. When a round is fired and the very hot gases exit the barrel quickly, they make the distinctive gunshot noise. When the suppressor is attached, the gases have more time to expand and cool.

But a suppressor can only reduce the sound of a rifle or pistol shot by so much. Even subsonic bullets make distinct sounds by their passage through the air and striking targets, and supersonic bullets produce a sonic boom resulting in what's called a "ballistic crack."

Yet, suppressors are still commonly referred to as "silencers" by people who should know better. This is an unfortunate gross misconception that has permeated throughout our society since Hiram P. Maxim invented the "Maxim Silencer" and patented it in 1909.

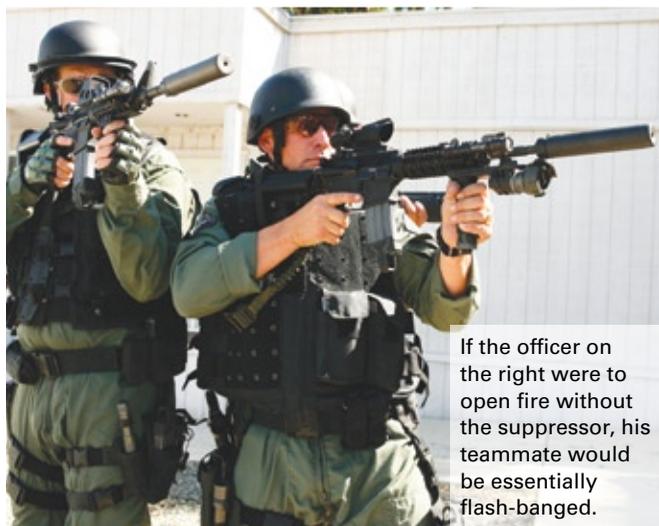
Further, the portrayal of "silenced" firearms on television and in movies over the years has fostered the belief that silencers completely eliminate the sound of firing or reduce it to a

quiet puff sound. It is this type of Hollywood nonsense that has ruined the reputation of suppressors in the United States.

Contrary to television shows and movies, no suppressor completely eliminates the noise of a discharging firearm. In fact, the decreased noise can still be heard and is very noticeable for some distance, depending on the surroundings and environmental conditions.

However, I have personally fired a Remington 512 Score Master .22 caliber rifle modified with a custom full-barrel integral suppressor using .22 CB minicaps. The report from the weapon was reduced to the point that the mechanical noise of the firing pin striking the rim of the cartridge was actually louder. I am not sure what the purpose would be for this type of weapon with such an extremely low-powered .22 cartridge would be except for demonstration purposes as a novelty item or to shoot a fox in a hen house so as to not disturb the chickens, which was actually the reason that Maxim invented his "silencer."

In the United States, suppressors are viewed as sinister and as assassination tools. But in France, for example, suppressors are sold openly in stores without restriction or registration. In fact in France and Switzerland, you can be fined by law enforcement for discharging a firearm without a sound suppressor in certain locations.



If the officer on the right were to open fire without the suppressor, his teammate would be essentially flash-banged.

WHAT GOOD ARE SUPPRESSORS

Most efficient modern suppressors will drop the sound of a gunshot by at least 30 dB.

To appreciate how significant a reduction 30 dB represents, one needs to understand how sound is measured.

The decibel scale is logarithmic, meaning that each unit is 10 times that of the preceding one. For example, a noise source measuring 80 dB is 10 times as loud as a source measuring 70 dB and 100 times as loud as a source reading of 60 dB. A small difference in value actually means a tremendous difference in intensity. So reducing a gunshot by even 30 dB makes it 1,000 times quieter, and it is through this tremendous drop in the amount of sound that the suppressor preserves your hearing from damage.