

ST 4-02.501
1 February 2008

ARMY HEARING PROGRAM

DISTRIBUTION RESTRICTION: Approved for public release; distribution is unlimited.

Headquarters, Department of the Army

Foreword

This special text (ST) is designed to provide techniques and procedures that govern the prevention of noise-induced hearing loss (NIHL) in Soldiers and to ensure their maximum combat effectiveness.

As a result of hearing issues identified in Operation Iraqi Freedom (OIF), Headquarters, United States (US) Army Medical Command, Operation Order 07-10, Army Operational Hearing Program Field Manual (FM), directed that an ST be developed and implemented on operational hearing in order to mitigate the effects of traumatic acoustic injuries sustained by Soldiers.

This ST will provide information to assist commanders in preventing NIHL. Current actions being staffed will, upon approval, incorporate these changes into relevant doctrine, technical guides, Army regulations (ARs), and Department of the Army pamphlets (DA Pams).

This publication will assist commanders in the planning and execution of the prevention of Soldier hearing loss.

Comments and recommendations to improve this publication are encouraged. They should be sent to Headquarters, Department of the Army, Consultant to the Army Surgeon General for Hearing Conservation and Audiology, Proponent Office for Preventive Medicine, ATTN: POPM/OTSG, 5111 Leesburg Pike, Skyline 5, Suite 538, Falls Church, VA 22041.



RUSSELL J. CERW
Major General, DC

Commander, US Army Medical Department
Center and School

Army Hearing Program

Contents

	Page
	PREFACE iii
Chapter 1	HEARING AND MILITARY OPERATIONS 1-1
	Section I — Communicating on the Battlefield 1-1
	Section II — Impact of Hearing Loss 1-1
	Section III — Noise 1-3
	Section IV — History 1-4
	Historical Perspective 1-4
	Noise Signatures 1-5
Chapter 2	HEARING READINESS 2-1
	Section I — Monitoring Audiometry 2-1
	Medical Protection System 2-1
	Section II — Hearing Readiness Classification 2-2
	Section III — Tasks 2-2
	Individual 2-3
	Leader 2-3
	Medical Treatment Facility Commander 2-4
	Section IV — Physical Profile Serial System 2-4
	Physical Profile Serial 2-4
	Temporary Versus Permanent Hearing Profiles 2-6
	Military Occupational Specialty Medical Retention Board 2-6
Chapter 3	CLINICAL SERVICES 3-1
	Section I — Audiological Evaluations 3-1
	Process and Rationale 3-1
	Section II — Temporary Versus Permanent Hearing Loss 3-2

Distribution Restriction: Approved for public release; distribution is unlimited.

	Temporary Threshold Shift	3-2
Chapter 4	OPERATIONAL HEARING SERVICES	4-1
	Section I — Operational Hearing Consultant	4-1
	Section II — Identifying Noise Levels and Sources	4-1
	Section III — Reducing Noise Levels	4-2
	Engineering Controls	4-2
	Administrative Controls	4-3
	Section IV — Tactical Communications and Protective Systems	4-3
	In-the-Ear Tactical Communications and Protective Systems	4-4
	Over-the-Ear Tactical Communications and Protective Systems.....	4-6
	Section V — Integrated Helmet Systems.....	4-11
	Combat Vehicle Crewman Helmet.....	4-11
	Flyer's Helmet	4-12
	Section VI — Earplugs.....	4-12
	Preformed Earplugs	4-12
	Foam (Hand-Formed) Earplugs.....	4-13
	Musician's Earplugs	4-14
	Ear Canal Caps.....	4-14
	Section VII — Noise Muffs.....	4-14
Chapter 5	HEARING CONSERVATION	5-1
GLOSSARY	Glossary-1
REFERENCES	References-1

Figures

Figure 4-1. In-the-ear tactical communications and protective systems	4-4
Figure 4-2. Common controls	4-5
Figure 4-3. Volume control.....	4-5
Figure 4-4. Push-to-talk mode	4-5
Figure 4-5. Dual, communication, left/right, rear guard kit.....	4-7
Figure 4-6. Depth and pressure gage.....	4-9
Figure 4-7. Microphone headset.....	4-10
Figure 4-8. Combat vehicle crewman helmet	4-11
Figure 4-9. Flyer's helmet	4-12

Tables

Table 1-1. Hearing profiles greater than H-3 in enlisted combat arms specialties.....	1-2
Table 1-2. Cost of hearing loss for veterans with hearing loss as a major disability.....	1-3

Preface

This ST establishes guidelines for the prevention of NIHL to Soldiers as a result of the reevaluation of hearing issues identified in OIF. It discusses the reduction of combat effectiveness due to hearing loss, hearing readiness (HR), hearing protection, and clinical measures. This reevaluation will result in future changes to existing DA Pams and ARs on hearing conservation.

This ST is designed for use by commanders and their staffs in the planning and execution of the prevention of Soldier hearing loss. It is not a stand-alone publication and must be used in combination with other publications. These publications are noted throughout the text and a consolidated list is provided in the references.

The proponent of this publication is the Commander, United States Army Medical Department Center and School (USAMEDDC&S), ATTN: MCCS-Z, Fort Sam Houston, TX 78234-6100. This publication was prepared by the Directorate of Combat and Doctrine Development, Doctrine Literature Division, USAMEDDC&S, Fort Sam Houston, TX 78234-5052. Users of this ST are encouraged to submit comments and recommendations to improve the publication. Comments should include the page, paragraph, and lines of the text where the change is recommended and a rationale should be provided for the recommended change. Comments and recommendations should be forwarded directly to the Headquarters, Department of the Army, Consultant to the Army Surgeon General for Hearing Conservation and Audiology, Proponent Office for Preventive Medicine, ATTN: POPM/OTSG, 5111 Leesburg Pike, Skyline 5, Suite 538, Falls Church, VA 22041.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

Use of trade or brand names in this publication is for illustrative purposes only and does not imply endorsement by the Department of Defense (DOD).

Chapter 1

Hearing and Military Operations

The purpose of the Army Hearing Program is to prevent NIHL in Soldiers and to ensure their maximum combat effectiveness. Hearing is a critical sensor used by Soldiers that increases their survivability and lethality. When hearing loss is present, the ability to conduct auditory tasks is greatly diminished. Good hearing is required to perform such tasks as localizing sound, gauging auditory distance, identifying a sound source, and understanding verbal orders and radio communications. This multidimensional sense provides an indispensable amount of information on the battlefield. Good hearing can mean the difference between life and death in combat, as well as in training.

SECTION I — COMMUNICATING ON THE BATTLEFIELD

1-1. Verbal communications, as well as hand and arm signals between dismounted Soldiers, remain the primary means of communication on the battlefield. Although technological advances have improved battlefield communication systems, these electronic advances cannot overcome the fact that human hearing is required to complete communication. Specifically, no matter how sophisticated the communication system, effective communication requires normal hearing.

1-2. Studies have shown that the ability to accomplish a unit's mission is directly proportional to its ability to communicate effectively. See *Impact of Communications on Armor Crew Performance, Army Research, Development, and Acquisition Bulletin*, January—February 1990. If effective communication drops by 30 percent, the ability to control the unit in order to accomplish the task drops by 30 percent as well.

1-3. During combat, this problem is magnified by the chaotic environment, the complexity of the problems encountered, and the reaction time required. Soldier hearing must be protected from damage caused by hazardous impact and sustained noise without compromising the ability to hear and communicate in these environments.

SECTION II — IMPACT OF HEARING LOSS

1-4. Hearing loss is an invisible injury that has been viewed as an acceptable by-product of military service. Compared to other battlefield injuries and disease, hearing loss is often viewed as having little or no impact on military operations. For additional information see *Introduction to Safety Engineering*, 17 February 1984.

1-5. Sound is often the first source of information a Soldier has before direct contact with the enemy. Unlike visual information, information carried by sound comes to us from all directions, through darkness, and over or through many obstacles to vision. Aggressive action produces sound the enemy cannot hide or camouflage.

1-6. The ability to hear and recognize combat-relevant sounds is a vital component to situational understanding and provides a tactical advantage. Noise-induced hearing loss is a tactical risk and threatens both individual and unit combat effectiveness.

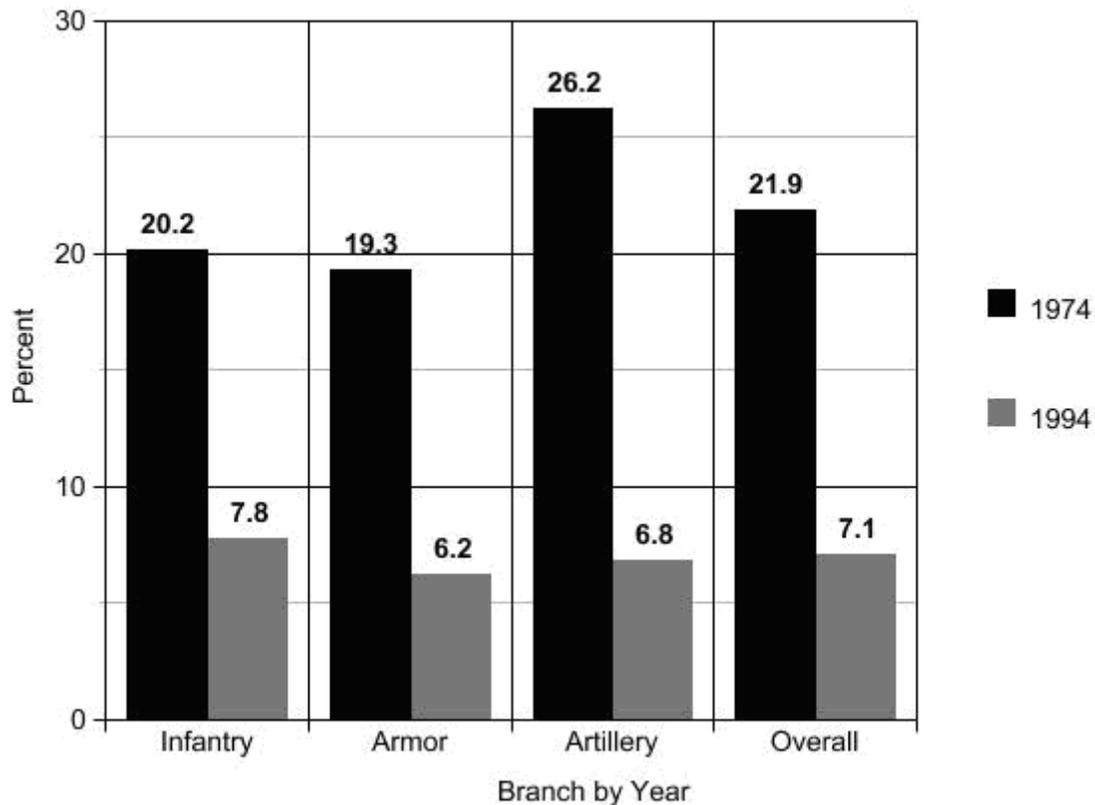
1-7. Hearing loss due to noise exposure usually occurs in the high frequencies. Since speech sounds that give meaning to words (for example, consonants such as ch, th, sh, f, and p) are high-frequency sounds as

well as the sounds that provide the ability to determine the *signature* of weapons and vehicles, high-frequency hearing loss is particularly devastating to military operations.

1-8. The ability to distinguish the sounds of different weapons, both friendly and enemy, is a combat-critical skill. See *Impact of Communications on Armor Crew Performance, Army Research, Development, and Acquisition Bulletin*, January—February 1990. If the sounds of weapons fire are coming from the next block of buildings, knowing whether it is enemy or friendly, small arms or automatic weapons, small caliber or large caliber, or whether it is a rocket-propelled grenade (RPG) or an antitank weapon determines a Soldier’s reaction and is critical information available only with good hearing.

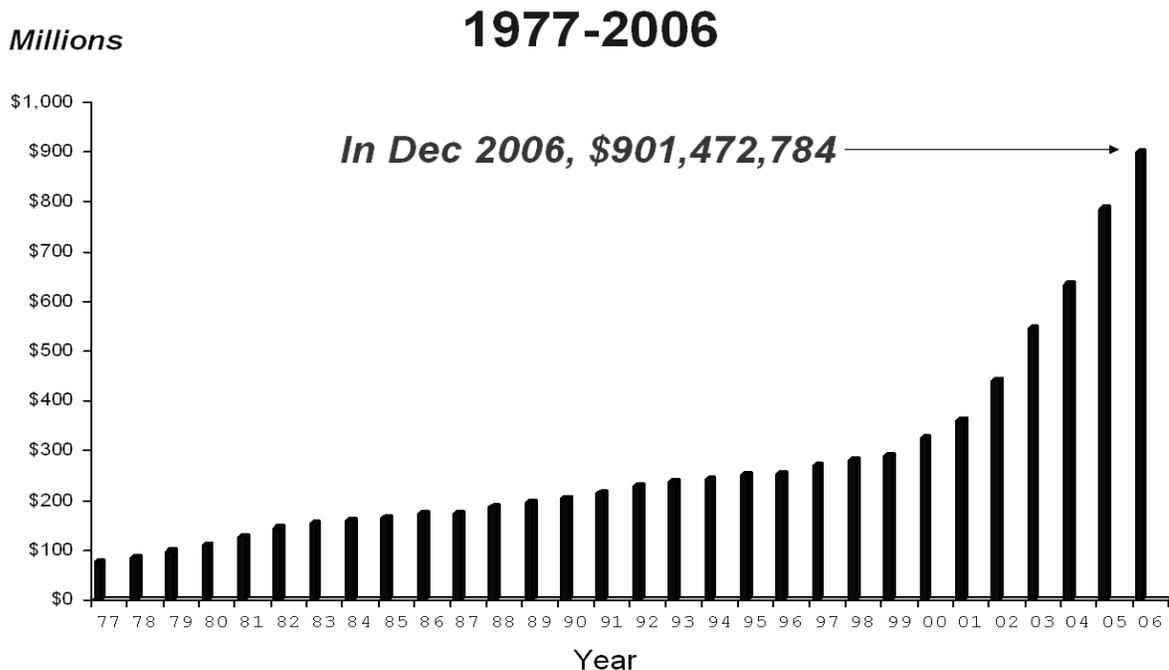
1-9. A review of hearing test data showed that in 1974, an average of 22 percent of active duty enlisted Soldiers in combat arms specialties had H-3 profiles. In 1994, this average was 6 percent, demonstrating that hearing conservation is effective in reducing Soldier hearing loss. See Table 1-1.

Table 1-1. Hearing profiles greater than H-3 in enlisted combat arms specialties



1-10. In addition to the impact on military operations, there is a significant financial cost, as well as quality of life concerns, associated with NIHL. In 2006, there were over 55,864 veterans’ compensation cases awarded for hearing loss, costing over 900 million dollars. See Table 1-2. Between 2001 and 2006, there was an increase of 319 percent in compensation payments for hearing loss as the primary disability. This increase includes all work-related hearing loss disabilities. Hearing loss is the second most common new disability awarded by the Department of Veterans Affairs (VA). Tinnitus (such as noises, ringing, or humming sounds in the ears) is the most common disability awarded by the VA.

Table 1-2. Cost of hearing loss for veterans with hearing loss as a major disability



1-11. In Iraq, an average of one Soldier per day was medically evacuated during the first deployment cycle of OIF for complaints related to hearing loss. This is where monitoring and maintaining Soldier HR during deployment was first introduced. As a result, recommendations were made in October 2003 for comprehensive operational hearing conservation support drawn from preventive medicine (PVNTMED) detachments. See *Audiology in Operation Iraqi Freedom, Audiology Today*, September/October 2004.

1-12. United States forces in Iraq have experienced a substantial amount of blast injuries from improvised explosive devices (IEDs), RPGs, and mortar rounds. These types of explosions remain the single largest cause of hearing loss from OIF. Of 564 patients seen for hearing loss at Landstuhl Regional Medical Center in Germany during the first year of the war, 67 percent were due to blast injuries. Twenty-five percent of the hearing losses were due to exposure to friendly forces weapons systems.

1-13. With the influx of Soldiers experiencing hearing loss in Iraq, once reluctant Soldiers began seeing the need for hearing protection while dismounted. The combat arms earplug (CAE) was introduced for operational service. This earplug allows for communication while protecting from hazardous impulse noises, such as weapons fire and explosions. In 2007, communication enhancement and protection devices (CEPDs) were introduced to the Army. Several units ordered these devices to improve communication, command, and control while protecting and preserving Soldiers' fighting ability.

SECTION III — NOISE

1-14. When the effects of noise on military operations are discussed, the discussion often centers on hazardous noise. However, nonhazardous noise levels can also significantly impact military operations. Both hazardous and nonhazardous noise may cause—

- Excessive fatigue.
- Stress reactions.
- Reduced efficiency.
- Depression.
- Headaches.
- Annoyance.

- Loss of sleep.
- Difficulty concentrating.
- Reduced reaction time.
- High blood pressure.
- Muscle tension.
- Low morale.

1-15. There are various factors that indicate noise is a problem during an operation. While people react differently to noise, subjective responses should not be ignored because they provide warnings that noise may be at unacceptable levels. Noisy conditions can make normal conversation difficult. When noise levels are—

- Above 80 decibels (dB), people have to speak loudly.
- Between 85 and 90 dB, people have to shout.
- Greater than 95 dB, effective communication is difficult or impossible.

SECTION IV — HISTORY

HISTORICAL PERSPECTIVE

1-16. In 1976, the General Accounting Office, which was renamed as the Government Accountability Office, issued an investigative report on *Hazardous Working Conditions in Seven Federal Agencies*, August 1976. This report identified over half of the US government employees, including the DOD, as working in environments with inadequate procedures for identifying and rectifying occupational health hazards. Further, the report requested that Congress amend the Occupational Safety and Health Act to bring Federal agencies under the inspection control of the Department of Labor. As a result, in 1978, military audiologists and other government employees achieved standardization in military hearing conservation with the publication of a Department of Defense Instruction (DODI) 6055.12. This document provided guidance and requirements for hearing conservation implementation.

1-17. To implement DODI 6055.12, the Army published Technical Bulletin, Medical (TB MED) 501. Department of Defense Instruction 6055.12 was updated in 1987 to implement new requirements by the 1983 Federal Noise Amendment. The new policy identified specific roles and responsibilities within a hearing conservation program and thereby paved the way for the first enforceable regulation to be published on the subject. This new implementing document was DA Pam 40-501.

1-18. Annual VA data evidenced the immediacy for implementing change by showing hearing as a primary disability. In 2006, the VA awarded 55,864 new cases for hearing loss alone. Between the start of Operation Enduring Freedom (OEF) and OIF, compensation payments for hearing loss increased by 319 percent. Hearing loss is the second most common new disability award by the VA preceded only by tinnitus. In 2007, hearing loss compensation reached over 1 billion dollars for a predominantly preventable injury. These figures do not account for service members that remain on active duty with hearing loss or those who may lose hearing in the future as a result of current hazardous noise exposure. Furthermore, the data presented is for primary disability only and does not include veterans that have another primary disability rating, such as an amputated limb, in combination with hearing loss or tinnitus as a secondary disability.

1-19. Whether in peacetime or wartime, hazardous noise exists as one of the primary occupational hazards in the Army. See *Blast Injury of the Ear: Clinical Update from the Global War on Terror, Military Medicine*, July 2007. The risk of NIHL in Soldiers has reached the highest rate in over 30 years. This trend resulted from current combat operations, increased numbers of combat arms Soldiers, extended periods of weapons training, and deployment of new and more powerful noise sources from weapons systems, vehicles, and aircraft. United States forces in Iraq and Afghanistan experienced a substantial number of blast injuries from IEDs, RPGs, and mortar rounds. These types of explosions remain the single largest cause of injury from OIF comprising 47 percent of all medical evacuations. See *Troops Return with*

Alarming Rates of Hearing Loss, Hearing Health, Fall 2004. As a result, developments in protecting Soldiers from these types of hazards are paramount.

NOISE SIGNATURES

1-20. Army audiologists, area of concentration (AOC) 72Cs, have been serving with combat support hospitals (CSHs) in Iraq since January 2004. Audiologists provided reactive services in theater, but it neglected the need for prevention and maintenance of Soldier HR in a forward deployed environment. The paradigm of what composed a comprehensive hearing conservation program shifted and now considers the Soldier's environment on the battlefield. As a result, a restructuring occurred and a contemporary model called the Army Hearing Program arose.

1-21. The Army needed to prevent NIHL in Soldiers and to ensure their maximum combat effectiveness in training as well as during deployments. The new Army Hearing Program provides prevention services in a more fluid environment than experienced in garrison. Operationally hazardous noise situations that involved large, military-unique equipment, lengthy work days, and immature infrastructure of base camps are addressed. Urban terrain, such as the streets of Baghdad, is a particular hazard for Soldiers because it is wrought with obstacles such as buildings, alley ways, and ditches. To compound the importance of good hearing, civilian inhabitants have to be distinguished from actual combatants in an often chaotic environment.

Chapter 2

Hearing Readiness

Hearing readiness is a process to ensure that Soldiers have the required hearing capability to perform their job-specific duties and have the correct personal protective equipment for their situation. The purpose of HR is to identify early changes in hearing and provide education, individual counseling, and hearing protection to prevent further damage to hearing. Without proper HR, Soldiers may be sent into combat with less than optimum communication performance. Poor hearing jeopardizes the unit mission and increases the likelihood of a serious mishap due to a Soldier's inability to understand verbal orders and radio communications, localize the direction of sounds, gauge distances accurately, and have good overall situational understanding.

SECTION I — MONITORING AUDIOMETRY

2-1. A key component of HR is monitoring audiometry using the Defense Occupational and Environmental Health Readiness System (DOEHRS) Hearing Conservation (DOEHRS-HC). This system uses computer software to test hearing. The hearing tests are saved in a database and then sent to the DOEHRS Data Repository (DOEHRS-DR). Audiograms administered on a DOEHRS-HC system are stored in this DOEHRS-DR for future reference. All Soldiers—

- Must receive a DOEHRS-HC hearing test prior to basic training and just before they separate from the Army.
- Are required to have an annual hearing test when assigned to table of organization and equipment (TOE) units.
- Have an annual hearing test when filling a Professional Filler System (PROFIS) position.
- Have an annual hearing test when the Soldier has been exposed to hazardous noise.

2-2. Results of the first hearing test administered are recorded on Department of Defense (DD) Form 2215 (Reference Audiogram). This is a baseline evaluation that measures how well the individual hears before being exposed to noise. Subsequent hearing tests are recorded on the DD Form 2216 (Hearing Conservation Data). These tests are compared to the baseline (initial or reestablished) hearing test and used to determine if there has been a change in hearing.

MEDICAL PROTECTION SYSTEM

2-3. The hearing tests in the DOEHRS-DR are entered into the Medical Protection System (MEDPROS) database.

2-4. The interface with the DOEHRS-DR improves the quality of the data and reduces unit data.

2-5. The MEDPROS receives a weekly file from the DOEHRS-DR. The MEDPROS uses the date of examination, H (hearing profile level) status, and significant threshold shift (STS) to calculate the HR classification. The MEDPROS also receives the hearing protection status and hearing protection type from DOEHRS-DR, but these are not used in the calculation.

2-6. All data entry into MEDPROS will be limited to the MEDPROS Web Data Entry (MWDE) module. Users are no longer able to enter HR data into the MEDPROS mainframe application.

2-7. The data elements from the DOEHRS-DR used for the HR classification calculation may also be entered directly into MEDPROS to provide an immediate status for the Soldier. All HR data entered into the MWDE will update MEDPROS Web reports in real time.

2-8. Training is necessary to provide Soldiers with the proper skills to use MEDPROS. Failure to conduct proper training may result in imprecise data in MEDPROS which will, in turn, result in inaccurate reporting of individual and unit medical readiness.

2-9. A bimonthly training session is held for mainframe data entry, predeployment health assessment, postdeployment health assessment, and Web reporting (other training provided upon request). There is no charge for this training. Standard temporary duty (TDY) applies for traveling personnel. For class details contact medprostraining@asmr.com or the Medical Operational Data System (MODS) help desk at 1-888-849-4341. For training in your region contact your MEDPROS readiness coordinator (MRC) at medprostraining@asmr.com or the MODS help desk at 1-888-849-4341 for locations and schedules. A contact list for all MRCs can be found at <https://apps.mods.army.mil/MEDPROS/Secured/MRCList.asp>. Online training is available on the MEDPROS Modules homepage under the Training/Updates tab.

SECTION II — HEARING READINESS CLASSIFICATION

2-10. Soldiers who are PROFIS or assigned to TOE units will receive HR classification designations.

2-11. The MEDPROS will use the H status from DOEHRS-HC to determine the additional requirements to properly determine the HR classification of a Soldier. The H status (H-1, H-2, H-3, and H-4) from DOEHRS-HC is calculated based upon the Soldier's hearing loss. The HR classification designations are as follows:

- Hearing Class 1—Soldier's unaided hearing is within H-1 standards for both ears based on latest DD Form 2215 dated within the past 13 months.
- Hearing Class 2—Soldier has DD Form 2215 or DD Form 2216 dated within the past 13 months. Soldiers that are H-2 must have a complete audiological evaluation and Department of the Army (DA) Form 3349 (Physical Profile). Soldiers evaluated as H-3 must have a complete audiological evaluation and DA Form 3349 and are found deployable by a Military Occupational Specialty Medical Retention Board (MMRB).
- Hearing Class 3—Soldier has DD Form 2215 or DD Form 2216 on file (not date-dependent); Soldier's unaided hearing is within H-2 or H-3 standards.
 - Hearing Readiness Classification 3A—Audiological evaluation is not complete.
 - Hearing Readiness Classification 3B—DA Form 3349 is not complete (but audiological evaluation is completed).
 - Hearing Readiness Classification 3C—The MMRB is not complete (audiological evaluation and DD Form 3349 are completed).
 - Hearing Readiness Classification 3D—The MMRB finds the Soldier does not meet deployment standards for hearing.
 - Hearing Readiness Classification 3E—The Soldier meets HR Classification 2 standards, but does not have required hearing aid and 6-month supply of batteries on hand.
- Hearing Class 4—The Soldier requires a hearing examination or follow-up examination.
 - Hearing Readiness Classification 4A—The date of the latest test is more than 13 months old and it does not fall under HR Classification 3 standards.
 - Hearing Readiness Classification 4B—The Soldier has an STS and is awaiting a follow-up test.

SECTION III — TASKS

2-12. It is essential that Soldiers who are exposed to loud noise be educated on its adverse effects (for example, permanent hearing loss, poorer job performance, and quality-of-life issues). Further,

commanders need to know how Soldiers with hearing loss will affect unit readiness. The responsibilities of Soldiers and their leaders concerning hearing conservation are discussed below.

INDIVIDUAL

2-13. Prior to deployment, Soldiers are required to have a current (within the past 13 months) DOEHRS-HC audiogram in their medical records.

2-14. If applicable, Soldiers must possess and properly use/maintain hearing aids. Periodic audiograms and evaluations are still required even if the Soldier has an identified hearing loss. Once someone has an NIHL, that person is highly susceptible to losing more hearing.

2-15. Soldiers ensure maintenance of their readiness record by monitoring Army Knowledge Online (AKO) Medical Readiness Alerts.

2-16. During a deployment, Soldiers must—

- Wear hearing protectors. This is especially pertinent when firing weapons or riding in noisy vehicles or aircraft. Hearing protectors prevent permanent and temporary threshold shifts (TTSs), allowing detection of quiet or low-level combat sounds and maintaining communication ability in noisy environments.
- Wear nonlinear hearing protectors, such as the CAE, during dismounted ground operations. Nonlinear hearing protection allows for greater communication ability while providing hearing protection from weapons fire and other impulse noise hazards.
- Retain and use padded inserts from aircraft or combat vehicle crewmember helmets.
- Seek medical attention if noticeable changes in hearing occur. Hearing loss can compromise the ability to effectively perform duties or communicate.
- Seek medical attention if changes in hearing occur following acoustic trauma.
- Request immediate replacement of hearing aid devices if they are lost or damaged. Not all job skills in the Army allow hearing aids to be used. Even with hearing aids, the ability to localize and gauge auditory distance is comprised.
- Recognize potential noise hazards, as well as the signs and symptoms of NIHL, and report them immediately to medical personnel as well as to the chain of command.

2-17. Upon returning from a deployment, Soldiers should receive a postdeployment DOEHRS-HC audiogram. If indicated, a complete diagnostic evaluation will be scheduled.

LEADER

2-18. Prior to deployment, a leader must—

- Ensure HR is part of the unit's standing operating procedures (SOPs).
- Ensure Soldiers have a current DOEHRS-HC audiogram in their medical records.
- Ensure Soldiers are properly fitted with approved hearing protectors by medically trained personnel and are issued multiple sets (especially in preparation for deployments).
- Enforce hearing protector use among Soldiers and incorporate their use into training events.
- Establish policies for wearing hearing protectors as part of the Army combat uniform (ACU).
- Ensure unit status rosters are accurate in MEDPROS and Electronic Military Personnel Office (eMILPO) and that arrival and departure transactions are processed in a timely manner.
- Track unit's readiness through the Unit Status Reporting (USR) Module of MEDPROS Web reporting.
- Identify current and projected individual medical readiness (IMR) shortfalls and coordinate with appropriate clinics for Soldiers to take corrective action prior to the requirement expiring (not possible for immunizations).

- Monitor Soldiers to ensure completion of predeployment health assessment (within 30 days of deployment), postdeployment health assessment (within 30 days of initial redeployment and repeated 90 to 180 days after redeployment [postdeployment health reassessment]).

2-19. During deployment, a leader must—

- Identify noise-hazardous/nuisance areas and operations. Contact PVNTMED personnel for guidance and/or assistance in correcting these sources.
- Control noise sources, whenever possible. Isolate and/or control them by—
 - Placing as much distance as possible between Soldiers and the noise sources.
 - Placing physical barriers (such as sandbags) between Soldiers and the noise sources.
 - Using and maintaining noise control devices (such as mufflers and engine covers) in organic, noise-hazardous equipment.
 - Enforcing hearing protector use among Soldiers. Ensure that Soldiers are using the protectors in all environments where hearing protection is required.
 - Avoiding excessive noise exposures to Soldiers caused by short, infrequent, mission-essential events.
 - Being aware of short- and long-term noise exposure effects on Soldiers' ability to hear combat-significant sound. Assign listening post (LP)/observation post (OP) duties to Soldiers with excellent hearing and augment LP/OP with night vision devices and/or audible alarms.
 - Maintaining an adequate supply of hearing protection.

2-20. Upon returning from a deployment, a leader must—

- Ensure that Soldiers receive a postdeployment DOEHRs-HC audiogram.
- Ensure Soldiers report concerns about their hearing on the postdeployment health reassessment and obtain a diagnostic audiological evaluation.

MEDICAL TREATMENT FACILITY COMMANDER

2-21. Duties and responsibilities of the supporting MTF commander include—

- Ensuring adequate resources are available so that individual Soldiers are fitted with preformed hearing protection and, when appropriate, level-dependent hearing protection.
- Ensuring that hearing services including hearing health education, monitoring audiometry, and unit assistance visits are available.
- Identifying authorized users to input IMR data into MEDPROS.
- Ensuring sustainment of Soldiers' records by entering medical readiness data into MEDPROS as changes occur. (For example, if a Soldier receives a permanent profile and is pending an MMRB review, update the medical nondeployable [MND] field.)

SECTION IV — PHYSICAL PROFILE SERIAL SYSTEM

2-22. The Physical Profile Serial System is based primarily upon the function of body systems and their relation to military duties. The functions of the various organs, systems, and integral parts of the body are considered. The analysis of the individual's medical, physical, and mental status plays an important role in an individual's assignment, welfare, and unit readiness. See DA Pam 611-21.

PHYSICAL PROFILE SERIAL

2-23. In the Physical Profile Serial System, the functions are categorized under six factors designated "P-U-L-H-E-S." Each letter stands for a specific medical area—

- The "P" denotes the Soldier's "Physical capacity or stamina." This factor, general physical capacity, normally includes the condition of the following: heart; respiratory system; gastrointestinal system; genitourinary system; nervous system; allergic, endocrine, metabolic,

and nutritional diseases; diseases of the blood and blood forming tissues; dental conditions; diseases of the breast and other organic defects; and diseases that do not fall under other specific factors of the system.

- The “U” denotes the Soldier’s “Upper extremities.” This factor concerns the hands, arms, shoulder girdle, and upper spine (cervical, thoracic, and upper lumbar) with regard to strength, range of motion, and general efficiency.
- The “L” denotes the Soldier’s “Lower extremities.” This factor includes the feet, legs, pelvic girdle, lower back musculature, and lower spine (lower lumbar and sacral) with regard to strength, range of motion, and general efficiency.
- The “H” denotes the Soldier’s “Hearing and ears.” This factor describes auditory acuity and diseases and disorders of the ear.
- The “E” denotes the Soldier’s “Eyes.” This factor addresses visual acuity, as well as diseases and defects of the eye.
- The “S” denotes the Soldier’s “Psychiatric.” This factor concerns personality, emotional stability, and psychiatric diseases.

2-24. The basic purpose of the Physical Profile Serial System is to provide an index to overall functional capacity through four numerical designations (1, 2, 3, or 4). For example, if a military job permits a serial profile of “123123,” this means, in order to qualify for that job, a person would have to be medically rated a “1” in the area of “Physical Capacity or Stamina,” a medical rating of “2” in the area of “Upper Extremities,” have a medical rating of “3” in the area of “Lower Extremities,” a rating of “1” in the area of “Hearing and Ears,” a rating of “2” for the “Eyes,” and a rating of “3” for “Psychiatric.”

2-25. The meaning of the numerical designators are as follows:

- An individual having a numerical designation of “1” under all factors is considered to possess a high level of medical fitness.
- A physical profile designator of “2” under any or all factors indicates that an individual possesses some medical condition or physical defect that may require some activity limitations.
- A profile containing one or more numerical designators of “3” signifies that the individual has medical conditions or physical defects that may require significant limitations. For those applying for initial service, this designation is usually a disqualifier. Individuals already in the service should receive assignments commensurate with their physical capability for military duty.
- A profile serial containing one or more numerical designators of “4” indicates that the individual has medical conditions or physical defects of such severity that performance of military duties must be drastically limited. This is a disqualifier for both entering the military and for continued military service.

2-26. The “H” position, the 4th value in the profile series, is the designation for hearing and condition of the ears. The ability to hear, as well as the presence of any disorders of the ears, are noted based on the following categories:

- 1—The average hearing threshold for each ear at 500, 1000, and 2000 Hertz (Hz) is not more than 25 decibel (dB) with no individual value greater than 30 dB at these frequencies. The value should not be over 45 dB at 4000 Hz or over 35 dB at 3000 Hz.
- 2—The average hearing threshold for each ear at 500, 1000, 2000 Hz is not more than 30 dB, with no individual value greater than 35 dB at these frequencies. At 4000 Hz, the value should not be over 55 dB or audiometer level 30 dB at 500 Hz, 25 dB at 1000 and 2000 Hz, and 35 dB at 4000 Hz in better ear. If one ear has very poor hearing (can be deaf) the audiometer values for the better ear should be over 30 dB at 500 Hz, 25 dB at 1000 Hz and 2000 Hz, 45 dB at 3000 Hz, and 35 dB at 4000 Hz.
- 3—Speech reception threshold (SRT) in the better ear is not greater than 30 dB hearing level (HL), measured with or without a hearing aid, or acute or chronic ear disease.
- 4—Functional level below the standard of “3.”

2-27. Only an audiologist or a physician can write a hearing profile.

2-28. If a Soldier is identified as having an H-3 profile, then a Speech Recognition in Noise Test (SPRINT) will have to be administered.

TEMPORARY VERSUS PERMANENT HEARING PROFILES

2-29. A profile is considered permanent unless a modifier of “T” (temporary) is added. Temporary and permanent hearing profiles may be assigned or changed by an audiologist. Changing from or to a permanent designator of “3” or “4” also requires the cosignature of a physician approving authority.

2-30. A temporary profile is given if the condition is considered temporary, the correction or treatment of the condition is medically advisable, and the correction will usually result in better hearing sensitivity.

2-31. Soldiers on active duty and Reserve Component (RC) Soldiers not on active duty with a temporary profile will be medically evaluated at least once every 3 months at which time the hearing profile may be extended by the profiling officer.

2-32. Temporary profiles should specify an expiration date. Otherwise, the profile will automatically expire at the end of the third month.

Note. In no case will an individual in military status carry a temporary profile that has been extended for more than a total of 12 months without positive action being taken either to correct the defect or to effect another appropriate disposition.

2-33. Whenever a temporary hearing profile is recorded on a DA Form 3349, Standard Form (SF) 88 (Medical Record—Report of Medical Examination), or is referred to in a routine personnel action, the modifier “T” will be entered immediately preceding the appropriate PULHES numerical designator.

2-34. Temporary hearing profiles are not entered into MEDPROS.

MILITARY OCCUPATIONAL SPECIALTY MEDICAL RETENTION BOARD

2-35. The MMRB is an administrative board charged with the responsibility to evaluate a Soldier’s ability or inability to perform duties required of his military occupational specialty (MOS) in a field environment anywhere in the world. All Soldiers with a permanent “3” or “4” in one or more of the PULHES must be referred for evaluation to an MMRB. Soldiers with temporary profiles are not seen by the MMRB board, until or unless the profile becomes permanent.

2-36. The following are within the scope of the MMRB’s recommendations—

- Retain the Soldier in current MOS—fully deployable.
- Reclassify because the Soldier cannot perform MOS.
- Identify that the probationary period does not exceed six months.
- Refer the Soldier to the Army’s Physical Disability Board.

2-37. The following are MMRB restrictions pending final action, the Soldier cannot—

- Reenlist or attend service schools.
- Deploy nor have a permanent change of station.

2-38. Soldiers, pending a MMRB evaluation or a decision on MMRB recommendations, must remain available for TDY and field duty within the duty limitations of their profile.

2-39. The Soldier’s immediate commander will write a physical capability evaluation that addresses the impact of the profile limitations on the Soldier’s ability to perform the full range of his primary MOS duties.

2-40. Soldiers below the rank of sergeant major will be counseled by the unit first sergeant on the impact of an MMRB decision regarding retention of the Soldier's attendance at noncommissioned officer education system courses and career progression.

2-41. The MMRB Convening/Approval Authority is the General Courts Martial convening authority. The MMRB convenes monthly or quarterly depending on the number of Soldiers that require boarding. The Personnel Management Branch, Military Personnel Services Division, prepares a memorandum announcing the date, time, and place the board will convene.

Chapter 3

Clinical Services

Quantifying a Soldier's HR classification, as well as determining the extent of injury from noise exposure, requires a more thorough evaluation than monitoring audiometry. Delivering these clinical services as far forward on the battlefield as possible is critical to providing leaders with Soldier hearing status information and limits unnecessary loss of duty time incurred if a Soldier is evacuated for these services. Current operations have shown that it is feasible to place these services as far forward as the CSH. In garrison, clinical audiology services are a normal part of the Soldier readiness cycle.

SECTION I — AUDIOLOGICAL EVALUATIONS

3-1. Audiological evaluations vary both in complexity and time but include an examination of a Soldier's hearing, balance, and nervous system. In combat, these evaluations are considered pertinent for determining Soldier readiness and fitness for returning to duty in an area of operations. Beyond these evaluations, a Soldier would likely be referred out of theater to ensure that the proper diagnosis and treatments are covered.

PROCESS AND RATIONALE

3-2. The purpose of an audiological assessment is to quantify and qualify hearing in terms of the degree and cause of hearing loss.

3-3. Audiological evaluation is also carried out for purposes of monitoring an already identified hearing loss. Once a particular hearing loss has been identified, a treatment and management plan is put into place. The plan may include medical or surgical intervention, prescription of personal hearing aids, assistive listening devices, aural rehabilitation, or monitoring the condition for changes. Training and counseling regarding how to prevent hearing loss from occurring with the use of hearing protection will also be addressed.

3-4. Once a treatment and management plan is in place, it is still important for a Soldier's hearing loss to be checked periodically to determine its stability (Is it changing? Has it improved as a result of medical intervention? Is it getting worse? Have new conditions come into play that have affected the original condition?).

HEARING TEST PROCEDURES

3-5. A hearing test is given to find out the faintest tones a person can hear at selected pitches (frequencies) from low to high. During this test, the Soldier will wear earphones. The Soldier taking the test is instructed to give some type of response such as raising a finger or hand or pressing a button.

SPEECH RECOGNITION IN NOISE TEST

3-6. To determine medical standards for different jobs and to ensure that military members are medically qualified to perform their duties, the military developed a medical profile indicator known as the Physical Profile Serial System (Chapter 2, Section IV). This system is critically important in combat because Soldiers that suffer from auditory injuries in theater must be evaluated for fitness of duty.

3-7. When a Soldier is assigned a permanent H-3 hearing profile by an audiologist, further evaluation is warranted. The SPRINT will be used to assess the communication ability of the Soldier and in the recommendation the audiologist makes to an MMRB. The category of the SPRINT is determined as a function of the Soldier's percentile of words heard correctly and the years of service the Soldier has served in the Army.

3-8. Soldiers can score differently because the pattern of damage in the inner ear varies from person to person. Therefore, two different Soldiers with the same amount of hearing loss can have different levels of speech recognition, particularly in the presence of background noise.

3-9. Recommendations based on Soldier performance on the SPRINT will be made to the MMRB and considered when completing the physical profile assignment limitations of DA Form 3349. The recommendations provide appropriate information with which the board can make a final determination on the disposition of the Soldier.

NOISE-INDUCED HEARING LOSS

3-10. Noise-induced hearing loss is sometimes seen as an injury secondary to other major trauma resulting from IED, mine, mortar, or grenade explosions and RPG attacks. Yet, NIHL affects the high frequencies and can have a negative effect on both communication and the correct identification of noise signatures. Hearing is a multidimensional sense that provides an indispensable amount of information on the battlefield. When hearing loss is present, the ability to conduct auditory tasks is greatly diminished; therefore, good hearing is essential. Some Soldiers experience temporary NIHL and become a liability or hazard to their unit in combat.

3-11. Noise-induced hearing loss can be caused by repeated exposure to loud noises and, in some cases, one single exposure.

3-12. Hazardous noise is characterized into two categories (see DA Pam 40-501)—

- Impulse noise: Any sound that is less than 0.5 seconds in duration, such as a weapon firing or an explosion.
- Steady-state noise: Any sound that is greater than 0.5 seconds in duration, such as an electrical generator or loud music.

3-13. Several factors influence the effects of impulse noise on a Soldier's hearing—

- Intensity of the impulse.
- Duration of individual impulses.
- Number of impulses per exposure.
- Frequencies of the sound.
- Angle of exposure.
- Individual genetic susceptibility to NIHL.

SECTION II — TEMPORARY VERSUS PERMANENT HEARING LOSS

TEMPORARY THRESHOLD SHIFT

3-14. When Soldiers are exposed to a loud noise, impulse or steady-state, hearing loss may last up to 48 hours. This is called a TTS. The hearing loss is real and is caused by the nerves in the inner ear being traumatized by hazardous noise. Tinnitus typically accompanies the TTS.

3-15. Hearing thresholds may return to normal after a quiet rest period; however, significant strain has been placed on the structures of the inner ear and some degree of permanent hearing loss may result. Temporary threshold shifts may occur from riding in a tactical vehicle without hearing protection, exposure to loud music, or firing a weapon without hearing protection.

3-16. Repeated TTS will result in a permanent hearing loss.

3-17. Temporary threshold shift caused by impulse or steady-state noise can be prevented by the regular use of properly fitting hearing protection.

PERMANENT HEARING LOSS

3-18. Permanent hearing loss typically occurs gradually. Loud noises damage the hair cells in the inner ear. Because they are nerve cells, they do not recover. When this occurs, sounds become distorted or muffled and it is difficult for the Soldier to understand speech. Since there is no blood or pain associated with this type of permanent hearing loss, the Soldier is usually unaware of the loss. However, it can be detected with a hearing test.

3-19. Permanent hearing loss due to impulse or steady-state noise causes more hearing loss to occur in the higher frequencies (above 2000 Hz) of the hearing range. This is due to the anatomical structure of the inner ear. As a result, many speech sounds such as consonants become inaudible. Since consonant sounds make speech intelligible by segmenting the vowel sounds, speech becomes distorted and difficult to interpret, particularly in the presence of background noise.

3-20. Vowel sounds are lower in pitch and typically still audible even in the presence of noise-induced permanent hearing loss, Soldiers may state that they can hear, but not understand what is said.

3-21. No cure is available for permanent hearing loss. However, permanent hearing loss caused by impulse or steady-state noise can be prevented by the regular use of hearing protection.

CONDUCTIVE HEARING LOSS

3-22. Conductive hearing loss is defined as hearing loss occurring because of interference in the sound conduction process. Common causes include ear infections, impacted ear wax, as well as damage to the ear's structures from very loud impulse noise.

3-23. When a Soldier is exposed to a very loud impulse noise, such as an explosion, hearing loss may occur as a result of eardrum rupture or physical disruption of the hearing bones. If there is a hole in the eardrum or a break in the middle ear bones, the sound vibrations are not transmitted through the middle ear to the hair cells of the inner ear for processing.

3-24. A conductive hearing loss is temporary with medical intervention.

TINNITUS

3-25. Stress from loud noise damages the inner ear; a ringing, buzzing, or hissing sound may be perceived by the exposed Soldier. This is called tinnitus. Stress, stimulants, and noise can contribute to or worsen tinnitus.

3-26. Tinnitus may be temporary. However, once loud noises cause a permanent hearing loss, these sounds are typically permanent and can add to a Soldier's difficulty hearing.

3-27. Tinnitus does not have a 100 percent cure or treatment. Tinnitus is recognized as a disability by the VA. Tinnitus can be prevented by the regular use of hearing protection.

EAR POISONS (OTOTOXINS)

3-28. Exposure to certain chemicals, either alone or in concert with noise, may also result in hearing loss.

3-29. Some of these potentially harmful chemicals are toluene, xylene, n-hexane, organic tin, carbon disulfide, mercury, organic lead, hydrogen cyanide, diesel fuel, kerosene fuel, jet fuel, organophosphate pesticides, and nerve agents.

3-30. A base camp survey must be conducted by the PVNTMED personnel to determine potential ototoxic hazards. Preventing Soldier contact with chemical hazards is the first line of defense against ototoxic chemical exposure. If this is not possible, the PVNTMED personnel will provide specific guidance on the use of personal protective equipment such as hearing protection, eye protection, gloves, or respirators.

Chapter 4

Operational Hearing Services

Maintaining normal hearing ability is a deployment concern for Soldiers since effective communication is dependent on normal hearing. This is especially true in operational environments where hazardous and nuisance noise is prevalent. A once fit Soldier exposed to an explosion could in an instant lose enough hearing to no longer be combat effective. The purpose of this chapter is to provide information on noise assessment and reduction and hearing protection to reduce the impact of noise and NIHL on military operations.

SECTION I — OPERATIONAL HEARING CONSULTANT

4-1. One military audiologist (AOC 72C), in the rank of lieutenant colonel, can be attached to the medical command. This subject matter expert will answer directly to the command surgeon providing HR oversight. Roles and responsibilities include, but are not limited to—

- Providing policy guidance on operational hearing conservation matters.
- Maintaining liaison with deployed medical units on hearing-related issues.
- Monitoring and analyzing hearing loss trends of deployed Soldiers and the impact on unit readiness through MEDPROS, DOEHRs-DR and the Joint Medical Workstation (JMeWS).
- Providing oversight and consultative and technical services to support operational noise evaluation and provide on-site technical assistance.
- Reviewing medical command, Office of The Surgeon General (OTSG), DOD, and DA documents that pertain to operational noise evaluation.

SECTION II — IDENTIFYING NOISE LEVELS AND SOURCES

4-2. Noise is unwanted sound. The impact of noise on military operations cannot be overstated. Noise distracts, disturbs, and interferes with communication and sleep. At worst, it affects Soldier performance, behavior, and hearing.

4-3. While low-level sounds may be annoying, exposure to those above conversational speech levels produce symptoms of stress such as increased heart rate and blood pressure and headache, as well as faster and shallower breathing. While Soldiers can attempt to ignore noise, its effects contribute to decreased attention, energy levels, and effective communication; fatigue; and irritability.

4-4. Although sophisticated equipment is needed to quantify noise levels, all Soldiers have the ability to identify noise levels and sources that impact operations. In situations where more thorough noise assessment is required, PVNTMED personnel may be contacted for assistance.

4-5. Some examples of noise sources include: generators, intermittent landings of rotary- or fixed-wing aircraft, tactical vehicles entering or leaving the compound, and intermittent field radio communications.

SECTION III — REDUCING NOISE LEVELS

ENGINEERING CONTROLS

4-6. For hearing purposes, engineering controls are defined as any modification or replacement of equipment or related physical change at the noise source or along the transmission path (with the exception of hearing protectors) that reduces the noise level at the Soldier's ears.

4-7. Typical engineering controls involve—

- Reducing noise at the source.
- Interrupting the noise path.
- Reducing reverberation.
- Reducing structureborne vibration.
- Increasing the distance between the noise source and the operation.

4-8. Common examples of the implementation of such controls are—

- Moving the affected personnel further from the noise, such as locating the personnel in the quietest area of the tactical operations center (TOC).
- Erecting acoustical enclosures and barriers, such as sandbags around a generator.
- Installing sound-absorbing material.
- Installing vibration mounts and providing proper lubrication.

4-9. Engineering controls can range from the simple (such as sandbagging) to the extremely complex (such as designing a quiet engine). For more complex engineering controls, it's important to have a thorough understanding of noise intensities and spectral characteristics. This requires an advanced survey by PVNTMED personnel.

4-10. In order to implement engineering controls, it is important to understand how sound travels. Airborne sound is heard transmitted through the air. While structureborne sound is transmitted through objects. Both air- and structureborne sounds must be considered in sound isolation.

4-11. Since the Soldiers who operate or maintain and repair equipment are often the ones who know the most about the processes involved, they must feel free to express their concerns and ideas to their chain of command so that the noise-control devices will be as practical and effective as possible. Soldiers also have the responsibility of learning to operate their machines with the noise controls in place, of maintaining the controls properly, and of notifying the appropriate personnel when additional maintenance is needed.

4-12. Two aspects must be considered when isolating noise sources: keeping sound out of the listening environment and retaining sound within the listening environment. Vibrations from equipment in direct contact with the structure can cause walls and floors to vibrate. They become sounding boards or sound conductors and tend to amplify sound.

4-13. There are two types of airborne noise: reflected and transmitted. Reflected noises occur within an enclosed space and bounce back and forth against hard surfaces. Transmitted noises travel into other rooms through entryways, ductwork, windows, and walls. Generators, low flying helicopters, and tactical vehicle traffic can produce substantial amounts of airborne noise.

4-14. Reflected noise increases the intensity of the noise by prolonging the effect. It is most noticeable in empty rooms or those furnished primarily with hard-surface materials, such as in a motor pool or aircraft hangar. Soft, thick, porous materials work best in reducing reflective noise. Some simple ways to reduce reflective airborne noise in an enclosure include the use of acoustic tiles or sandbags.

4-15. Airborne noise travels through any opening where air can get through. Sound waves put walls into motion causing sound to radiate into adjoining rooms. Sound will find its way through the smallest crack. Separating the noisy equipment and the area of operations by increased distance wherever possible or using barriers to block sound waves and to keep them from traveling into a room or a tent are the best solutions in a field environment where structural improvements are not feasible.

4-16. Platoon leaders are responsible for ensuring that the chain of command is aware of the need for engineering controls and their benefits. They should ensure that the unit has thoroughly assessed the hazardous noise threat through site noise surveys by their PVNTMED detachment or supporting military audiologist.

ADMINISTRATIVE CONTROLS

4-17. Administrative controls, defined as changes in the work schedule or operations which reduce noise exposure, may also be used effectively. Examples include operating noisy equipment when fewer Soldiers are exposed or shifting a Soldier to a less noisy job once a hazardous daily noise dose has been reached (see the equipment technical manual [TM] or PVNTMED personnel). This practice of rotating Soldiers between quiet and noisy jobs, as with a high heat-index work-rest cycle, may reduce the risk of substantial hearing loss in a few Soldiers. Preventive medicine personnel should be consulted as part of the risk management process.

4-18. The most effective administrative control is to provide quiet areas where Soldiers can gain relief from workplace noise. Areas used for breaks and dining facilities should be located away from noise. If these areas must be near noise, they should have noise barriers appropriately placed to minimize background noise levels.

4-19. Leaders must ensure that both engineering and administrative controls are implemented to reduce Soldier exposure to hazardous noise.

4-20. Purchasing quieter equipment is an important administrative noise control and must be considered whenever possible. Some benefits of purchasing quieter equipment—

- Protecting Soldiers.
- Preventing the need for additional noise barriers.
- Reducing stress and the other negative effects of nuisance noise.

4-21. Often, a noise-control effort may seem overwhelming. As a result, it may be tempting to determine noise control is not feasible and rely on hearing protection alone to prevent hearing loss. Hearing loss prevention measures are needed only until the noise is reduced to a safe level. Many times, two hazards may be removed at once, such as in the case of enclosing a noise source that also generates high heat levels. An enclosure may trap the noise while the heat is vented to the outside.

4-22. Finally, it is important to ensure that break areas are as free from noise as reasonably possible and that other avenues of administrative controls have been explored.

SECTION IV — TACTICAL COMMUNICATIONS AND PROTECTIVE SYSTEMS

4-23. A summary of the currently available technology in hearing protection devices follows. All technologies listed are subject to change without notice. Specifications set forth in this chapter are those listed by the manufacturer. The actual performance of the devices depends on the achieved fit and the noise environment. Selection of devices should be based on relevance to the mission requirement to include: type and intensity of noise, functional requirements, and compatibility with preexisting communication equipment. For example, a hearing protection solution integrated into one device may provide excellent speech understanding inside a vehicle, but would be inappropriate for use in dismounted operations or vice versa. In addition, assessment of the performance of these devices should take place in a training environment before they are incorporated into the theater. Many of the devices have training requirements set forth by the manufacturer.

4-24. Tactical communications and protective systems (TCAPS) contain talk-through capabilities and can connect to at least one radio and/or an intercom. The single-channel version can interface with one radio or the vehicle intercom. The dual-channel version can connect to two radios or one radio and the vehicle intercom. External microphones allow for perception of environmental sounds and process sound independently to better enable localization such as the ability to locate a sound source). Some devices use external voice microphones for out-going communications while other devices use internal microphones

located in the external ear canal. Advantages of the internal microphones include elimination of the external boom microphone and reduction of background noise due to the placement of the microphone inside the ear canal. An active noise reduction (ANR) circuit reduces noise and can improve speech understanding in high-noise environments. The TCAPS come in two varieties: in-the-ear (ITE) devices and over-the-ear (OTE) devices.

IN-THE-EAR TACTICAL COMMUNICATIONS AND PROTECTIVE SYSTEMS

4-25. A variety of in-the-ear tactical communications and protective systems (ITETCAPSs) are currently available. All have the same components which include a housing body, microphone, cables, and ITE inserts. An example of an ITETCAPS is shown in Figure 4-1.

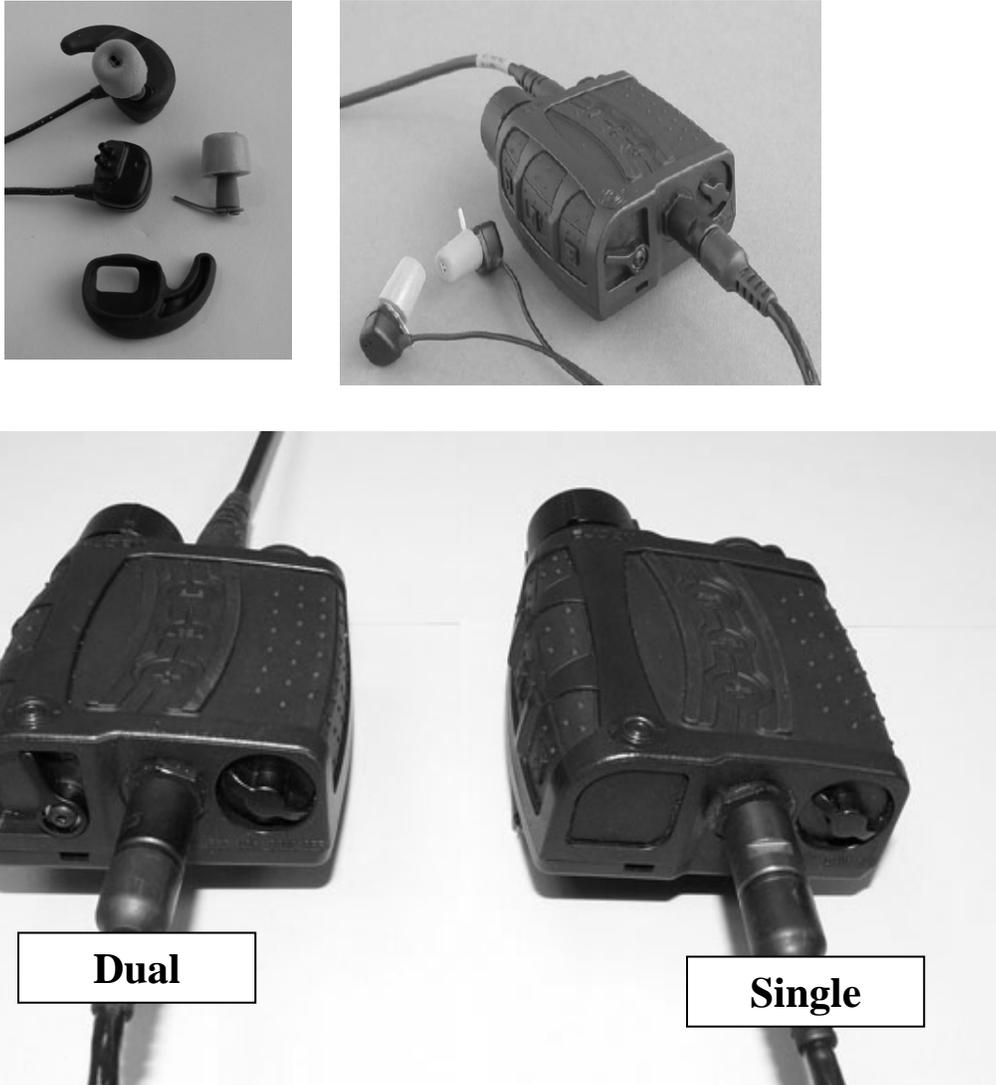


Figure 4-1. In-the-ear tactical communications and protective systems

4-26. Refer to manufacturer’s specific instructions for donning and doffing.

4-27. Control devices are built into the equipment—

- For device-specific controls, refer to manufacturer’s information. An example of common controls and brief description of controls is provided in Figure 4-2.

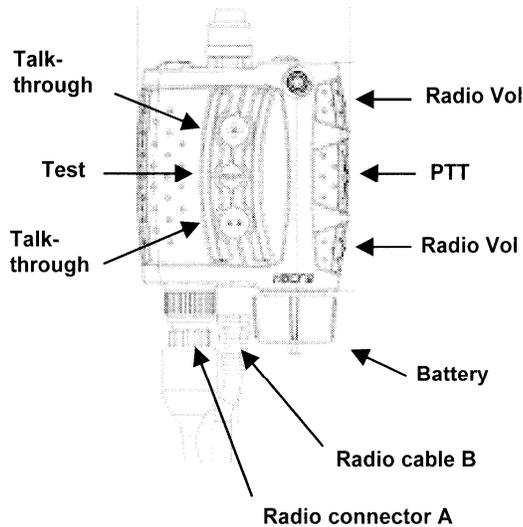


Figure 4-2. Common controls

- All devices contain a volume control similar to Figure 4-3. The manufacturers recommend using the lowest volume setting for the radio since an increase could cause distortion and hazardous noise levels.

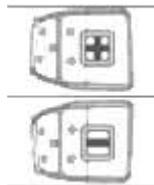


Figure 4-3. Volume control

- The push-to-talk (PTT) feature transmits the user’s voice over the intercom or radio. This mode will continuously transmit as long as this mode is selected. See Figure 4-4 for a graphic illustration of the push-to-talk button.



Figure 4-4. Push-to-talk mode

- The voice-activated microphone (VOX) mode will detect when the user talks and transmit the signal. This is a noncontinuous alternative to the PTT mode. The manufacturers recommend that in quiet environments, the volume is set to the lowest level because surrounding sounds can

trigger the VOX to transmit these sounds over the radio. The VOX mode will remain on for one second after the user speaks. If this results in interrupted conversation, use the PTT feature. The PTT button will override the VOX mode.

- The open microphone mode is intended for use with an intercom; however, this mode will also transmit surrounding environmental sounds. To avoid transmission of environmental sounds over radio transmission, use the VOX mode. The open microphone mode is not recommended for use with the radio since it will constantly transmit in this mode, which can result in damage to the radio. Constant transmission will also interfere with radios on the same channel.

4-28. When connecting radios it is imperative that the user ensure that their radios are compatible with the selected ITETCAPS. Refer to the manufacturer's information for compatibility information.

4-29. All devices use a leak test to ensure a proper ear canal seal is obtained. Active noise control cannot be utilized without a proper ear canal seal.

OVER-THE-EAR TACTICAL COMMUNICATIONS AND PROTECTIVE SYSTEMS

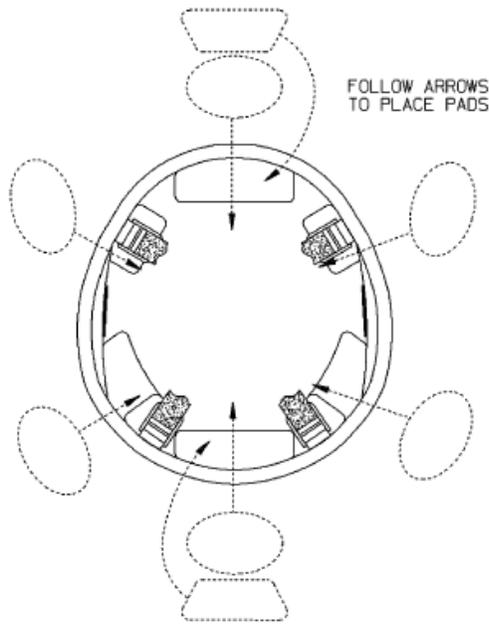
DUAL, COMMUNICATION, LEFT/RIGHT, REAR GUARD KIT

4-30. This circumaural headset, national stock numbers (NSNs) 5895-01-518-8865 and 5895-01-518-8870 (Figure 4-5), fits under the advanced combat helmet (ACH) and allows for talk-through communications, radio and/or intercom connection, and PTT capabilities. However, due to the changing nature of vehicle intercom systems, this device is not recommended for use with vehicle intercoms despite manufacturer's description. The modular integrated communications helmet (MICH) can connect to up to two radios. The headset provides both active and passive noise protection and uses compression to actively attenuate hazardous noise. The boom microphone is not interchangeable between the two ear cups. If the user wants a boom microphone on a particular ear cup, it must be ordered according to that specification. Figure 4-5A shows the dual, communication, left/right. Figure 4-5B shows the pads placement on the ACH. Figure 4-5C shows the interior of the ACH with the pads installed. Figure 4-5D shows the exterior of the ACH with the pads installed.

A



B



C



D



Figure 4-5. Dual, communication, left/right, rear guard kit

4-31. To don or doff the headset—

- Make sure that the padding inside the helmet is properly arranged before donning the headset.
- Fully extend the headband by holding each cup.
- Place the headset on the head with the microphones facing forward. Ensure the control buttons are on the left ear.
- Hold the ear cup over the ear. While holding the ear cup; adjust the headband by pressing on the top of the band. Repeat for the other ear.
- Don the headset and confirm that it is working by holding down the button on the left ear cup to “on.” Confirm that the pass-through microphone is working.
- Ensure that both controls (buttons on either side of the “on” button) are working.
- Hold down the center button to turn the system off.
- Check all components for excess moisture. If the headset has moisture, remove the earmuff headset microphone to dry completely for 24 hours.
- Remove ear cup hygiene kits and ensure that the speakers are not fogged. Replace the headset if fogging occurs.
- Test radio communications by connecting the headset to the radio with the PTT radio connector cables. Ensure that the headset functions properly with the radio.
- Check and replace the batteries if the headset does not turn on or if a tone is heard 10 seconds after turning the headset on. The tone indicates battery life of less than 40 hours.
- Ensure boom microphone is positioned close to the user’s mouth for maximum speech intelligibility.
- To doff the headset, remove the helmet and fully extend the headband.
- Press the ear cups together.
- Tuck the ear cups into the headband.

CAUTION

The headset will automatically turn off after 4 hours if no volume is adjusted. Three short tones will indicate that 5 minutes remain until automatic shut off.

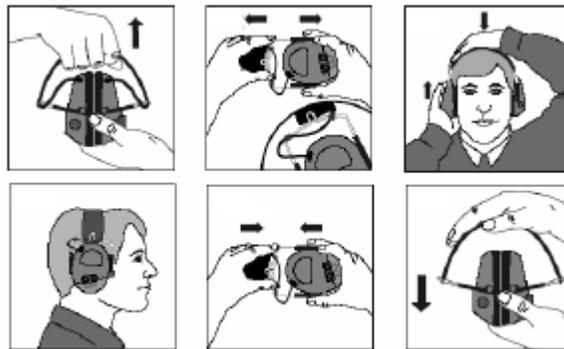
DEPTH AND PRESSURE GAGE

4-32. The depth and pressure gage, NSN 4220-01-493-8188 (Figure 4-6), is a circumaural headset designed to fit under the ACH. The headset allows for talk-through communications (TTC) and can connect to up to two radios or one radio and an intercom. This device can be ordered in a one, two, or no channel configuration. The microphones are spatially separated microphones, which preserve some auditory localization cues. The headset provides both passive and active methods for reducing noise. The system is also equipped with a boom microphone that can be mounted on either ear and a PTT box or optional hard-wired remote PTT. Throat microphones are also an optional feature. A single, dual, or no channel device is available. Figure 4-6A shows the proper wear of the headband with the headset attached. Figure 4-6B shows the gage’s proper placement. Figure 4-6C shows the gage.

A



B



C



Figure 4-6. Depth and pressure gage

4-33. To don or doff the headset—

- Pull up on headband while grasping the ear cups.
- Place the device over the head and adjust the height of the cups while holding the headband in place and moving the ear cup. Ensure that the ear cup microphones are facing forward.
- To remove the device, remove the headset, press the cups together, and collapse the ear cups into the headband.

CAUTION

Do not store with batteries in the device.

MICROPHONE HEADSET

4-34. The microphone headset (Figure 4-7), NSN 5965-01-521-0941, was designed for infantry passengers in combat vehicles and is compatible for use with the ACH. The microphone headset allows for TTC and PTT capabilities with an intercom and/or radios. The talk-through microphones are spatially separated, which preserves some localization cues. The microphone headset uses a headset that is anchored by hook and loop straps that fit over the helmet and around the back of the neck. The ear cups also house ANR circuits. The microphone contains a noise-cancelling microphone that can be worn on either ear cup. The headset can be worn in a dismantled situation and is compatible with the M42A2, combat vehicle crewman mask. The neck band and the over-the-helmet strap were designed for quick removal if the user dismantled the vehicle and wanted to replace the headset with another form of hearing protection. Cables are available to interface the microphone headset with two radios or a radio and an intercom.

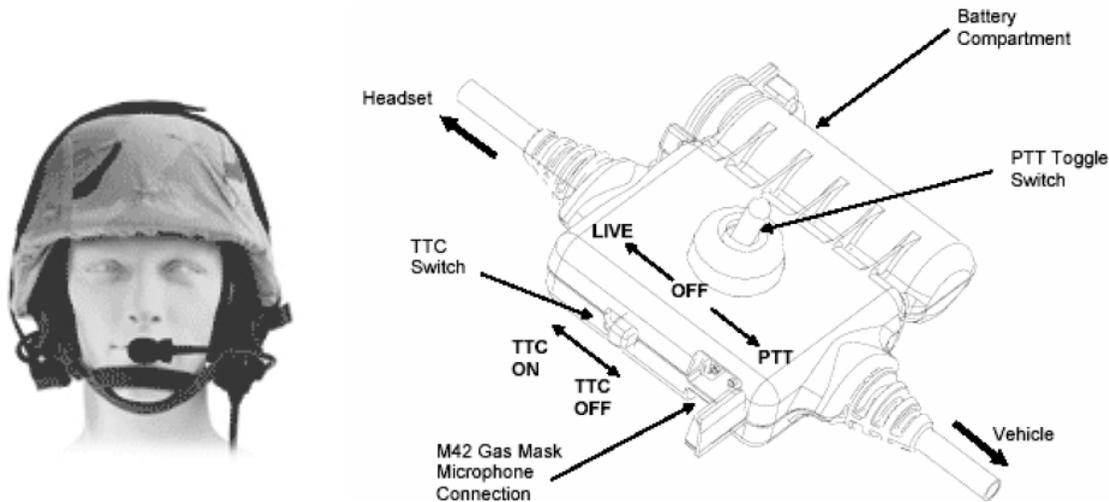


Figure 4-7. Microphone headset

4-35. This headset is compatible with the use of the ACH, provides TTC, and can connect up to 1 advanced narrowband/vehicular intercom (AN/VIC-3) and a multiband inter/intrateam radio. The headset provides passive and active attenuation through the use of an ANR circuit.

4-36. If the user has a V-centric version of the headset, then the device can be donned and doffed without removing the ACH. To don or doff the headset—

- Ensure that the cables connecting the headsets are connected and are fastened to the clips in the neckband.
- Replace the size AA battery prior to each use.
- Grasp the ear cups, one in each hand.
- Slide the headset from the back of the head and under the helmet and around the ears.
- Secure the hook and loop straps over the helmet by placing the right strap over the left.
- Ensure that no gaps exist between the ear cups and the head.

SECTION V — INTEGRATED HELMET SYSTEMS

4-37. In accordance with DA Pam 40-501, helmets are inspected by the unit hearing conservation officer every six months.

COMBAT VEHICLE CREWMAN HELMET

4-38. The combat vehicle crewman (CVC) helmet (Figure 4-8) was designed to provide ballistic protection, intercom communication, talk-through capabilities, and hearing protection for Soldiers in combat vehicles. The ear cups pass the windblown rain test.



Figure 4-8. Combat vehicle crewman helmet

- 4-39. To don the helmet—
- Place the lining inside the protective shell.
 - Make sure the hook and loop closure on the inside of the shell is firmly attached to the lining.
 - Attach the rear snaps on the shell to the rear tab on the lining.
 - Move the microphone to the side and grasp each ear cup and pull out and down.
 - Press down on the top of the helmet.
 - Fasten the chinstrap ensuring that the helmet fits snugly.
 - Adjust the nape strap.
 - Position the microphone.

FLYER'S HELMET

4-40. The flyer's helmet (Figure 4-9), NSN 8415-01-394-6474, is intended for pilots in rotary-wing aircraft. The helmet provides ballistic protection, intercom communication, and hearing protection. The built-in eyewear is compatible with the ear cups. The noise inside aircraft may exceed the level of hearing protection provided by this helmet, and therefore, the use of foam earplugs combined with the helmet ear cups is appropriate.



Figure 4-9. Flyer's helmet

4-41. Information concerning donning and doffing this helmet is included in TM 1-1680-377-13&P.

SECTION VI — EARPLUGS

PREFORMED EARPLUGS

4-42. These earplugs require an initial and annual fitting by medically trained personnel. Both ears need to be fitted individually since some users may have different-sized ear canals and ear canals change as one ages.

4-43. This hearing protection is reusable in the absence of physical defects such as tears and cracks.

4-44. A carrying case with an insertion tool inside should be provided with each set of preformed earplugs issued. This case can be carried on the ACU on the belt loop.

4-45. Wash earplugs with warm soapy water. Allow earplugs to completely dry before returning to the carrying case or placing in the ear.

4-46. The earplugs are compatible for use with most Army headgear.

4-47. If the earplug is properly inserted, the user should feel as though his voice sounds louder and environmental sounds should sound softer.

CAUTIONS

1. Improper insertion technique can reduce noise protection.
2. Earplugs may become loose with normal jaw movements.

COMBAT ARMS EARPLUGS

4-48. The CAE is a nonlinear earplug that allows effective communication and situational understanding and also provides protection from hazardous impulse noises. Introduced to the military by the start of OEF, Soldiers shunned them for operational use. With units' strength decreasing because of hearing loss, the CAE began to be issued to all deploying Soldiers in 2004. As reported by audiologists who served in Iraq, no Soldier seen at the CSH that reported wearing the CAE when exposed to an explosion had ruptured eardrums.

4-49. The CAE provides a unique type of passive hearing protection in that it combines two types of hearing protection into one device. There are currently two versions of the CAE. Both will be discussed below.

4-50. With the double-sided CAE, the green side of the earplug serves the same purpose as the triple flange earplug because it protects against a variety of noise hazards. The yellow side minimally softens speech, but will protect against impulse noise hazards, such as weapon fire and blasts. The yellow side will not provide protection against steady-state noise, such as generator, vehicle, and aircraft noise. This earplug is the best passive protection for Soldiers who need to hear softer level sounds when exposed to unexpected weapons noise.

4-51. To insert the double-sided CAE follow the directions for inserting the triple flange earplug, however—

- The insertion tool is not used.
- One size fits most.

4-52. The dual mode single-sided CAE offers all of the protection of the double-sided CAE in a single-sided device, with the added benefit of multiple sizes. This earplug requires fitting by medically trained personnel with training in fitting hearing protection. The dual mode action of this CAE is accomplished by rotating the center dial of the earplug. Rotating the disk so that the pistol points towards the stem of the earplug places the device in the level dependent mode and allows for best communication and protection against weapons fire. Rotating the disk to any other position allows for protection against both impulse and steady-state noise.

4-53. The CAEs are now a rapid fielding issue item for deploying Soldiers. The CAE will soon become a standard issue item for all initial entry Soldiers allowing them to train with the CAE prior to using them in combat. Additional information regarding the CAE can be obtained from your local hearing program manager or PVNTMED personnel.

FLANGED EARPLUGS

4-54. There are two types of flanged earplugs in the inventory. The triple-flange and the quad-flange earplugs are best used when protection is needed against steady-state noise such as aircraft, generators, and other industrial-type noise. Both of these devices must be fitted by medically trained personnel to ensure proper fit.

FOAM (HAND-FORMED) EARPLUGS

4-55. No medical fit is necessary to fit foam (hand-formed) earplugs.

4-56. These earplugs are washable and reusable, but once the foam loses its ability to expand, the earplugs need to be thrown away.

4-57. These earplugs are appropriate for those who work around intermittent noise exposures and can be worn with a MICH.

MUSICIAN'S EARPLUGS

4-58. Musician's earplugs provide flatter reduction across frequencies, which preserves the fullness of sound better than traditional hand-formed or preformed earplugs.

4-59. Due to their acoustic response provided by a filter built into the stem, these earplugs are recommended for musicians or listeners who need to differentiate acutely between small differences in sounds. These earplugs are recommended for moderate levels of noise given low sound attenuation. One size fits most and must be fitted by medically trained personnel, however, a more expensive custom option is available for harder to fit ear canals.

4-60. To insert the musician's earplug—

- Pull the top of the ear up and back with the opposite hand, in order to straighten out the ear canal.
- Tug gently to ensure that the earplugs do not slide out of place.
- Twist the earplug out of the canal to gently remove it.

EAR CANAL CAPS

4-61. Characteristics of ear canal caps include—

- One size fits most.
- The ear canal caps cannot be used in environments where the noise level exceeds 95 dB, A-weighted (dBA). This means ear canal caps are most appropriate in low-background noise, industrial-type operations, such as in port operations. Ear canal caps will not effectively protect Soldiers from weapons fire or blast noise.
- The ear canal caps can be worn around the neck.

4-62. To insert ear canal caps—

- Place the caps either into the opening of the ear canal or just over the ear canal.
- Adjust the headband to fit snugly over the head, behind the head, and under the chin.

SECTION VII — NOISE MUFFS

4-63. Noise muffs are routinely used in industrial operations.

4-64. These devices should be inspected regularly to ensure that the ear cups and their components are in good working condition in accordance with DA Pam 40-501.

4-65. All of these devices are water-resistant. A damp cloth combined with mild detergent should be used to clean the seals on the ear cups.

4-66. In high-noise environments (for example, aircraft noise and explosions), headsets may be lifted off of the head, rendering the ears vulnerable to noise hazards. Therefore, the use of double hearing protection, such as plugs and earmuffs, is recommended.

Chapter 5

Hearing Conservation

For many years, the Hearing Conservation Program served as the flagship for the prevention of NIHL. This primarily garrison-focused program is instrumental in preventing NIHL in primarily industrial-based settings. Although some Soldiers work in industrial-based settings, hearing conservation efforts are primarily directed at our civilian workforce.

5-1. The Hearing Conservation Program (DA Pam 40-501) provides an in-depth overview of the essential elements of the program. A brief overview is listed below. For additional information, refer to DA Pam 40-501.

5-2. Elements of the Hearing Conservation Program include—

- **Noise Hazard Identification:** Describes the frequency of noise surveys, the equipment used, equipment calibration requirements, personnel involved in conducting noise surveys, risk assessment, and posting requirements.
- **Engineering Controls:** Discusses engineering control implementation, plus control measures for both existing and new equipment and facilities.
- **Hearing Protectors:** Details the requirements for use and maintenance, characteristics of protectors, and the hearing protector requisition process.
- **Monitoring Audiometry:** Describes personnel hearing testing requirements, test equipment and methods, hearing loss diagnosis and referrals, and Occupational Safety and Health Administration reporting and recordkeeping requirements.
- **Health Education:** Discusses hearing conservation training requirements, including available educational materials.
- **Enforcement:** Details the requirement for command emphasis of the importance of hearing conservation, program performance standards, compliance measures, and disciplinary action in the event of noncompliance.
- **Program Evaluation:** Describes the requirement for ongoing Hearing Conservation Program internal and external evaluation.

Glossary

ACRONYMS AND ABBREVIATIONS

ACH	advanced combat helmet
ACU	Army combat uniform
AKO	Army Knowledge Online
ANR	active noise reduction
AOC	area of concentration
AR	Army regulation
attn	attention
CAE	combat arms earplug
CEPD	communication enhancement and protection device
CSH	combat support hospital
CVC	combat vehicle crewman
DA	Department of the Army
DA Pam	Department of the Army pamphlet
dB	decibel
dBA	decibel, A-weighted
DC	Dental Corps
DD	Department of Defense/day, two digits
DOD	Department of Defense
DODI	Department of Defense Instruction
DOEHRS	Defense Occupational and Environmental Health Readiness System
DOEHRS-DR	Defense Occupational and Environmental Health Readiness System—Data Repository
DOEHRS-HC	Defense Occupational and Environmental Health Readiness System—Hearing Conservation
eMILPO	Electronic Military Personnel Office
FM	field manual
H	hearing profile level
HL	hearing level
HR	hearing readiness
Hz	hertz
IED	improvised explosive device
IMR	individual medical readiness
ITE	in-the-ear
ITETCAPS	in-the-ear Tactical Communications and Protective System
JMeWS	Joint Medical Workstation
LP	listening post
MEDPROS	Medical Protection System

MICH	modular integrated communications helmet
MMRB	Military Occupational Specialty Medical Retention Board
MND	medical nondeployable
MODS	Medical Operational Data System
MOS	military occupational specialty
MRC	Medical Protection System Readiness Coordinator
MWDE	Medical Protection System Web Data Entry
NIHL	noise-induced hearing loss
NSN	national stock number
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OP	observation post
OTE	over-the-ear
OTSG	Office of The Surgeon General
PROFIS	Professional Filler System
PTT	push-to-talk
PVNTMED	preventive medicine
RC	Reserve Component
RPG	rocket-propelled grenade
SF	standard form
SOP	standing operating procedure
SPRINT	speech recognition in noise test
SRT	speech reception threshold
ST	special text
STS	significant threshold shift
TB MED	technical bulletin, medical
TCAPS	Tactical Communications and Protective System
TDY	temporary duty
TM	technical manual
TOC	tactical operations center
TOE	table of organization and equipment
TTC	talk-through communications
TTS	temporary threshold shift
US	United States
USAMEDDC&S	United States Army Medical Department Center and School
USR	unit status reporting
VA	Department of Veterans Affairs
vol	volume
VOX	voice-activated microphone

References

SOURCES USED

These are the sources quoted or paraphrased in this publication.

DEPARTMENT OF DEFENSE INSTRUCTION

These documents are available online at: <http://www.dtic.mil/whs/directives/>

DODI 6055.12, *DOD Hearing Conservation Program (HCP)*, 5 March 2004

ARMY PUBLICATIONS

These publications are available online at: <https://akocom.us.army.mil/usapa>

DA Pam 40-501, *Hearing Conservation Program*, 10 December 1998

DA Pam 611-21, *Military Occupational Classification and Structure*, 22 January 2007

This publication is available through the LOGSA Publications System at:

<https://www.logsa.army.mil/etms/online.cfm>

TM 1-1680-377-13&P, *Interactive Electronic Technical Manual (IETM) for Air Warrior*, 27 January 2006

DOCUMENTS NEEDED

These documents must be available to the intended users of this publication. These documents are available online at: <http://www.usapa.army.mil>.

DA Form 3349, *Physical Profile*

DD Form 2214, *Noise Survey*

DD Form 2214C, *Noise Survey (Continuation Sheet)*

DD Form 2215, *Reference Audiogram*

DD Form 2216, *Hearing Conservation Data*

SF 88, *Medical Record—Report of Medical Examination*

OTHER REFERENCES

Audiology in Operation Iraqi Freedom, Audiology Today, Volume 16, Number 5, September/October 2004

Available from the National Office, American Academy of Audiology, 11730 Plaza America Drive, Suite 300, Reston, VA 20190

Blast Injury of the Ear: Clinical Update from the Global War on Terror, Military Medicine, July 2007

Available at http://findarticles.com/p/articles/mi_qa3912/is_200707/ai_n19434361

Gloss, David S. and Wardle, Miriam G. 1984. *Introduction to Safety Engineering*. John Wiley and Sons, Incorporated

Hazardous Working Conditions in Seven Federal Agencies, 4 August 1976

Available at <http://www.gao.gov>

Impact of Communications on Armor Crew Performance, Army Research, Development, and Acquisition Bulletin, January–February 1990

Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402

Troops Return with Alarming Rates of Hearing Loss, Hearing Health, Fall 2004

Available at http://www.drf.org/hearing_health/archive/2004/fall04_troopsreturn.htm

WEB SITE

<https://apps.mods.army.mil/MEDPROS/Secured/MRCList.asp>

READINGS RECOMMENDED

These sources contain relevant supplemental information. These publications are available online at:
<https://akocom.us.army.mil/usapa>

AR 40-5, *Preventive Medicine*, 25 May 2007

AR 40-501, *Standards of Medical Fitness*, 29 May 2007

AR 220-1, *Unit Status Reporting*, 19 December 2006

DA Pam 40-11, *Preventive Medicine*, 22 July 2005

FM 4-02.17, *Preventive Medicine Services*, 28 August 2000