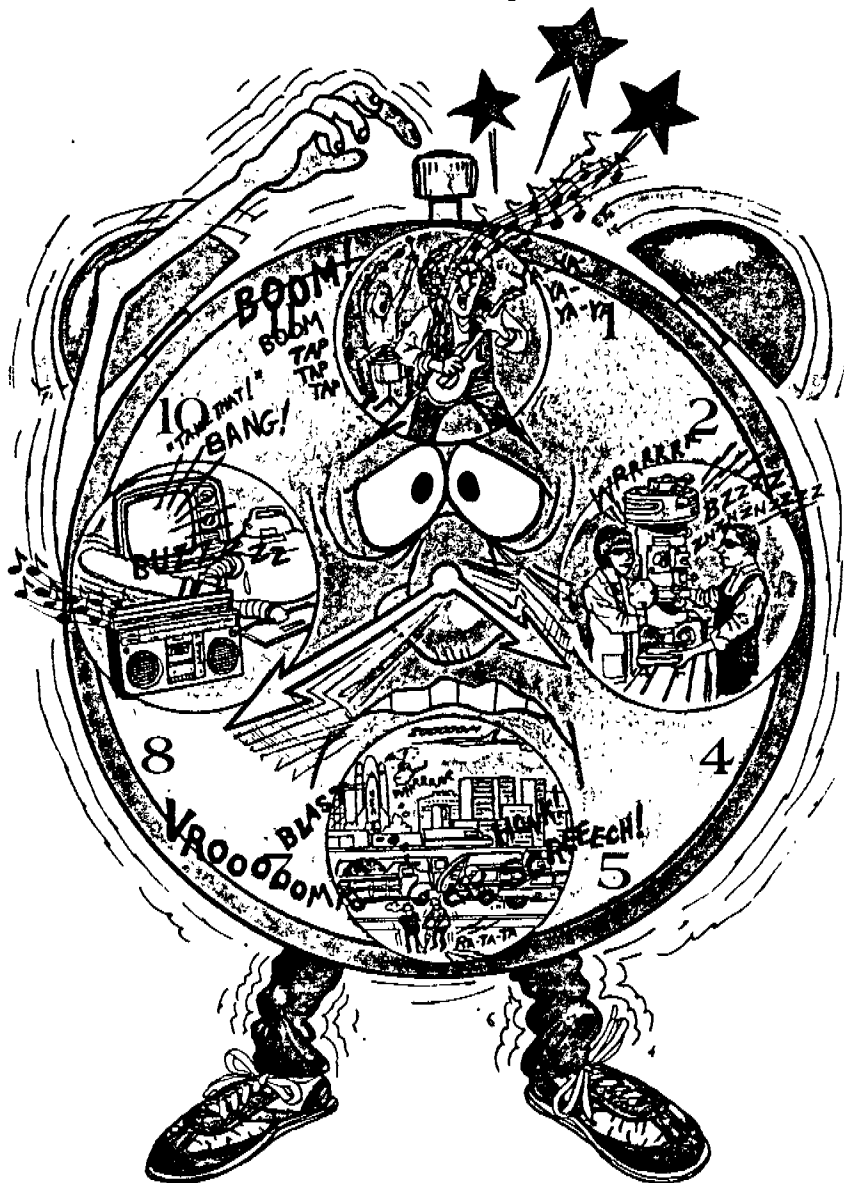


HEARING CONSERVATION

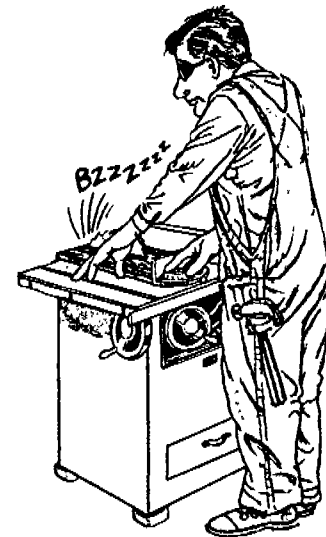
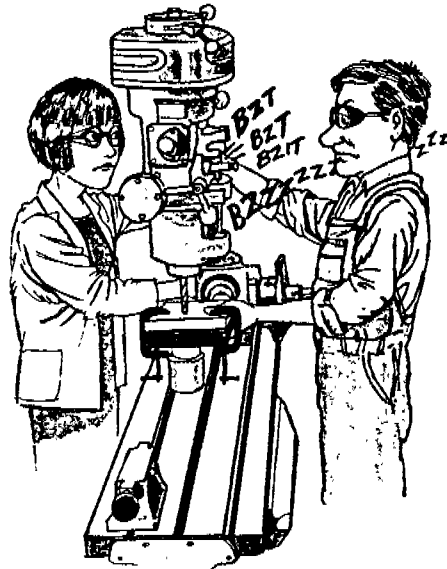
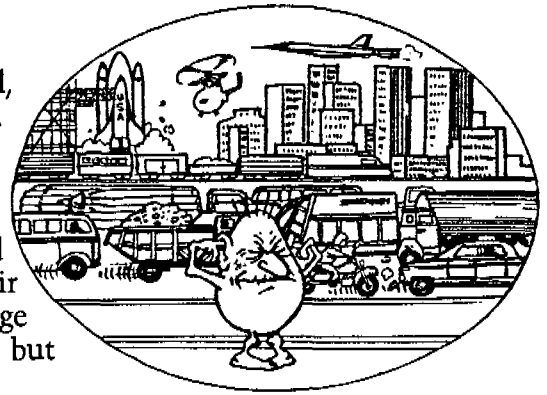
A Guide to Preventing Hearing Loss



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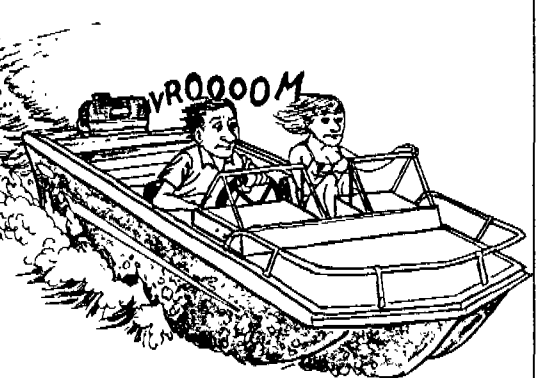
IT'S TO NOISY TO THINK!

As our world becomes more mechanized, the problem of noise pollution increases. Noise—unwanted sound—bombards us around the clock, at work, home, and play. It also bombards tiny hair cells inside our ears. Loud and prolonged noise can permanently destroy these hair cells, causing hearing loss. The damage may be gradual, painless, and invisible, but it's permanent and very real.



Hearing Conservation Program

Today, more than 20 million Americans are exposed to hazardous noise on and off the job. A hearing conservation program is designed to help you learn how you can protect your hearing at work, home, and play. To make sure you'll keep hearing the good sounds of life—murmuring brooks, your favorite music, a child's laugh—you need to learn how to protect your hearing now.



This booklet is not intended to replace your company's health and safety policies. Only your company can establish the specific guidelines appropriate for your job.

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NOW, THAT'S MUCH BETTER!



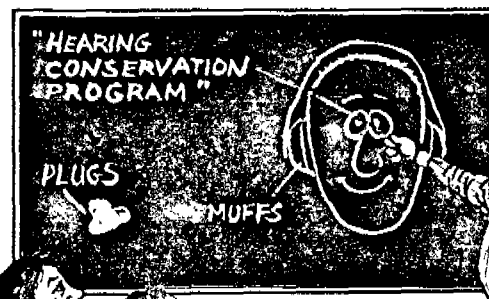
Fortunately, hearing loss caused by noise can be prevented. Working together as a team, you and your employer can give your hearing the around-the-clock protection it deserves. Your company is aware of the noise problem and is committed to teaching you the basics of hearing protection. Your company wants you to understand how noise affects your hearing, why hearing protectors are important, and what you can do to prevent hearing loss both on and off the job.

WHAT WE CAN DO

In addition to educating you about the prevention of hearing loss, management assesses the areas of hazardous noise exposure. If you work in one of these areas, you may choose from a selection of protectors an appropriate type that fits you best. Your hearing will be tested regularly to let you know if a problem is developing—in time to do something about it.

Hearing damage can result from cumulative exposure to noise. Since you count on your ears all the time—at work, home, and play—it's up to you to think of ways to protect them when you are on and off the job.

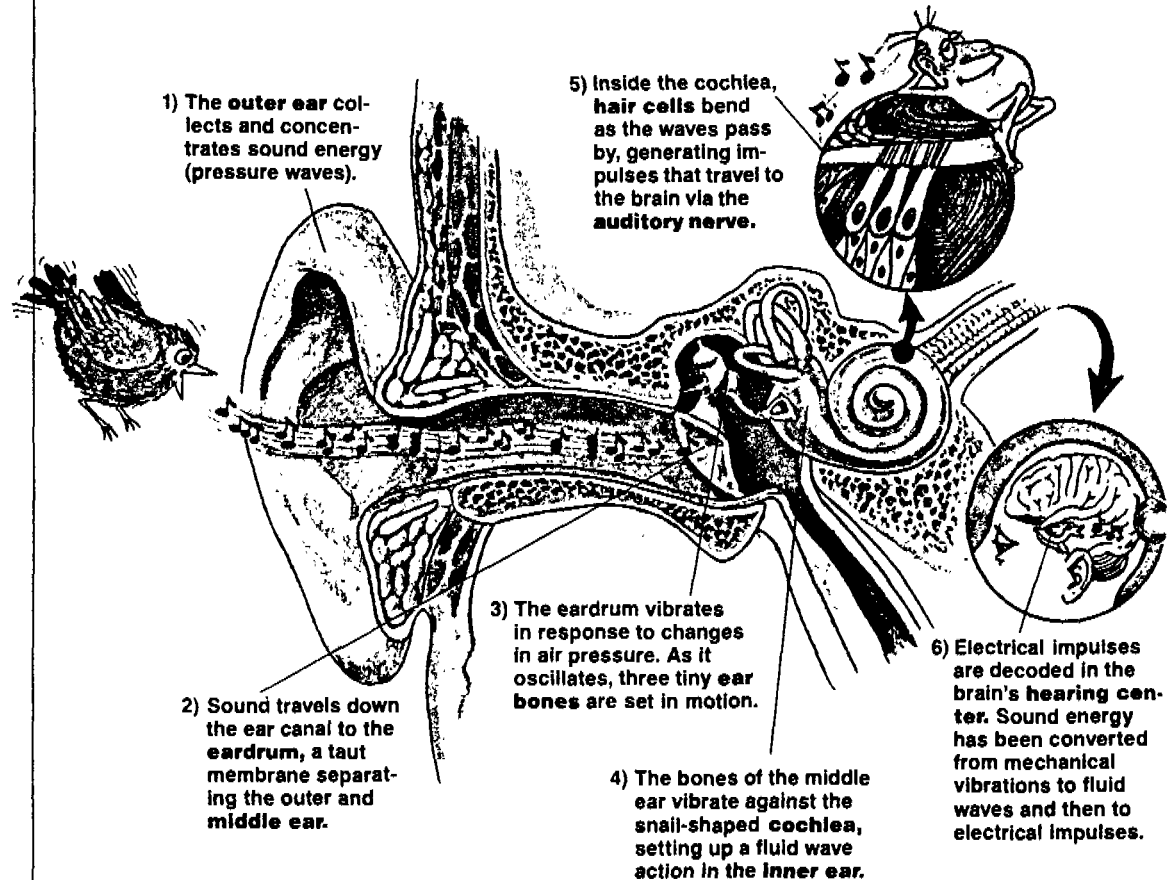
Healthy, protected workers are safer and more productive. So management, your supervisor, and you all have a stake in the future of your hearing. When you and management team up to take care of your hair cells, your hair cells can do their own job—help you hear for a long time.



NORMAL HEARING

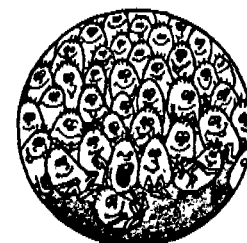


The outer ear collects sound energy and funnels it into the middle ear where it is transformed into mechanical vibrations. These vibrations, or oscillations, enter the fluid-filled inner ear as undulating waves. It's in the inner ear that thousands of hair cells change the mechanical energy of the waves into electrical impulses that the brain interprets as sound.



YOUR HAIR CELLS THROUGH LIFE

We start life with a fixed number of hair cells. As we age, they begin to die off naturally, resulting in hearing loss called **presbycusis** (from **presby**: old + **akousis**: hearing). Usually presbycusis isn't noticed until later in life, although premature presbycusis can run in families. Hair cells also can be damaged by head injury, infections, and some medications.



We're born with about 40,000 hair cells.

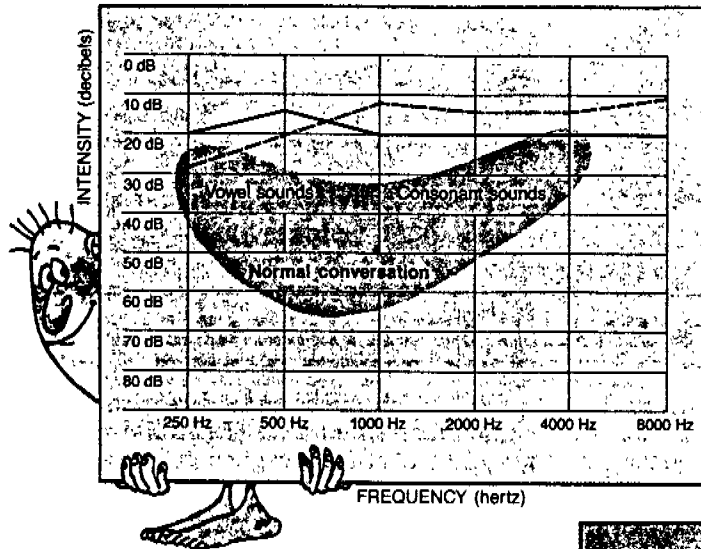


By adulthood, cells have died.

MEASURING HEARING

Sound has both frequency and intensity. Frequency, or pitch, is measured as sound vibrations per second, or hertz (Hz). The frequency of a boat whistle or a locomotive horn is approximately 250 Hz, while the frequency of a bird singing or a table saw is 4,000 Hz. Intensity, or loudness, is measured in decibels (dBA). A conversational voice is around 65 dBA; a shout is 90 dBA or greater.

The Audiogram



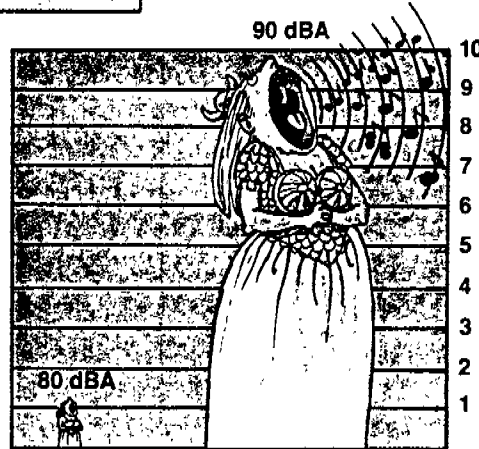
The Hearing Test

The hearing test measures how loud a sound has to be before you can just hear it. As you sit in a test room wearing earphones, you will be asked to signal to the examiner when each tone can first be heard.

From the results, a hearing profile called the audiogram can be plotted. By comparing current to previous audiograms, you can see if hearing loss has occurred, and at which frequencies.

More on decibels (loudness)

Decibels are a measure of sound (how much pressure sound exerts on a surface). As the decibel level rises, the sound increases more rapidly than you perceive it. A sound of 90 dBA is 10 times stronger than a sound of 80 dBA. A sound of 100 dBA is 100 times stronger than a sound of 80 dBA.



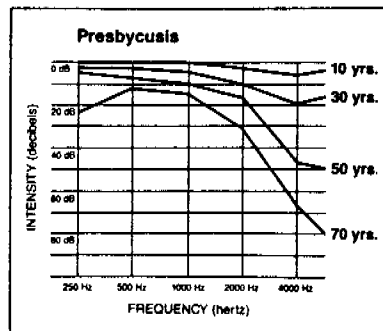
The 10 decibel difference



People in their 50s may show some hearing loss.



Others don't show it until their 80s.

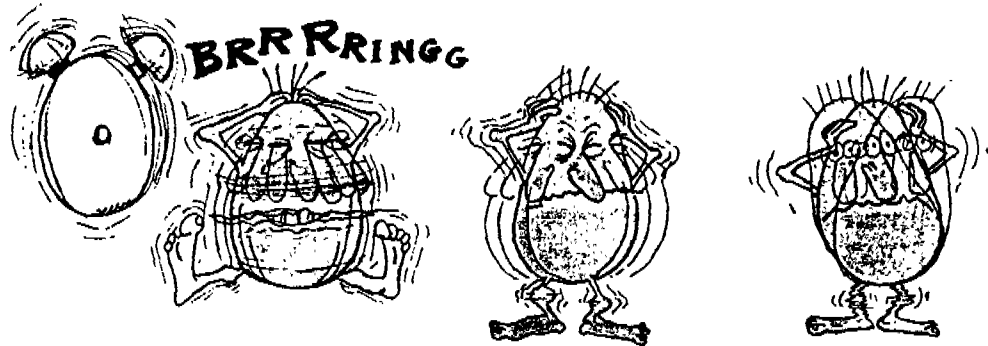


Presbycusis begins in adolescence, but it doesn't become noticeable until years later, when you can't hear high-frequency sounds like a watch ticking or certain consonant sounds.

NOISE AND HEARING L SS

Noise can cause hearing loss, depending on the **dosage**, the amount of noise exposure over a period of time. Dosage equals **intensity**, or loudness,

multiplied by **duration**, or length of time exposed. Hair cells are less traumatized when the noise is less intense and of shorter duration.



THE SOUND SPECTRUM AND YOUR HAIR CELL

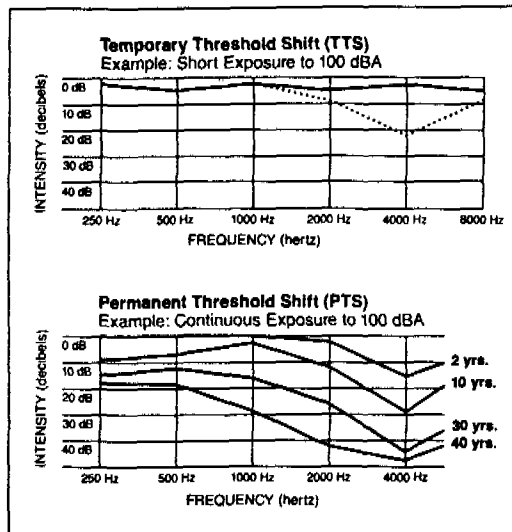
The sounds around us vary in intensity. Low intensity sounds can be quite pleasant—and harmless. Excessive exposure to noise at or above the **caution or action zone** (85–90 dBA) is dangerous. If the noise is such that you have to raise your voice above background noise at three feet, the noise level is probably above 85 dBA and hazardous to your hearing.



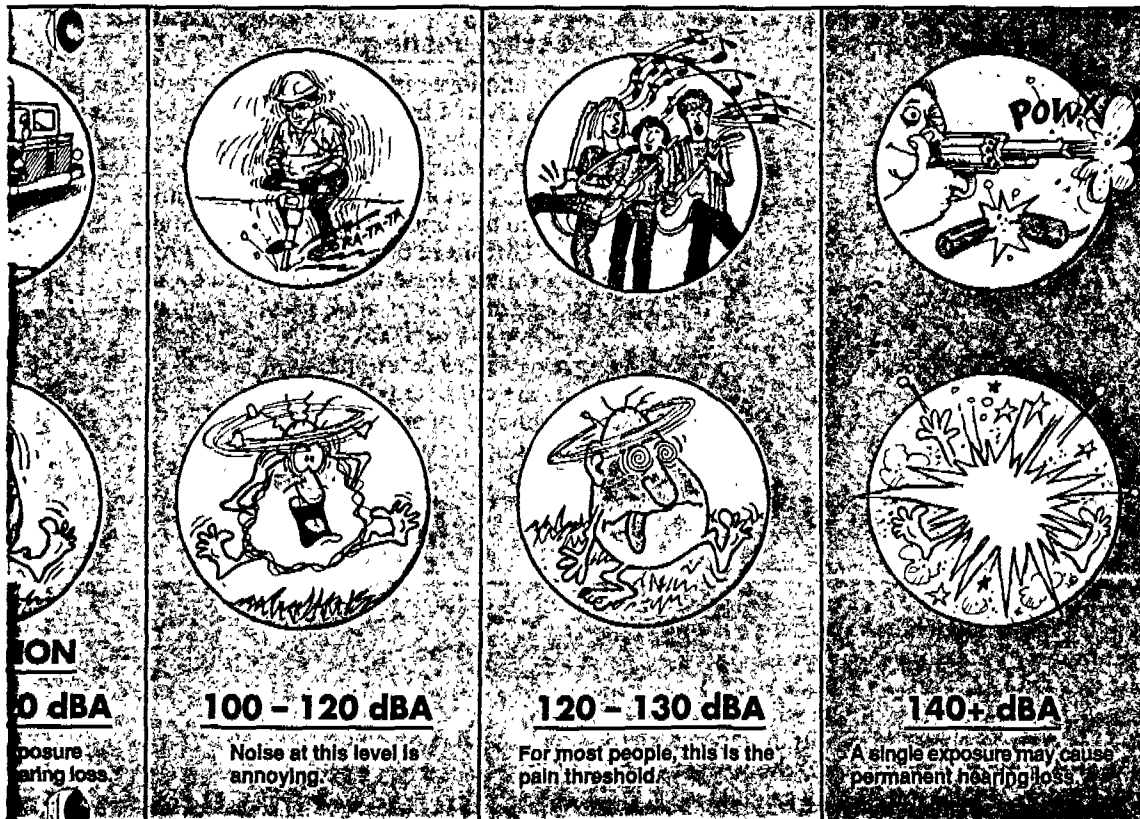
KINDS OF HEARING LOSS

Exposure to noise above the caution zone can cause a temporary loss of hearing called **Temporary Threshold Shift**. There is a loss of hearing in the higher frequencies, perceived as a muffling of sounds. It may be accompanied by **tinnitus** (head noises) and, at work, usually occurs during the first two hours of continuous noise exposure.

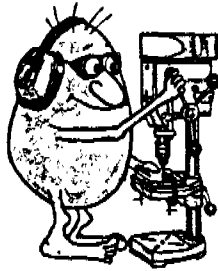
Repeated exposure can cause **Permanent Threshold Shift**, a permanent hearing loss, which is not medically recoverable.



Continuous exposure to noise (85 dBA or greater) can cause permanent loss of hearing. Short exposure to extremely loud noise (greater than 140 dBA), known as **acoustic trauma**, can also cause permanent hearing loss. Try not to expose your ears repeatedly to sounds above the caution zone. Save your hearing for the more pleasant sounds of life.



HEARING CONSERVATION PROGRAM

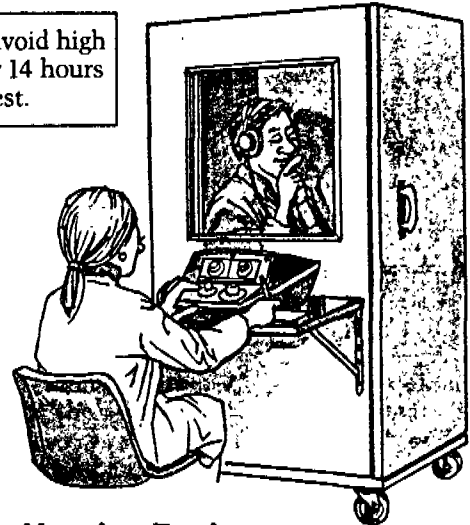
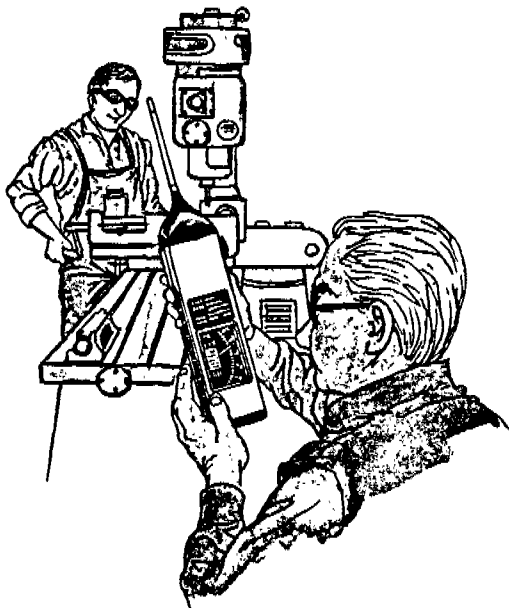


Your employer is committed to helping you conserve your hearing. OSHA (Occupational Safety and Health Administration) has established guidelines for on-the-job prevention of hearing loss. Hearing protectors are of first importance. Hearing tests determine employees' baseline hearing and are followed up by annual tests to discover any changes in hearing. Workplace noise measurements will assess noise exposure.

It's important to avoid high noise exposure for 14 hours before a hearing test.

Hearing Protectors

Any employee exposed to a noise dosage equivalent to an 8-hour exposure above 90 dBA must be fitted with hearing protectors. The effectiveness of hearing protectors depends on proper fitting. Training in their use and care is also an important part of a hearing conservation program.



Hearing Testing

Every employee in an identified high-risk area is given a hearing test to establish a baseline audiogram and show whether a hearing problem already exists. Hearing tests are then given every year and compared to baseline hearing results. A **Standard Threshold Shift** has occurred when the hearing threshold has changed by an average of 10 dB or more in either ear at 2,000, 3,000, or 4,000 Hz. The audiogram is reviewed to determine whether the results are consistent with excessive noise exposure; if an employee shows a change in hearing, he or she will be notified.

Workplace Testing

Properly trained individuals can use a **sound level meter** to measure the noise level in your work area. There are various ways of measuring noise, depending on whether the sound is continuous or intermittent. To determine the individual **noise dose**, the worker would wear a **dosimeter**, which calculates noise exposure over the entire work shift.



TOGETHER, WE CAN DO IT!

The best hearing protection insurance is wearing hearing protectors whenever necessary. Your employer can identify high-risk noise areas where hearing protectors should be worn and can instruct you in their proper fit, use, and care. Only you can follow

through, wearing them properly at all required times and places.

Your company's management, your supervisor, and you are the hearing conservation team for getting the job done—and keeping your ears healthy.



Information

You will be notified if noise exposure for your job reaches the action level (a time-weighted average exposure of 85 dBA or greater for 8 hours).



Taking Responsibility

Hearing protectors should be worn whenever needed. Take responsibility for wearing them in situations where there is a noise problem.



Happier Workers

The reduction of noise benefits both the employee and management. Workers who are protected from on-the-job noise have fewer injuries. They also tend to have less job-related tension.



Education

Your company can teach you about the effects of noise on hearing and about the use and care of protectors.



Wearing What's Right

Be sure you have maximum hearing protection when entering a risk area. If your plugs and muffs aren't right for the job—or if they feel too uncomfortable—talk with your supervisor.



A Friend For Life

Protect your hair cells from noise damage and they will go on serving you faithfully for a long, long time.

HEARING PROTECTORS—YOUR EARS' BEST FRIENDS

Hearing protectors act as barriers to reduce sound entering the ear. They may be inconvenient at times and take some getting used to. But wearing them now is your best insurance for hearing well in the future.

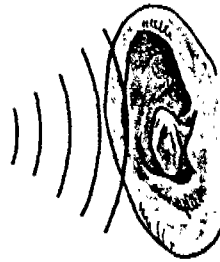
Your company provides a selection of protectors and will reevaluate their suitability if there's a change in working conditions. Choose the kind that fits well and is comfortable. A Noise Reduction Rating (NRR) system tells

TYPES

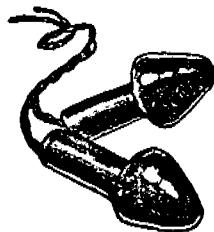
HOW THEY WORK



Disposable Plugs



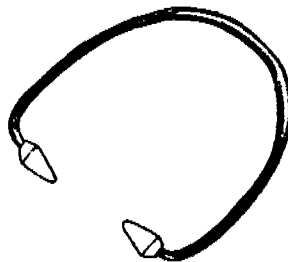
Disposable plugs come in a variety of styles. All are placed inside the ear canal to block out noise. Plugs are almost invisible and also help prevent dirt and grease from entering the ear.



Reusable Plugs



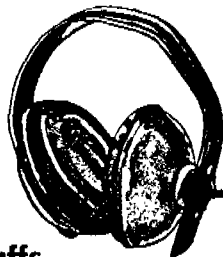
Reusable plugs come in a variety of styles and fit into the ear canal to block out noise, dirt, and grease. Some plugs come in pairs joined by a string so they are not easily lost.



Headband Plugs



Headband plugs provide a snug yet comfortable fit. They can be worn along with safety glasses, helmets, or other headgear. They are, in many ways, more versatile than muffs.



Muffs



Ear muffs have cushions that form a seal around the ear, covering it completely and blocking out noise. The ear cushions may be foam- or liquid-filled.

how much noise each type attenuates, usually between 20–29 dBA. In general, if you can hear co-workers over the background noise without hearing protectors, you will hear them better with hearing protectors.

Remember, ear protectors only work when worn properly and constantly! If you have a problem with your protectors, see your supervisor. Often, a simple adjustment or switch to another type may solve the problem.

USE AND CARE

COMFORT TIPS



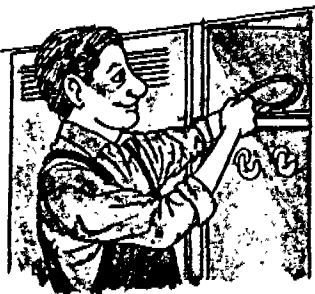
Wash your hands and inspect plugs for wax, dirt, or grease before inserting them. Some disposable plugs need to be shaped before you use them. Don't share plugs. Throw plugs away after your shift.

Plugs should be pliable and fit snugly into the ear canal. Never break off the tips. After inserting plugs, if they are working, your voice should sound louder to you.



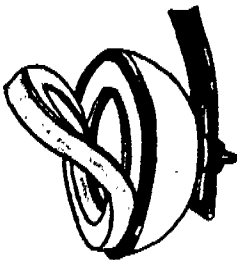
Wash hands and inspect plugs for dirt and grease before using. Wash reusable plugs at least once a day; rinse and dry. Store in a plastic case or clean pill bottle. Replace them when they harden or become discolored.

Plugs should fit snugly into the ear canal. Try different kinds to see which are most comfortable. Check the fit of reusable plugs the same way you check disposable plugs.



Headband plugs are made of washable materials and should be cleaned often. Although they are durable and long-wearing, they mustn't be subjected to twisting or bending. Store them safely.

The headband ensures uniform pressure on the eartips. Again, don't bend the headband; this will interfere with the performance of the protectors. If you experience any problems, see your supervisor.



Keep muffs clean by washing the cushions. Since the cushions may harden with use, periodic examination will determine the need for replacement. Store muffs in a safe place, such as a shelf or a locker.

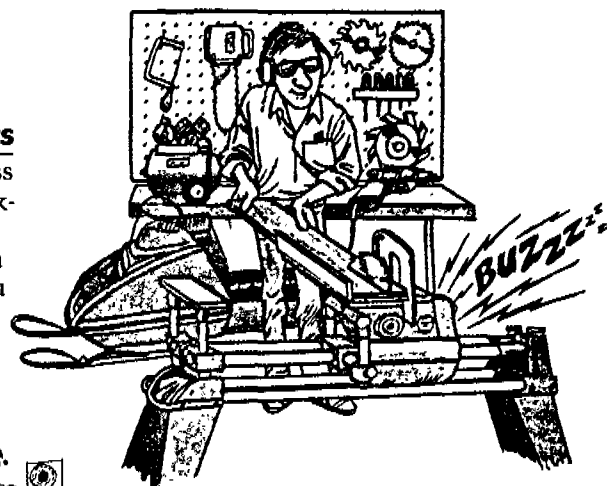
All muffs should be fitted carefully for maximum comfort. Don't loosen muffs; that will reduce their noise-reducing efficiency. If you wear glasses, muffs may not fit properly; you'll need another type of ear protector.

HELPFUL HINTS F R HOME AND PLAY

Your ears are always at work, whether you are or not. It's important to apply the same principles you've learned at work to reduce noise hazards at home and play, all day long—including wearing your hearing protectors.

To keep the best possible hearing for the rest of your life, take good care of your ears. Follow these ear-saving tips for around-the-clock protection.

Wear your hearing protectors at home. Guard against hearing loss by wearing your protectors while working around the house. Power tools, lawn mowers, and carpentry work can cause permanent hearing loss that you might not notice until it's too late.



Watch noise from firearms. Noise from guns causes severe hearing loss. It is important to wear good hearing protection when target shooting.



Anticipate recreational noise. Motorcycles, snowmobiles, and speed boats create noise above the caution zone (85–90 dBA). Even a spectator can experience some hearing loss from the noise. Be careful; put on hearing protectors before you start the motor.

We have little control over much of the environmental noise that is a part of the modern world. We are virtually surrounded by sound—not just at work, but at home and during leisure activities as well. Hearing protectors provide ideal protection but aren't always available. Fortunately, there are other common sense ways to protect your hearing. Avoid places you know will be noisy. Work for a quiet environment at home and in the community.



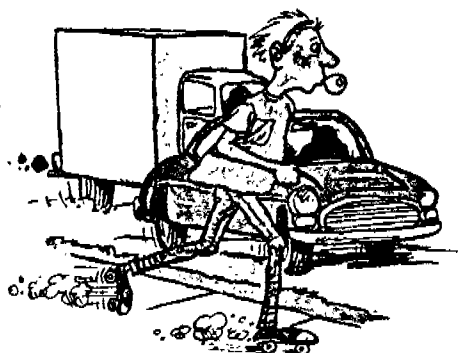
Control environmental noise. Help to reduce noise in your community. For brief exposure to noise you cannot control (emergency sirens, jackhammers, and subway trains), cover your ears tightly with your hands.



Avoid loud music. When listening to music (live or recorded), don't sit close to the sound source. Accustom yourself to lower volumes.

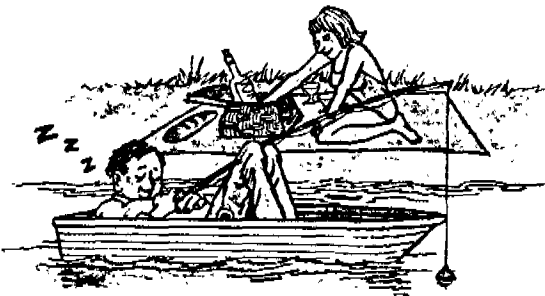


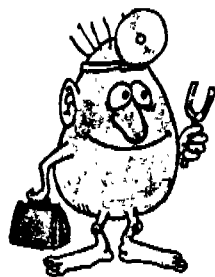
Choose quiet appliances. When buying household appliances such as dishwashers, blenders, vacuum cleaners, and disposals, select quieter models. Ask about decibel levels and consult consumer guides.



Don't compound the problem. Do not blast your ears with earphones. They get enough noise already!

Escape! Rest your ears in a quiet environment, even if only for a few minutes at a time. A quiet break gives your jangled nerves a chance to recover from a noisy world. When possible, take a vacation from noise.





EAR CARE TIPS

Besides guarding your ears and hair cells from noise, there are other ways to protect ears and hearing. Proper care and cleaning help ward off ear infections. If you notice a hearing loss, you can see an audiologist, who specializes in hearing measurement. If you have ear symptoms of any sort, see a physician who specializes in ear problems.

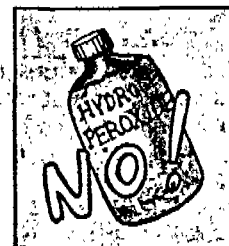
Let them be.

Your ears are basically self-cleaning. Earwax traps dirt and will usually work itself out with normal washing and chewing. You may clean your outer ears with a washcloth. If wax builds up and blocks hearing, see your doctor.



Don't put anything in.

Cotton-tipped swabs will push the wax farther into the ear canal, plugging your ear. This can cause irritation or even puncture the eardrum. Don't use chemicals such as hydrogen peroxide to clean inside your ears either.



Don't scratch inside.

Scratching with your finger can scrape or irritate the delicate skin in the ear canal, paving the way for infection. If it itches, have it checked.



Keep water out.

Keep your ears dry since moisture invites infection. When you swim, use plugs made for that purpose. Try not to let water run into your ears when you take a shower.



See a doctor.

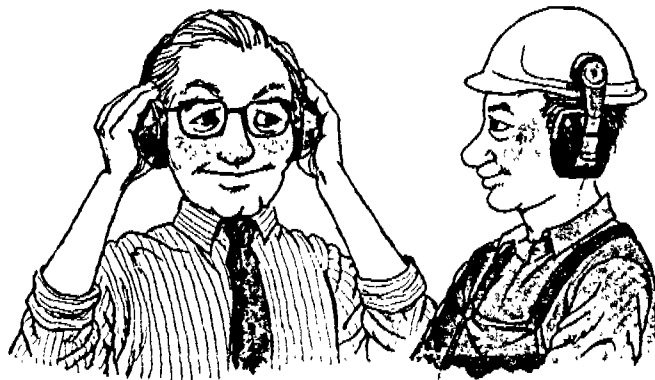
Have your ears checked during your regular physical exam. Also, seek medical attention if you have ringing in the ears, ear pain or discomfort, dizziness, hearing loss, or frequent headaches.

THAT'S TEAMWORK!

Government and industry are making a concerted effort to make noise control a national priority. Your company is committed to doing its part by teaching you the basics of hearing conservation. When you join in and do your part—on and off the job—we can all be proud of a job well done.

Your hair cells will thank you.

When you and your management team up to protect your hair cells, many more of your hair cells will live to a ripe old age along with you. They'll help you hear better in your later years, when you have more time to enjoy life's pleasant sounds.



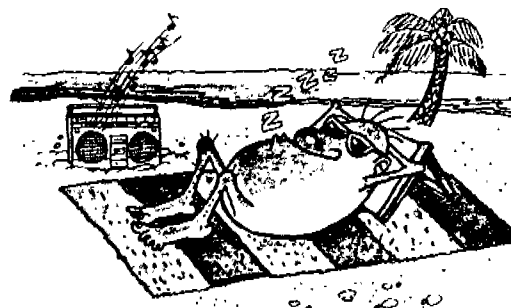
You're the one.

If you want your ears to keep working for you all the time, you need to protect them all the time. You're the only one who can decide to put up with wearing ear protectors to block out loud noises—on and off the job.

What else can you do?

The hair cells you have are the only ones you'll ever get. Watch out for them. Ask about the results of your own hearing tests. Think up ways to reduce the noise in your life. If your community has noise control ordinances, work to have them enforced.

But most important of all, take time out to give yourself and your hair cells some peace and quiet. It's a pleasant responsibility to fulfill.



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AROUND-THE-CLOCK HEARING PROTECTION

Noise exposure around-the-clock can damage hearing. To prevent hearing loss, protect your hearing all day long—at home, work, and play. Save your hearing from noise to enjoy all the good sounds of life for a long time!




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