

An Occupational Hazard



Hearing loss. Auditory nerve damage. Tinnitus. Lately it seems we're hearing more and more about these problems and their relation to drumming and high volume music. Drummers Joey Kramer, Lars Ulrich, Jimmy Copley, and Rod Morgenstein are just a few of many who've reported either some hearing loss, or the onset of tinnitus.

Basically, nerve damage indicates that a portion of one's delicate hearing mechanism has been abused to the point where some degree of hearing loss occurs. Tinnitus is the medical term for a continuous ringing in the ears. It can range from a moderately high-pitched squeal, to a downright roar for those with severe cases.

I used to think that hearing damage induced by high-volume music was a potential danger just for rock drummers performing under incredibly high decibel conditions. I was wrong. Even the typical club band that cranks it up beyond the comfort level late in the evening can be loud enough to cause problems in time. My own case of tinnitus was not so much the result of playing under extremely loud conditions as it was a case of moderately high volume—night after night—over an extended period of time. We now know that too many years in a few *too many* relatively loud situations can be just as much of a threat. Unfortunately, there isn't much you can do about hearing damage *after* it occurs. You simply learn to live with it, which can be somewhat difficult for a musician.

It's not our purpose here to unduly frighten anyone who's ever picked up a drumstick or performed with a band. It's quite true that some of us may be more genetically prone to auditory problems. And we know that drumming and high volume music aren't the *only* things that can cause hearing damage. But there's no denying the fact that whether on the concert stage or club bandstand, surrounded by high-powered sound systems, on an instrument with potentially dangerous frequencies itself, we drummers certainly *do* fall into the high-risk category.

This month we're presenting an article by drummer/author Peter Cohen entitled "Drumming: How Risky Is It To Your Hearing?" In it you'll learn just how hearing damage occurs, and about the warning signs that may indicate you're in the danger zone. You'll also hear from several name players who are experiencing hearing problems, and others—now aware of the risks involved—who are taking the necessary precautions. Finally, we'll examine just what's being done in the area of hearing protection. And we'll look at some of the devices available from companies that are continually at work designing and improving hearing protection for musicians.

We hope you'll take a moment to think about the information offered here. Hearing damage is a potential occupational hazard we all face, and a problem too serious to ignore. But fortunately, it's one of those problems we can do something *about*.

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MODERN DRUMMER magazine (ISSN 0194-4533) is published monthly with an additional issue in July by **MODERN DRUMMER Publications, Inc.**, 870 Pompton Avenue, Cedar Grove, NJ 07009. Second-Class Postage paid at Cedar Grove, NJ 07009 and at additional mailing offices. Copyright 1990 by **MODERN DRUMMER Publications, Inc.** All rights reserved. Reproduction without the permission of the publisher is prohibited.

EDITORIAL/ADVERTISING/ADMINISTRATIVE OFFICES: **MODERN DRUMMER Publications**, 870 Pompton Avenue, Cedar Grove, NJ 07009. Tel.: (201) 239-4140.

MODERN DRUMMER welcomes manuscripts and photographic material, however, cannot assume responsibility for them. Such items must be accompanied by a self-addressed, stamped envelope.

MUSIC DEALERS: Modern Drummer is available for resale at bulk rates. Direct correspondence to Modern Drummer, Dealer Service, P.O. Box 389, Mt. Morris, IL 61054. Tel.: (800) 334-DRUM or (815) 734-6013.

SUBSCRIPTIONS: \$27.95 per year; \$49.95, two years. Single copies \$3.95.

SUBSCRIPTION CORRESPONDENCE: Modern Drummer, P.O. Box 480, Mt. Morris, IL 61054-0480. **Change of address:** Allow at least six weeks for a change. Please provide both old and new address. Toll Free Tel.: (800) 435-0715.

A Member Of:



Magazine Publishers of America

Audit Bureau Of Circulations
Membership applied for.

DRUMMING: How Risky Is It To Your Hearing?

In an age when it's wise to practice safe sex, it may be even wiser to practice "safe drumming." For it just may be that drumming is hazardous to the health of your ears.

BY PETER COHEN



It's all in the feeling, we all know that—the *feeling* of the music. We revel in the visceral impact of it—the raw, palpable surge of the sound waves as they sweep us up in their good, good vibrations.

But there may be an underside to this happy indulgence, and many of us are beginning to recognize the symptoms: You just finish the gig, and your ears are filled with a high, piercing ringing. As you get up to leave your throne, you find your balance is wobbly. You feel as though you've just been run over by a herd of wild heffalump. Your nerves are shot. Sleep, you know, will be a long, long time coming.

Players of rock will be more apt to relate to this description, but others should not assume that they're exempt. Increasingly, the evidence is pouring in that the effects of loud music on the ears and the entire nervous system are both dramatic and subtle, blatant and insidious. Just how loud the music needs to be in order to cause damage is a matter of some debate, but even those playing in the symphonic domain may not be entirely immune to risk.

But if the risk is proportionate to volume, it is indeed in rock that the risk is highest; and it is primarily in rock that the victims are coming out of the closet and speaking up. Everybody from Billy Joel's three-year-old daughter to veteran blaster Ted Nugent has gotten into the act recently, giving public warnings about the dangers that come with this territory. And when someone as prestigious as Pete Townshend announces, "...I've shot my hearing; it hurts and it's painful, and it's frustrating when little children talk to you and you can't hear them," then you know there's been a change in the musical climate. As *Rolling Stone* recently put it, another of "rock 'n' roll's dirty little secrets" has been brought into the light.

Drummers may stand (or sit, as the case may be) at particular risk. First of all, drummers are positioned both closer to and in a more direct line from their mon-

itor speakers than anyone else in the band. The barrage is close-range, and there's no dodging it. They're sitting ducks. Also, it seems universal that when talking about what "gets" to their ears the most, both drummers and other group

son that something's not quite right. He can hear words, but misses the consonants within them. He can detect speech, but strangely, has trouble understanding conversation. No, he realizes, something is definitely not quite right.

Hearing is a fairly direct, mechanical process. As sound waves sweep into the inner ear, they cause the delicate receptor hair cells there to bend over, flat to the basilar membrane upon which they grow. And it is those particular cells that are responsive to the higher frequencies that are most easily deflected. Usually, a good night's sleep will allow these hairs to spring back to normal. Repeated exposure to loud noise, however, will cause them to stiffen and die.

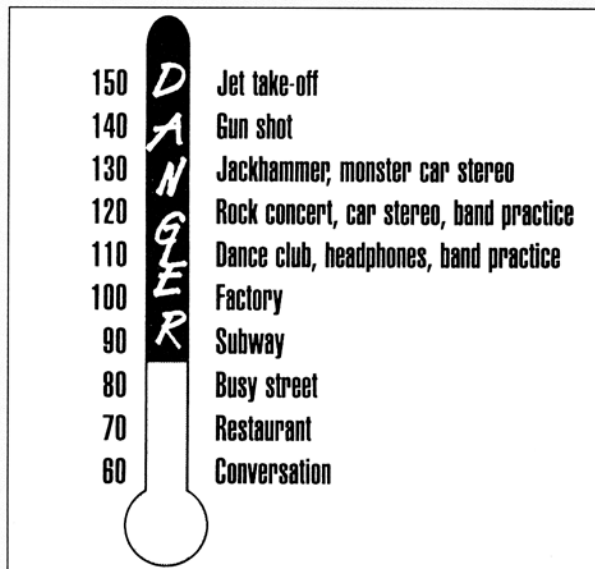
It's this repetition that lies at the root of the musician's risk. It's common for anyone to experience a loss of hearing acuity following exposure to loud noise. This is called a temporary threshold shift—that muffled sensation (usually accompanied by an annoying ringing) that you sometimes get after attending a concert or listening to a

stereo at high volume. For most people, most times (there are always exceptions), this does not represent any serious problem. With time, as the tiny hairs spring back up, your hearing acuity returns, the muffled sensation dissolves, and the ringing goes away. With musicians, however, this exposure is repeated so frequently and with such intensity that eventually the threshold shift becomes permanent. First the higher-end-responsive hair cells—then others down the line—start to just give up; they lie down and never get up again.

Would that this were all. Unfortunately, however, hearing loss does not usually occur as an isolated phenomenon. The ears constitute a direct channel to the entire nervous system, and research has implicated loud noise exposure to a wide range of psychological and physiological symptoms. Among these are high blood

Decibel Scale

The unit used to measure sound intensity is a decibel (dB). The decibel scale begins at 0, approximately the softest sound the healthy human ear can discern. The scale increases logarithmically. With every ten decibels, the level of perceived loudness doubles.



members alike accuse the cymbals and the snare as among the greatest offenders. And although these higher-end parts of the drumkit are *supposed* to penetrate through other sounds—it's what makes them "work"—it is precisely this power that makes these instruments pose the most threat to the human ear. As one respected audiologist told me, "Drummers especially have to beware."

Beware of what? Well, first and most obviously, actual hearing loss. Obvious, but not always noticeable. Indeed, the first stages of noise-induced hearing loss are signalled only by the inability to hear certain upper-frequency sounds—the ticking of a watch, the playing of high-pitched music at low volume, the speaking of certain words in quiet discourse—symptoms that are tempting to ignore or explain away. But it's usually that last symptom that finally alerts a per-

pressure, high blood cholesterol levels, chronic headaches, disturbed sleep patterns, *generalized hyper-irritability*, gastric acidity, ulcers, and intestinal spasticity. Most commonly, these indirect effects are experienced by musicians as simply that feeling of overall “strungoutness” following a gig. Alex Van Halen has called this sensation “noise drunk.” And Joey Kramer describes it as feeling “as if someone’s beat me with a baseball bat.”

But it’s the other effects that occur in the ear itself that cause the most distress for musicians. The least common of these is called *hyperacusis*—the condition in which the victim hears all sounds, even the everyday, ordinary ones, as abnormally, painfully loud. It’s as if the ear’s volume-control knob is broken, or as if one were living in a movie in which the sound track is turned up all the way, all the time. Strangely enough, hyperacusis can occur in a person with little or no measurable hearing loss. This is distinct from a second condition, called *recruitment*, which is the abnormal perception

of loudness in people who also have hearing loss—perhaps a compensation by the brain for inner-ear damage. Whereas for people with hyperacusis all noises are experienced as uncomfortable, people with recruitment perceive only loud noises that way. Not a treat, in either case.

Tinnitus, however, is the single most common side-symptom to hearing loss. This is that notorious “ringing” in the ears that, to some degree at some time, almost everyone has experienced as a temporary discomfort. Believed to be another result of inner ear insult, however, this can also become a permanent condition—one in which the ringing (or sometimes buzzing) can become maddening. The pitch of it can rise to that of a high scream, and volume levels have been reported as high as 70 dB. (See *Decibel Scale*.) As tinnitus sufferer Joey Kramer reports: “You know the sound of those loud crickets in the summertime? Well, the ringing in my ears is sometimes very close to that.”

Although various relaxation methods,

diet, and sometimes medication can be used to mitigate the intensity of tinnitus and these other ailments, they are essentially irreversible conditions. Once the damage in the inner ear is done, it’s done. True, there may be some degree of variability among individuals as to how much exposure each can tolerate without developing problems, but this assumption has not been proven. The sensible thing, therefore, might be to ask: “What can I do to prevent the damage from happening in the first place? How can I protect myself?” (See *How Damage Occurs*.)

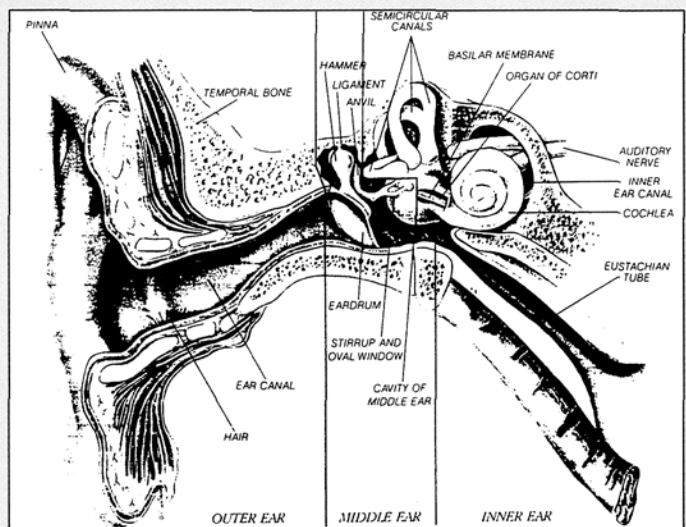
Earplugs

The answer usually elicits a response from musicians that is less than enthusiastic—particularly from rock musicians. After all, isn’t that the whole *point* of rock ‘n’ roll—to be LOUD? And if a consequence of playing loud is to lose your hearing someday, well, as John Flansburgh of the group They Might Be Giants once observed, that’s just “one of

How Damage Occurs

Although the hows and whys of the ear still aren’t fully understood, scientists have constructed a fairly accurate model of it.

- The *outer ear* is mostly the part that you see on your head. It is designed to collect sound and pass it to the eardrum via the outer ear canal. This canal is efficient at collecting sounds in the 2000 - 5000 hertz frequency range. This is the frequency range of your hearing that gets damaged first.
- The *middle ear* consists of the eardrum and the ossicles bones (hammer, ligament, anvil). The eardrum is a thin membrane stretched across the ear canal that converts pressure variations (sound waves) to mechanical vibrations. The ossicles bones work as a lever. The eardrum vibrates against this lever, which vibrates against the inner ear at the same frequency, but about 30 times stronger in force.
- The *inner ear* is the section most susceptible to damage. It contains the cochlea, a small organ shaped like a snail’s shell. The ossicles bang against the end of the cochlea and set up pressure waves within it. These waves bend tiny hairs within the cochlea (inside a smaller organ called the organ of Corti). These hairs are connected to auditory nerves, which send an electrical signal to the brain.
- The organ of Corti is the part of the system most easily damaged—not the eardrum, as most people think. The tiny hairs within it are resilient, but if pushed *too far*, can be permanently damaged. Damage occurs in progressive stages. First the hair cells die, and the supporting cells become swollen. Once these cells die,



they do not grow back. Further damage causes the entire organ of Corti to collapse. Hair cells disappear totally, and the auditory nerves begin to die.

• Complete degeneration occurs with the total absence of the organ of Corti and the auditory nerve. Simply put, this means a complete loss of hearing and *no* hearing aid will make any difference at all. If it’s loud enough to make your ears ring the next morning—you’re *pushing the limit!*

• Spiros A. Psarris

the little sacrifices you make for rock."

Whether or not any music needs to be loud, rockers speak for *all* musicians when they emphasize the critical importance of that subjective item called "feel" when they play. "We need to feel that energy," says Axl Rose. And it seems to be the universal attitude of musicians, whether from direct experience or not, that earplugs inevitably compromise one's ability to do just that—to be able to open oneself up, whole-bodily, to the onrush of sound. Not just the waves of energy being reciprocated on stage among the players, but the energy surging back and forth between the players and the audience. "You have to be able to *feel*," says Lars Ulrich (earplugs wearer). "If you can't feel what's coming back from the audience, that can give you a real distorted sense of how you're playing." And as Neil Peart (non-earplugs wearer) put it last December in his *MD* interview: "I love loud music and always have, and I think there's a certain forcefulness about it that's irreplaceable.... I think you're losing touch with your instrument with earplugs...."

Quite a dilemma, it would seem: To sacrifice that ecstatic "feel," or...to go deaf.

Well, the good news is that, with new advances being made in earplug technology, the trade-offs between "feel" and "protection" are not nearly as great as they used to be. The bad news is: A trade-off of some kind must still be made.

Most musicians who reject earplugs have done so on the basis of their experience with over-the-counter (OTC) varieties. Most commonly, these are the ones made of foam that you squeeze before inserting in your ear, and which then "re-inflate" to create a seal inside your ear canal. Others are made from pliable rubber, silicone, or wax. All of these have the advantages that they're cheap, comfortable (especially the foam ones), disposable, and when properly inserted, provide high levels of sound attenuation—often up to the mid-30s. (See *Earplugs, HPDs, and More*.) However, all of them also suffer from precisely the one characteristic that makes earplugs so problematic for musicians.

Earplugs, HPDs, and More

The U.S. Environmental Protection Agency requires that over-the-counter hearing protection devices be labelled as to their Noise Reduction Ratings (NRRs), as expressed in decibels (dB). An NRR is an expression of how many decibels are "attenuated," or blocked out, by the device. Thus, for example, if the environmental noise level as measured at the ear is 92

dB, and NRR of the device worn is 17, then the level of noise actually passing through the ear canal would be 75 dB.

Over-the-counter (OTC) earplugs range in NRR anywhere from 6 dB to the mid-30s, with most in the 25 dB range. Much of their effectiveness depends upon how precisely and conscientiously they are inserted, as there can be considerable variability in the degree to which the ear canal is sealed (and this can change with jaw and facial movement). The standard squeeze-and-let-inflate foam plugs cost about \$1.00 per pair, while the rubber, silicone, and wax varieties can cost up to \$8.00. These are available at most drugstores and shooting supply stores.

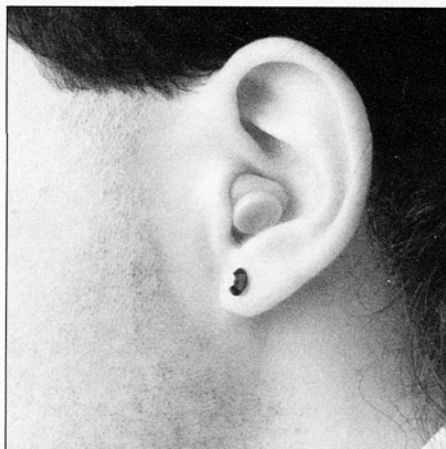
I have found the foam plugs to be very comfortable and to provide very good protection when inserted properly. However, as predicted, the attenuation is very uneven along the frequency spectrum, so that the sacrifice of full, true musical "feeling" is considerable. Nevertheless, these remain my plug-of-choice for maximum volume situations (I play in a touring rock band), and I have learned to compensate for them, even while singing.

The *Sonic II* HPD, made by North Consumer Products and available at many music stores, offers an averaged NRR of 6 dB and costs around \$10. It is made of silicone rubber and employs the "terraced" design found in several other OTC models. For me, wearing this device was almost worse than wearing nothing at all. It produced all of the negative aspects of wearing plugs (uneven attenuation, occlusion effect, etc.), while offering very little overall attenuation. I wonder whether the internal diaphragm actually closes for anything but the most short-duration and impactful of noises, and therefore might be more suited for shooters than for musicians. As advertised, however, you

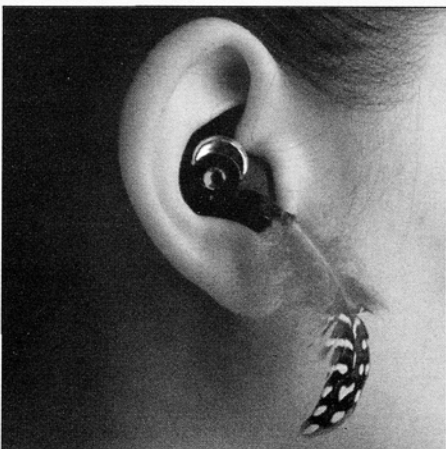
continued on page 10



The Sonic II



The ER-15



The Earshade

It is the very nature of sound that there's a differential in the ease with which it can be blocked along its frequency range. The higher frequencies are the ones most easily obstructed by any barrier placed in the way. As the frequencies get lower, however, they become more and more difficult to shut out from perception—down to where you can actually sense the vibrations on your skin or “in your gut.” That is why a wall can easily block out, say, a piccolo in the next room, whereas (much to your chagrin) you can hear (and feel) the throbbing bass beats of your neighbor's stereo from several apartments away.

And that is also why almost all available earplugs—and all the over-the-counter kind—have what is termed “uneven attenuation” values. To put it simply, they shut out more of the higher-frequency sounds than the lower ones. To the wearer, the resulting perception is that “everything sounds ‘bass-y.’” All those sharp overtones from cymbal, snare, hi-hat, and guitar are cut out, and what you hear are just the “boomy” residual effects of them, as if you've stuck your head in an

oil drum. (Not to mention that you can't hear any of the verbal communications that may take place during rehearsals or on stage.) True, you have protected yourself from the most harmful of the frequencies, those high ones, but in the process you have shorn the music of its liveliness—some would say, of its very life. You've made yourself safe, but is the price worth it?

“No,” has been the answer for many musicians, and has left a prevailing negative bias about earplugs throughout this population. This may prove to be a premature judgement, however. The guys in the hearing labs have been hard at work in recent years, and they've begun to come up with at least a few products that warrant attention. No longer merely “earplugs,” these new, high-tech devices are known as “hearing protection devices” (HPDs), and they represent some ingenious attempts to solve the “uneven attenuation” problem.

First, among the over-the-counter varieties, several models have become available that feature internal “chambers” inserted within the rubber/silicone body,

or “cushion,” of the plug. These chambers contain moveable parts or diaphragms that, when pushed upon by the shockwaves of loud noises, actually close down, obstructing passage through the ear canal. Such an arrangement makes it possible for the wearer to hear conversation and even softer noises somewhat normally, but to be protected as soon as any loud blast of sound tries to get through. It can be imagined how these HPDs might be useful to shooters, and indeed, they are most commonly available in gun shops. One of them, however, has been targeted to the musicians' market as well, and for ten years now has been available in music stores. This is the *Sonic II* hearing protector, made by North Consumer Products.

It is not with the over-the-counter variety of HPDs, however, that the greatest hope for musicians lies, but rather with the custom-fitted kinds. To obtain a custom-fitted HPD, you first need to get an impression of your ear canal made by an audiologist or other hearing health care professional. He or she injects some strange, colored goo into your ear with a large syringe, and leaves it to sit there for a few minutes until it hardens. This individualized impression is then sent off to a specialized laboratory, where the final earmold—usually made out of a polyvinylchloride compound—is made. And it is also at this lab where the selected internal filter is inserted.

These filters—or “sound attenuators”—are the heart of the matter. Remember that the more the high sound frequencies are allowed to pass through the ear canal, the more natural—less “bass-y”—will the resulting mix seem to the listener. Well, a couple of the new filters available now boast the ability to let a proportionately increasing amount of exactly such “highs” through, even while still lowering the overall level of sound volume. And it is these filters that are inserted inside the custom-fitted HPDs.

But there is one filter available that claims to let virtually *all* the highs through—that is, to allow each frequency along the spectrum to pass through in a near-true proportional relationship to each other (providing a “flat attenuation”). The idea is that the sound seems nearly normal, just softer. Enter the *ER-*

Is your hearing at risk?

Here are some warning signs:

- A ringing or buzzing in the ears immediately after exposure to loud music.
- A slight muffling of sounds after exposure.
- A difficulty in understanding speech after exposure; you can hear all the words, but you can't understand all of them.
- Over time and multiple exposures, it becomes more and more difficult to hear conversation in groups of people, when there is background noise, or in rooms with poor acoustics.

Dr. Neville Carmical, who consults at the Kathryn & Gilbert Miller Health Care Institute for Performing Artists in New York, says that the first thing to be noticed in noise-induced hearing loss will be a confusion in discerning the consonants during conversation—the p's, t's, th's, b's, etc. And in music, it will be the overtones, rather than the fundamentals, that will be missed. “It's the subtle shadings, the colorations, that will be noticed [to be gone].”

A Self Test

Prior to exposing yourself to loud music, set the volume on your car radio or other standard audio source, so that you can barely hear the words. Then later, following the exposure, turn on the radio again at that setting, and listen up. Can you still hear and understand the words?

If not, you are probably experiencing a temporary threshold shift. And with enough repetitions over time, this shift can become permanent.

If you experience any of these early warnings, have your hearing checked by a qualified audiologist, or have your ears checked by a physician.

15 attenuator, commonly known as the "musician's plug."

Developed by a laboratory near Chicago called Etymotic Research (etymotic being a "new ancient Greek" coinage meaning "true to the ear") and available for only two years now, this filter has been widely embraced by musicians of all kinds, from symphony players to rockers. Over a thousand pairs of them have been sold so far, a result only of word-of-mouth communication among musicians, producers, and the like. They would seem to be "the answer" to all those who object to wearing earplugs. And they may be—within certain limits.

The first is actually not so much a limit as a caution: For the *ER-15s* to work, as with all custom-fitted earplugs, the ear impression must be taken with great care and accuracy. And not every practitioner has the requisite experience and skill. As Chicago audiologist Mike Santucci told me, "I don't think that just any audiologist can do it. It's just a whole different ball game." In fact, with some people, the injection of that liquid goo deep into the ear canal can produce some pain. "There's a real knack to it," asserts Etymotic partner Ed DeVilbiss.

The most troubling limit to the *ER-15*, however, is the fact that it attenuates only 15 dB of volume. This may be sufficient, if the music you're playing stays within the 100 dB range. But this is rarely the case for rock players, in whose domain it is not uncommon for sound levels to average 120 dB—and to remain there (and even higher) for long periods of time. For players of rock who are unwilling to sacrifice that sacrosanct "feeling," a trade-off must be decided upon. Rebecca Meredith, a Bay Area audiologist who specializes in musicians' problems, explains: "If a musician comes in to see me and he hasn't been wearing any protection at all, I say, 'Well, the *ER-15s* are better than nothing—but they really aren't meant to be worn in situations above 95 dB.' So a lot of musicians will end up getting both kinds of plugs." (The "other kind" Meredith refers to is called the *Earshade*, a custom plug that offers greater protection, even if it does also produce uneven attenuation.)

This opinion is echoed by Santucci:

continued on page 8

What The Drummers Say

Modern Drummer conducted a random survey of prominent drummers to find out what they thought about the hearing risks associated with their profession. Some of them were quite eager to express their views on this subject and to report on their own experiences with hearing damage. Others, however, were very reluctant to talk—even though they were concerned about the issue and wore protection. They were worried that people (especially prospective employers) might make the automatic assumption that they had "hearing problems" and would therefore be less "able" than others competing with them for gigs.

Paul Wertico, for example, emphasized that he wears protection (the *ER-15*, alternating with the *680-Ohm* filter) only as a preventative measure, and that his wearing of earplugs is only one part of a total program of hearing conservation designed for him. Not only does this not compromise his ability in any way, he asserts, but it actually enhances it. (Wertico's audiologist, Mike Santucci, designs individualized programs for musicians and groups. His number, in Chicago, is (312) 988-4822.)

At the other extreme, Joey Kramer, who makes no bones about his raging case of tinnitus, is almost evangelical about getting the word out. "Anything I can do to help guys," he says, "that's what it's all about for me." Kramer, of course, is an earplug wearer. His choice is one of the rubber, terrace-shaped OTC kinds, which, he claims, provides for more high-end pass-through than others he's tried. "I will not go on stage without them."

Similarly, Lars Ulrich would like to at least make the information available to players. "I hate preaching to anybody," he cautions; "I hate telling anybody what to do. But I just wish that somebody had made me aware that you're exposing yourself to a certain degree of possible damage. I just think that people should be aware of the possible dangers, and then make their own decision, based on their own judgment." A sufferer from what sounds (to me) like a case of hyperacusis, Ulrich is currently consulting with Rebecca Meredith at Golden State Audiology (see *Earplugs, HPDs and More*) to come up with a workable form of protection.

Referring to one of rock's more notorious cases of hearing loss, Ulrich says, "Ted Nugent is about 40 years old, and I'm already getting a tough ride at 26. I love what I do, and Metallica music is my life, but, you know, I want to be able to hear my kids play when I'm 35. I know that's not a 'heavy-metal' thing to say, but at this stage it doesn't matter, you know what I mean?"

Neil Peart, on the other hand, (as reported in his December, 1989 interview for *MD*) finds that the information regarding the effects of noise on hearing is "ill understood." Saying that he's "read a lot about it, and most of the information is conflicting," Peart seems to hold wearers of earplugs with something close to contempt. "I think it's a stupid thing. If you're not going to accept [the volume level], why should you bludgeon your audience with it? If you need [earplugs] to get through a performance, then maybe the music is too loud."

Concurring that noise-induced hearing loss is not such a cut-and-dried matter, Carl Palmer emphasizes that "It is not so easy to say when, where, and how" it occurs. A veteran of years of non-protected playing, Palmer reports that he has incurred no hearing loss or tinnitus. (And he gets his hearing thoroughly checked every one-and-a-half years.) Palmer does pay some attention to his monitor positioning when he performs, but insists that "one should not get to a stage where protection is needed."

Similarly, Simon Phillips insists—contrary to conventional medical wisdom—that it is not the loudness of a sound, per se, that can present a danger, but rather the quality of that sound. "Music played through a clean monitor system (no distortion or overdriving of any component) at a level of 100 dB is infinitely more desirable than machinery noise at the same level," he says. "I am convinced this has a lot to do with it." Although he has sustained a slight

continued on page 11

DRUMMING: HOW RISKY IS IT?

continued from page 7

“Most drummers I measure average [in their playing environments] about 116, and peak at about 128. I don’t know if a 15 dB attenuation for a two- or three-hour set is enough. But I’d just as soon see them wear a 15 dB plug—if that’s all they can tolerate—than nothing at all.”

Most drummers still wear nothing at all (in their ears, that is). As we have seen, even if they owned a pair of *ER-15s*, they would still be well-advised to equip themselves with some other, more highly attenuating pair of devices; and this reality does seem a deterrent. (At least for now—new, more “powerful” flat-attenuation filters are under development by Etymotic and others, and should be available soon.) Yet, when weighed against the prospect of losing one’s hearing, the drawbacks of wearing protection may deserve a second look—especially when there are a number of steps one can take to ameliorate these drawbacks.

The first and most obvious strategy is to mix and match the protection to the playing situation—to use the *ER-15s*, for example, while practicing alone or attending other peoples’ performances—and saving the heavier ammunition for use during full rehearsals and your own group’s performances. This is, in fact, how Paul Wertico handles it. Kenny Aronoff, on the other hand, often does the reverse: He will use plugs only for practicing, taking them out for performances, “because it affects the way I hear the music.” That all-important factor of “feeling” again.

Some players wear protection in only one ear—the ear that gets the most direct barrage—while letting the other one go naked. Some even alternate the earplug back and forth between ears, just to give each of them equal relief.

Another recommended ploy is to start wearing the protection *prior* to the performance, rehearsal, session, or whatever. This seems to give one’s internal perceptive mechanisms time to adjust to (and compensate for) the altered perceptual mode, so that it feels more natural once you start to play. “I put the plugs in anywhere from 20 to 30 minutes before I go

on stage,” reports Joey Kramer. “As soon as I put them in, I go out of my way to engage in conversation with someone. So by the time I get to the stage, they feel pretty normal.”

Conversely, it does not work very well to begin a gig, or even a multi-day recording session, without wearing protection, and then try to switch over to it later on, mid-stream. As Kenny Aronoff reports, “It’s when I start without plugs, then change to using plugs a couple of days later [in the session], that I have a hard time adjusting.”

Another “don’t” rule for the wearing of protection is: Don’t turn up your monitor in an attempt to compensate. Otherwise, you could end up with an even worse situation than when you started. Lars Ulrich describes what happened to him: “I beefed my monitor up so much, in order to feel what the other guys were playing and feel what I was playing myself—we measured it at 125 dB!—and that started causing a lot of problems with the other guys, so that by the end of the tour we had three out of four guys in Metallica playing with earplugs. My monitor was so loud that the other guys couldn’t hear themselves. And it just started escalating; everything started getting turned up and turned up. It just got to be really silly.”

There is no remedy either for something known as the “occlusion effect,” which comes with the wearing of any earplug, but especially one that doesn’t extend deep into the ear canal (which would be any device but the *ER-15*). Caused by the mechanics of sound vibration within the mouth cavity, this is the phenomenon wherein one’s own voice becomes highly magnified in one’s ears—an effect which is often unnerving at first, if you also sing while you play. Although actually a potential help in keeping a vocalist on pitch (which is why performers will often momentarily raise a finger to their ear during a song), the occlusion effect makes it difficult for a backup singer to blend his own voice with any others that might be singing at the same time. The only solution to this challenge is good ol’ trial-and-error over a period of time.

The bottom line is that the wearing of

protection, even if it’s the *ER-15*, takes some getting used to; there’s just no way around it. But consider the alternative. Each individual musician must decide for himself or herself whether the adjustment is worth it. It should be remembered, however, that, as un-ideal as wearing protection may be, the break-in period is a finite one. You can reach a stage of equitable trade-off with it, if you take the time and have the patience. As Joey Kramer puts it: “It’s like anything else. If you want to have hearing protection, it’s the kind of thing that you have to start with and stick with. It took me a long time to get used to wearing earplugs; and it still isn’t by any means my favorite thing to do when I go on stage. However, I am at the point now where I cannot go on stage without them.”

Lars Ulrich agrees: “I think a lot of people put in earplugs, play for five minutes, and then take them out because they can’t handle it. But I think that people have to give it some time.” Forced into a real necessity due to his previously incurred hearing damage, Ulrich describes having to undergo the adjustment process right in the midst of huge concert situations. “I did four or five shows in front of 10,000-15,000 people each night, where I didn’t feel that I knew what I was playing or what the other guys were playing. I didn’t feel like I was in touch with the situation. And when you’re the drummer, and you’re supposedly, quote-unquote, pushing things and driving things and so forth, and yet you’re not knowing, or not feeling confident about what the hell is going on around you—it’s a very, very uncomfortable situation to be in.”

But he persevered, telling himself that “in the long run, it would probably be worth it.” And after five gigs or so, “I finally started to understand what was going on, what to listen for, and how to compensate. You really have to roll with it for a couple of gigs and hope that you’ll get used to it. I’d used earplugs before at rehearsals, when there were just the four of us in a room. But once you’re out there in front of 10,000 people, that’s a really different situation. But,” he concludes proudly, “I at last conquered that.”

All is not just struggle and “making the

best of it," however. There is at least one side effect from the wearing of protection that's quite positive. Anyone familiar with the "wall of sound" sensation during a performance, especially when the hall is reverberant, will recognize how it works: The earplugs act as a kind of refining filter for all the ambient echo. Joey Kramer explains: "No matter how much noise, no matter how much bottom-end rumble, or anything else that might be getting in the way of hearing what you need to hear on stage, the earplugs filter it out and make everything clearer." And says Doane Perry: "If the sound is very boomy, earplugs can help cut out unwanted reverb, delay, and frequencies."

Etymotic's Ed DeVilbiss concurs. In fact, a famous vocalist had recently called him from Los Angeles to testify precisely about this effect, saying: "You know, it's the first time that I've actually heard my drummer. I've been standing up there and hearing all this noise and clatter coming at me for years. But I'd never before heard just how good he was."

Whether earplugs offer extra advantages or represent hurdles to overcome, one thing is clear: The infamous "wimp factor" is no more. No longer is it considered a betrayal of the macho spirit of rock to wear protection. And with the likes of Lars Ulrich and Joey Kramer speaking out so strongly for it, this attitude is likely to spread. "I think that anybody who doesn't entertain the idea of protecting their ears is doing nothing but fooling themselves," asserts Kramer. "They're just denying it. Because it's only a matter of time. You only get one pair of ears, and once you've abused them, that's it."

And as Ulrich says: "I think that everybody should make their own decision, but just don't give me this stuff that you're a wimp if you put earplugs in, because I think you're a bigger idiot if you end up walking around not being able to hear what your friends are saying, or not being able to hear the next Metallica album or whatever. I mean, would that really be so hip?"

Spreading this word across the land is a San Francisco-based organization dedicated to the dissemination of hearing information to rock musicians and their

audiences. Co-founded by Kathy Peck, a bass player who in her punkier days suffered a 40 percent hearing loss in one ear, HEAR (for Hearing Education and Awareness for Rockers) sponsors a hearing screening service at the Haight-Ashbury Free Clinic, runs several support groups for people with hearing disabilities, operates a telephone hotline, and in general acts as a clearing house for all kinds of outreach educational projects. With an advisory board that includes such notables as promoter Bill Graham and Grateful Dead drummer Mickey Hart, HEAR feels that it can act with much more sensitivity to the needs of music lovers with regard to this issue than, say, the government would, if it were ever spurred to intervene. (This is actually a distinct possibility now, with several hearing-damage lawsuits against rock groups and their promoters in the courts.)

"At HEAR," Peck says, "we're dedicated to education, not regulation. We feel that music should be self-regulating within the industry." And about earplugs, Peck's attitude is unequivocal: "Rock 'n' roll is like any other sport. You wear your protective gear. Think of them as being like sunglasses for your ears."

Whether you choose to wear earplugs or not, it doesn't hurt to learn what the stakes are. After all, if you've been playing unprotected and your hearing is still unscathed, perhaps you've just been lucky, or perhaps you've just got good genes. Or, perhaps it's something else altogether.

"God protects musicians," says Dr. Mead Killion, the developer of the *ER-15*. "Otherwise, they'd all be deaf."



continued from page 5

can hear spoken conversation quite well through these devices—which you can't do with the other OTC plugs.

Aside from any other advantage over the OTC plugs, all custom-fit earplugs are easy to insert correctly; there is, in fact, only one way you can put them in. However, despite assurances to the contrary, I have found that the snugness of these plugs is still affected by facial movements. It is possible that my initial ear canal impressions were not done as precisely as possible—an operation requiring some experience and skill on the part of the practitioner. (For example, my audiologist failed to instruct me to move my jaw and facial muscles while the impression goo was “setting up,” so that the final product would take these movements into account.)

The largest earmold lab in the country, and the one with the most experience serving musicians, is Westone Laboratories in Colorado Springs. A call to Bonnie Foster there, at 1-800-525-5071, and you will be referred to a practitioner in your local area who can do the job.

Besides the ER-15 “musician’s plug,” Westone equips their earmolds with two different internal filters (“sound attenuators”) that are suitable, if not ideal, for use by musicians—the *680-Ohm* and the *DefendEar*. The *680-Ohm* filter attenuates 18 - 20 dB from everything you hear, whereas the *DefendEar* brings all sound that is above 80 dB down to that level. Depending on the practitioner, both of these cost about \$70.

Westone is reluctant to recommend either of these products for musicians, as both of them are flawed by uneven attenuation values along the sound frequency spectrum, which produces that “bass-y” effect described in the main part of this article. Moreover, Westone expects that several new “flat response” filters—like the *ER-15*, but offering more protection—will soon be available; and the company would not want to see musicians get soured on the use of plugs altogether by using less than state-of-the-art ones. Some of these new products will be coming from Etymotic Research, while others are being developed in Europe—but in

any case, the first of them should be available as early as this summer. Write to Westone to get on their mailing list, at P.O. Box 15100, Colorado Springs, CO 80935.

In the meantime, I use the *DefendEar* filters for gigs requiring more protection than the *ER-15s* can provide, but less protection than would justify using the foam ones. Sure, they don't provide as true a fidelity as I'd like, but when it comes to my hearing (I already suffer from both high-end loss and moderate tinnitus) I'll take the trade-off.

The *ER-15*, the only currently available device offering a nearly uniform response across the frequency spectrum (thereby providing a natural sound, which preserves much of the music's inherent “feel”), attenuates 15 dB and costs about \$100.

As advertised, this device (inserted in the Westone earmold) has proven to be the most satisfying “plug” I have tried. In addition to providing the most un-muddled of sound perception, it stays put in the ear canal no matter how much I grimace—a product of the earmold's deep insertion (which also eliminates most of the occlusion effect). Alas, the mere 15 dB level of protection does not leave me feeling as secure as I'd like; so for high-volume gig situations, I reach for my *DefendEars* or foam plugs (which I sometimes use in combination with the *ER-15s* in one ear or the other, in situations where the loudest sound is coming from a certain side). I look forward to the advent of the newer, more protective “flat response” filters coming from Etymotic.

Golden State Audiology, in Sunnyvale, CA—a major supporter of the HEAR effort in San Francisco—offers its own earplug, which it dubs *Earshades*. Although lacking any internal mechanism, this is a true custom-fitted device, offering 31 - 35 dB of attenuation and costing \$36. However, the really unique feature of these earplugs is that they are available in a variety of “limited edition” fashion designs, created by noted designer Kate Drew-Wilkinson. Now you too can flaunt earplugs with jewels, stones, or feathers dangling down from them. Call Golden State at 1-800-635-EARS.

As part of their standard equipment

arsenal, some bands carry with them a sound-level meter, just to keep them honest. One model, which is small, light, and reliable, is available from Radio Shack for about \$30.

A great resource for information and inspiration is HEAR (Hearing Education and Awareness for Rockers) in San Francisco. As they put it: “We provide education and services to music industry personnel, performers, and patrons regarding hearing loss prevention, and enhancement of hearing for the hearing impaired. We seek to de-stigmatize the use of hearing enhancement and protection devices.”

For an information packet, send \$5 plus a self-addressed, stamped envelope to: HEAR, P.O. Box 460847, San Francisco, CA 94146, or call them at (415) 431-LOUD. Or you can call the HEAR Hotline for up-to-the-minute news and events, at (415) 773-9590.

A struggling, non-profit organization, HEAR could also use your support. They have therefore developed a membership group called the HEAR Music Industry Council. Write to Kathy Peck at HEAR for details.

Other resources for information include the American Tinnitus Association (P.O. Box 5, Portland, OR 97207), and the American Speech, Language, and Hearing Association (10801 Rockville Pike, Rockville, MD 20852).

WHAT THE DRUMMERS SAY

continued from page 7

hearing loss in one ear (probably due to his “large swish cymbal” on that side) and does experience temporary bouts of tinnitus following concerts, Phillips does not wear protection. “I’m sure if I had to I could get used to them, but it would give me an insular feeling, which is not the sort of feeling you need when you are entertaining an audience.”

Nevertheless, Simon does devote a lot of attention to the preparation of his own monitor system—and when in the studio, to his headphone levels, which has been “probably the major cause of Pete Townsend’s hearing problems,” according to Simon. “If your system sounds good and individual instrument sounds are good,” he concludes, “I’m sure this makes a difference in the matter.”

Two other non-wearers with seemingly tough ears are Stan Lynch and Max Weinberg. Although both describe the symptoms of temporary threshold shift following concerts, neither has incurred any significant permanent damage. Both, however, do pay some attention to volume levels while they’re playing. Weinberg places “plexi” around his performance area, while Lynch turns down his moni-

tors. “The natural sound of a drumkit being hit by me—I don’t bash my brains out anymore—is not the least bit unpleasant or loud,” asserts Lynch. “Turn down your monitors,” he advises. “Let the PA do the work!”

Somewhere in the middle ground in terms of protection usage are Kenny Aronoff and Rod Morgenstein.

Although he has not yet incurred any significant hearing loss, Aronoff does experience post-gig tinnitus, which varies in intensity directly proportional to the length of time he’s been “on vacation” since the last performance. (Time off evidently re-sensitizes the ears to noise.) As described elsewhere in the article, Aronoff wears earplugs for non-live situations (“squish-up” foam ones for practice, tissue paper for studio sessions), while going unprotected for performances. “I’m always trying to use plugs,” he says, “because it makes sense that loud noise to your ears is going to eventually create hearing loss.” He therefore has been experimenting with using plugs “on and off for about 10 years.” However, because “it affects the way I play,” he still goes without about 75 percent of the time.

After many years of playing,

Morgenstein first noticed that he had developed a moderate case of continuous tinnitus only last year—“not blaring, but definitely there and loud enough to be annoying”—and this naturally has captured his attention. Although he had already been a user of crumpled-up tissue paper before, he has now adopted the wear of an airport/shooting-range headset for practice, and foam earplugs for performances. “Since hearing loss is permanent,” he says, “I am overly concerned with protecting my ears.”

Doane Perry reports that he often keeps his head “turned favoring the left ear over the snare.” He also cites the use of a click track during lengthy recording sessions as being a source of trouble. Perry has just ordered a pair of custom-molded plugs, and he is most anxious to try them out as soon as he can. “If you want to protect your hearing and are in high-volume situations constantly,” he warns, “you *must* have protection!”

And echoing this sentiment is Gregg Bissonette, who although he has not experienced any hearing problems as yet, recommends the use of protection wholeheartedly. “It’s *very* important to keep what hearing you have,” he says. “My only suggestion on this is plugs.”

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