SOME PRACTICAL INFORMATION ON NOISE AND HEARING PROTECTION

WHAT IS NOISE?

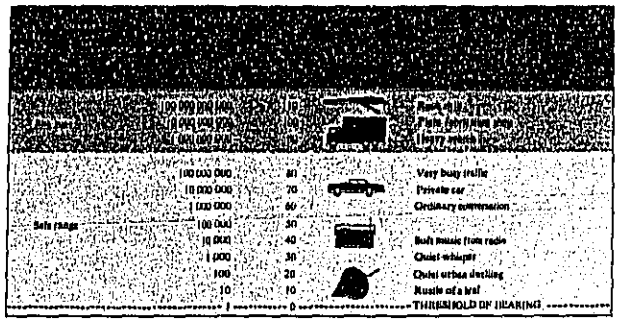
In simple terms noise is unwanted sound. We are able to close our eyes to bright light but if we want to shut off our ears to noise we must resort to artificial means.

To indicate the strength or intensity of sound we use a unit called the decibel, abbreviated to dB. The scale we use is graded from 0 to 140 dB. This represents roughly the range of sound the human ear is able to hear. A sound of 0 dB is so weak that it is practically inaudible, whereas a sound level of around 120 dB is so loud it causes the hearer pain. The dB scale is logarithmic so it doesn't add or subtract in the normal way. Add a 60 dB noise to another 60 dB noise and you wind up with 63 dB noise. And an increase of 10 dB means that the sound intensity has been increased 10 times.

By using a logarithmic scale we are able to express in dB the ratio between the intensities of widely different sound levels with convenience and clarity. If instead we used real units of intensity to cover the same range, we would have to work on a scale of 100 000 000 000 000 to 1, see below.

The other characteristic of sound is frequency – or the number of sound waves per second measured in Hz – which the ear registers as pitch. The higher the frequency, the higher pitched the sound. Most noises we meet with in everyday life are composed of a large number of frequencies.

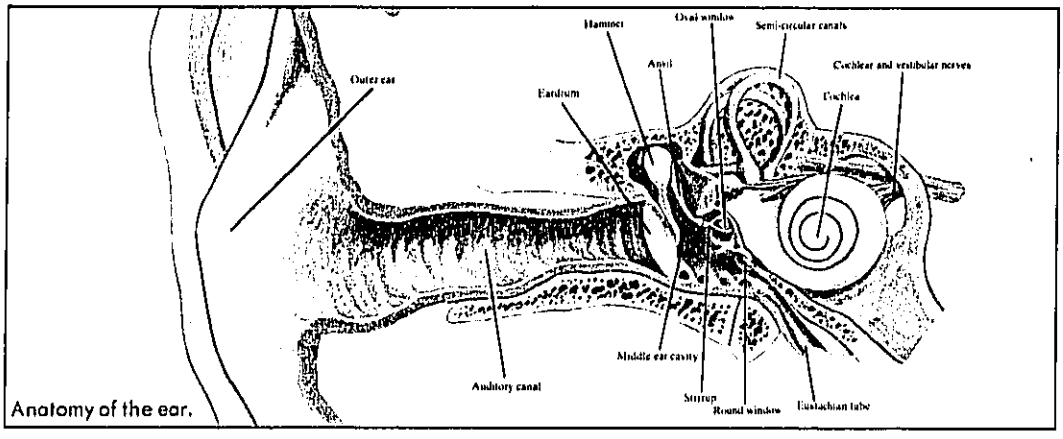
Sound levels are often expressed in dB(A). The (A) merely tells us that in measuring the loudness, the effect of the low frequency components of the sound has been suppressed by an A-type filter. The filter or weighting network is the sound-level meter's means of responding to some frequencies more than others in a similar manner to the human ear. The A-weighting is generally employed when measuring industrial noise.



NOISE – A HEALTH HAZARD

The chief detrimental effect of noise is, of course, loss of hearing. The ear is a very sensitive instrument, capable of translating sound between some 16 Hz and 20 000 Hz into nerve impulses, which are interpreted by the auditory centres of the brain. The perception of sound by the nerves takes place in the inner ear, along the basilar membrane of the cochlea. The actual organ of hearing is a complex structure of hair cells which contains the auditory nerve endings. Noise overstrains these hair cells and in time they suffer irreparable damage. Unlike most other human cells, the hearing cells are not regenerated. Hearing loss caused by noise is permanent and incurable.

Noise has other negative effects on the human system even after fairly short periods of exposure. The noise doesn't have to be very loud either. The body subconsciously registers noise as a warning signal. All parts of the organism are put on instant alert. The heartbeat accelerates. The blood pressure rises and the digestive function slows down. Noise also produces emotional effects: tiredness and the inability to concentrate. Stress symptoms appear and we become tense and bad-tempered.

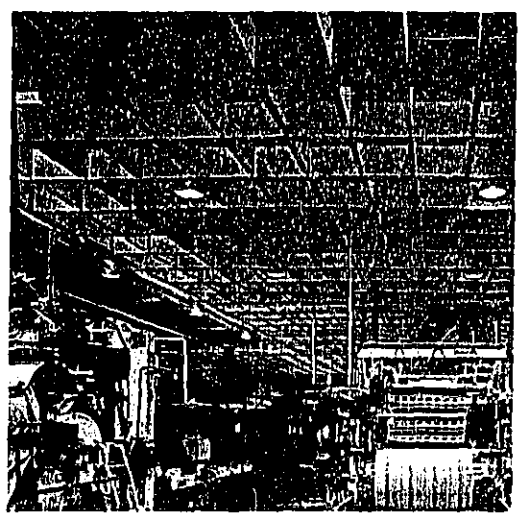


Anatomy of the ear.

METHODS OF COMBATING NOISE

Since hearing damage from noise cannot be cured, it is essential that we fight noise with every means at our disposal. And there is plenty to do. Not only by making sure new machines and processes are as quiet as possible. Much can be done to improve existing conditions.

Noisy machinery can be provided with sound-insulating enclosures.



Machines and processes producing high sound levels can be set apart and partitioned off to prevent the noise spreading.

It may be advisable to provide sound absorbing materials in noisy areas to avoid an increase in sound level due to reflection.

But most of these methods of noise control are costly, time-consuming and not always practicable. Until the noise has been brought down to acceptable levels, managements must make certain that personal, effective hearing protection is always close at hand.

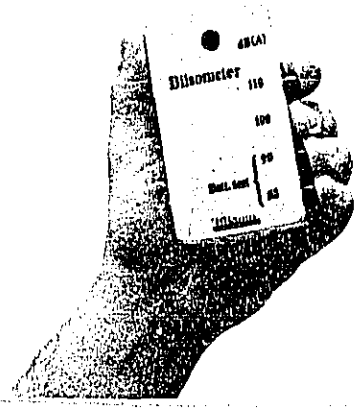
HEARING CONSERVATION MEASURES

The development of noise-induced hearing loss is insidious. Its onset is not apparent but its progress can be swift and devastating. It is often not before deafness spreads from the high frequencies into the speech range that we notice something is wrong.

People exposed to noise need to be constantly on their guard, keeping a careful watch on the noise level, going for regular hearing check-ups and making sure their hearing protection is of the right type.

MEASURING NOISE

Before you can decide what kind of hearing protection is required at a particular location, you will need to measure the actual noise level. The instrument for this is called a sound level meter or indicator. There are a number of different types. There are sophisticated precision instruments for detailed noise analysis, but for most practical purposes a sound level meter or indicator is adequate.

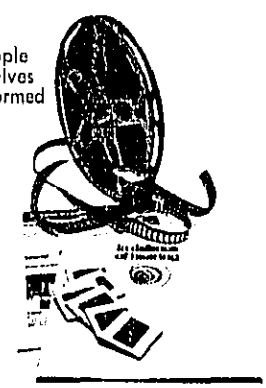


HEARING TESTS

Regular audiometric examination of hearing in a controlled environment by trained personnel is a vital hearing conservation measure. By comparing recent results with earlier tests, any change in hearing ability can be detected and action taken before any serious loss occurs.

INFORMATION

To bring home to people how vital it is to protect themselves against noise they must be informed about the damage noise can cause and the kinds of protection that are available. As an aid to this worthwhile endeavour, Bilsom has put together a hearing care information package. It comprises films, slide sets, posters, pamphlets and brochures. The package is ideally suited for in-plant hearing care programmes and is available complete, or in selected parts, from Bilsom.



DIFFERENT TYPES OF

There are three main kinds of individual hearing protectors: permanent 'reusable' earplugs, disposable earplugs, and earmuffs. The important aspects of these protectors are dealt with on the right.

Permanent earplugs are usually made of plastic or silicone rubber. They come in all shapes and sizes, but have one thing in common: they are intended to be used more than once.

Disposable earplugs are of mineral down or other formable materials like foamed plastics. They are used once only and then discarded. The mineral down comes either in bulk or as preformed plugs.

Earmuffs are basically hard cups which fit over the ear and are sealed to the head with soft cushions.

COMFORT

Hearing protectors are not of much use unless they are worn **all** the time the surrounding noise is at a harmful level. But they won't be worn all the time if they are uncomfortable. As soon as the discomfort becomes too great, they will be removed. And since even short periods of exposure to noise can damage the hearing, it's worth investing in comfort.

Permanent earplugs

These plugs, when properly fitted in the ear canal, provide a good noise seal. Being solid, however, they seal against air and moisture too, which can cause a feeling of pressure in the ear or other discomfort.

Disposable earplugs

One of the most common types of disposable earplug is made of soft mineral fibres. Their resilience enables these plugs to adapt to changes in the shape of the ear canal due to jaw movement. And because they are porous, air and moisture are not entrapped in the ear.

Earmuffs

The pressure exerted by the headband, the flexibility of the ear cups' attachment to the headband and the softness of the ear cushions are the main factors that affect the comfort of earmuffs.

An earmuff headband should give a firm initial pressure which decreases after a few minutes to a comfortable level. The cups must be so attached to the headband that they automatically assume the correct angle to any shape of head. And the cushions must be soft and easily replaceable.

HEARING PROTECTION

HYGIENE

Normally it is taken for granted that anything that comes in contact with the skin should be clean. Regretfully basic hygienic standards are often neglected when it comes to hearing protection.

Permanent earplugs

It is most important that a reusable type of plug is kept clean by regular washing. Preferably every time it is used. But in practice this is often forgotten. Moreover the plug is often handled with dirty fingers before being inserted in the ear.

Disposable earplugs

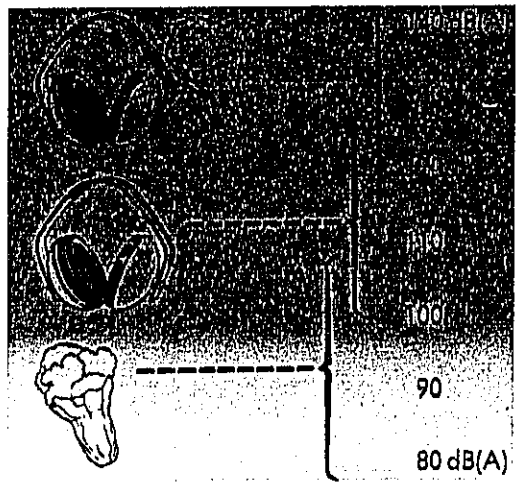
Because fresh, clean material is used every time, disposable earplugs are more hygienic in practice than permanent plugs. After use, the plugs are simply thrown away.

Earmuffs

All earmuff cushions are liable to be damaged and, in any case, they become soiled and brittle in time. It is therefore essential that these skin-contact parts can be replaced separately and easily on site. Glueing or special tools should not be necessary. An ear cushion that is simply snap-fitted in the muff is the ideal solution.

ATTENUATION

The diagram below is meant as a rough guide for the selection of hearing protectors for different levels of noise. It is based on the attenuation provided by Bilsom's earmuffs and earplugs.



As is apparent from the above, earmuffs generally provide more protection than earplugs. It is worth noting, however, that about 90 % of industrial noise levels are below 100 dB(A) and consequently within the range of protection provided by earplugs of mineral down. In very high noise levels, the use of muffs and plugs combined affords an added measure of protection.

Bilsom International Ltd.
P.O. Box 56, 47 Bell Street
HENLEY-ON-THAMES
Oxfordshire RG9 2DB
Tel. 04912-4288

Bilsom AB
S-260 50 BILLESHOLM
Tel. 042-730 30
Telex: 72287 gullbil s
Sweden

Bilsom International, Inc.
11800 Sunrise Valley Drive
RESTON, VA 22091
Tel. (703) 620-3950
Telex: 82-4458 bilsom rstn

Bilsom International Ltd.
1 St. Clair Avenue, East, Suite 503
TORONTO, Ontario M4T 2V7
Tel. (416) 922-7807
Telex: 06-217746 bilsom tor

436-2 GB-USA-CDN