



BBC Studioworks

Noise and Sound Policy

Health and safety policy

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1.0 General

1.1 Policy

BBC Studioworks recognises that high sound levels are hazardous and will:

- Take action to reduce hazardous exposure to noise.
- Assess and control exposure to excessive levels of noise and sound.
- If noise exposure is foreseeable, a noise risk assessment will be undertaken and all reasonably practicable measures will be taken to prevent exposure to hazardous levels.
- Ensure that the use of personal hearing protection is considered only as a last resort, when all other methods of control have been fully explored.
- Insist that employees make use of the personal hearing protection or other control measures supplied to them.
- Provide information, training and instruction to those likely to be exposed to high noise levels.
- Introduce health surveillance for those exposed to noise levels at, or above the Upper Exposure Action Value, if required.

1.2 Guidance

Deafness caused by exposure to noise at work is permanent and incurable.

Exposure to noise can also cause other forms of hearing damage e.g. tinnitus, which is a sensation such as 'ringing' or 'buzzing' in the ear, which can also occur in combination with hearing loss.

Exposure can occur from various sources including the surrounding environment, headphones and earpieces.

Potential exposure to noise/sound (noise and sound can be used interchangeably) levels will be controlled to known action values.

Where potential exposure to sound levels is at or above 80 dB(A), known as the Lower Exposure Action Value (LEAV), some action has to be taken, this includes with the sound level at the ear when using headphones.

The Upper Exposure Action Value (UEAV) of 85dB(A) requires that all reasonably practicable measures are taken to prevent exposure to noise levels between the LEAV and the UEAV, or above.

An Upper Exposure Limit Value of 87dB(A) has also been introduced as a controlling limit value, which means that this level must not be exceeded, at the ear, taking into account any hearing protection being worn.

Noise/Sound Levels

A decibel comparison chart can also be used to give further guidance of the levels of noise that can be produced from various activities / venues / processes;

Decibel (loudness) Comparison Chart – <u>use this for initial assessment</u>	Approximate levels	Notes and critical levels
Quiet office	40 – 50dB(A)	
Normal conversation at 1 metre	60 - 70dB(A)	
Loud radio	80dB(A)	Lower Exposure Action Value @ 80dB(A) Hearing protection to be made available and advice given to persuade those exposed to use it
Chamber music in a small auditorium	85dB(A)	Upper Exposure Action Value @ 85dB(A) Hearing protection compulsory; both provision and use
Stadium football or rugby match	87dB(A)	EXPOSURE LIMIT LEVEL @ 87dB(A) at the ear – even with PPE
Average personal stereo	90dB(A)	
Walkman® on 50% volume setting	94dB(A)	
Piano fortissimo or nightclub bar	92 – 95dB(A)	
Symphony orchestra	95dB(A)	
Some power tools (eg band saw)	100dB(A)	
Rock band / outside broadcast music event or indoor concert	120dB(A)	
Jet engine at 25 metres or outside broadcast motor racing event (pits or trackside)	140dB(A)	Permanent damage, extreme discomfort

NB. Figures in dB (A) mean that this is the averaged level for an 8-hour exposure.

2.0 Responsibilities

2.1 Policy

- Line managers are primarily responsible for ensuring that staff are not exposed to dangerous noise and sound levels and that, as appropriate, the rules and guidance specified in this document are complied with.
- Furthermore, where external resources or resource providers are used then all managers and those who commission external facilities must ensure that the standards set out in this document are met.

2.1 Guidance – Responsibilities

The need for a noise risk assessment should normally be identified at the planning stages of any event and considered as part of the Programme or Resources risk assessment, or from local standing arrangements for particular situations.

Noise assessments, a quick guide

If an activity is over 80dB(A) a noise assessment will have to be undertaken to help controlling the sound level. (appendix 1 gives more detailed guidance).:

Consider who might be affected and how. Inform individuals. e.g. the individual staff member, a visiting contractor, a member of the public

Consider what action should be taken to eliminate or reduce the noise level and implement the necessary action – does the noisy activity have to happen at all, can it be done more quietly by turning the volume down, can the numbers exposed be reduced by restricting access, can the time individuals spend in the noisy area be reduced, can the equipment be quieter, can barriers or screens be erected to reduce the noise or position equipment e.g. speakers more appropriately; use limited headphones and/ or limited noise excluding headphones.

Identify those who need training in noise awareness and use of hearing protection – if those working in noisy areas or doing noisy activities understand more about the risks, individuals may be more co-operative with any measures you might put in place.

Select and provide appropriate personal hearing protection for the individual and the activity – if all other measures for control are not sufficient or suitable for the activity then personal hearing protection will need to be provided. Select style

based on activity, level of protection required and user; make sure the individual is trained when and how to use it and that you check it is being used correctly.

Identify who might require health surveillance – anyone regularly exposed above the upper exposure action value of 85 dB(A) or anyone who may be particularly sensitive to noise even below this level may require health surveillance. Anyone being employed into a post where regular exposure to loud noise is a hazard of his or her work should have a hearing test performed at recruitment to give a baseline measurement.

Retain records of assessment and action taken , and review regularly – records can provide important information for review the success or otherwise of your controls, they also act as evidence should the need arise.

3.0 Headphones

3.1 Policy

BBC Studioworks supply headphones (either in-house or via approved 3rd party hire companies) that have been tested and confirmed to function correctly with all other equipment, in accordance with the criteria below. Personal headphones are used entirely at the user's own risk, as they have not been verified to meet the specification, tested, or confirmed to be adequately maintained and in good working condition.

- All headphones in use which are capable of delivering a noise dose equal to or exceeding the lower exposure or peak action values must be controlled so that the noise dose experienced from them by a user does not reach or exceed the lower exposure or peak action values.
- Unlimited headphones must not be made available for general use. An authorised issue of unlimited headphones must be strictly controlled by the manager who has authorised the use and by the individual(s) concerned.
- Headphones should be limited to at least 93dB and usage controlled and maintained not to exceed 4 hours.
- Where headphone use regularly exceeds 4 hours of consistent use, reduce the limiting level to 88dB (this may well require a different, more suitable type of headphone to be obtained and used).
- Users should take a break from listening with headphones at regular intervals.
- Issue individuals with their own headphones, especially those using headphones for longer than 4 hours at a time (hygiene consideration).

- Where an individual uses more than one set of headphones during the course of their daily work activity, or it is impractical to issue a single pair per person then appropriate cleaning materials and cleaning procedure should be adopted.
- Where use of headphones consistently exceeds 4 hours and the limiting value cannot be practically reduced to 88dB (even with different types of headphones being supplied) OR headphones are used without a 88/93dB limiter fitted, the following action must be taken:
 - A risk assessment must be made for the individuals concerned;
 - A written safe system of work must be in place and adhered to;
 - Such use must be authorised by the manager responsible;
 - Records must be kept;
 - A health surveillance program must be introduced for the staff concerned.

3.2 Guidance

Most headphones in current use in broadcasting are capable of delivering a noise dose in excess of the lower exposure value.

Limiting the output capability of headphones to 93dB is likely to result in noise exposure below the upper exposure action value and for the vast majority of purposes, headphone listening levels do not need to exceed this average level of 85 dB(A), the upper exposure action value.

Where headphone use can be controlled and maintained to not exceed 4 hours, then exposure will not exceed the lower exposure action value either.

Ask individuals who regularly use headphones about the suitability and comfort of the headphones.

Headphones should be selected for the task or activity i.e. in open plan offices it may be better to use a noise cancelling headphone so the user can keep the volume down within the audio cup.

In a few circumstances there may be a requirement where the use of unlimited headphones, which are capable of exceeding the lower or peak exposure action values can be justified (e.g. short duration listening to a headphone feed to determine if a perceived fault condition is being introduced by a limiter or by some

other factor). For some circumstances a different limiter setting or other controls may be deemed necessary.

In all cases a separate risk assessment must be carried out.

4.0 Earpieces / in-ear headphones

4.1 Policy

- Earpieces inserted into the ear canal should only be used by persons requiring to listen to talk-back or programme information whilst appearing on camera and their use will be properly controlled.
- The use of any non-standard in-ear devices of unknown characteristics is not allowed, this includes the use of in-ear headphones (those supplied with personal stereos, mobile phones, etc.)
- Earpieces should be limited to 106dB - These are limited to this level due to the fact that the acoustic tube and ear mould, reduce the noise level by 13dB. (Thus maintaining the output capability to 93dB, which is likely to result in noise exposure below the upper exposure action value of 85dB(A)).
- Where the limiting of ear pieces/ headphones exceeds 106dB, as may be required for some individuals, a separate risk assessment for the individual concerned must be carried out. The equipment should still be limited, albeit at a higher level and such use must be authorised by the manager responsible and hearing health surveillance introduced.
- The upper lead and transducer should be plugged into a limiter box, limited to 93dB and the user able to control the volume level being received, so that a comfortable listening level can be maintained.
- Where the role requires earpieces to be worn for more than 4 hours per day, the limiting level of the limiter box should be reduced to 88dB thus maintaining exposure to below the lower exposure action value.
- Ideally earpieces should be issued for personal use by individuals, to maintain an appropriate level of hygiene. A stock of clean earpieces should be kept for guest presenters.
- Before using devices inserted into the ear canal an adequate noise assessment together with a written safe system of work must be in place which prevents persons wearing them from receiving a noise dose equal to or exceeding the lower or peak exposure action values.

- Where ear-pieces are cabled, such as on studio floors or in presentation areas sound feeds to earpieces should be restricted to those controlled at source by a limiter/compressor. The sound level delivered at the earpiece for differing settings of limiter/compressor would thus be known and could be adjusted by the Sound Supervisor. The noise dose could consequently be kept below the lower action value by controlling the combination of sound level delivered at the earpiece and duration of exposure.
- The range of earpieces should be restricted to one or two locally preferred types. These should be appropriate to the circumstances of use and their electrical and audio characteristics known. Control measures, which ensure that only the specified types can be used, include design features such as fitting unusual or modified plugs and sockets.
- Devices worn externally to the ear canal (including telephone headsets) should be treated as headphones. Where they are capable of delivering a noise dose in excess of the lower exposure action value they should be either limited to 88dB or treated as for the earpieces above.

4.2 Guidance

Uncontrolled devices inserted directly into the ear canal have an inherent danger since they are closely coupled to the hearing mechanism. Listening levels when using these earpieces are often very high, particularly when listening against high-level background sounds. Zero level talkback fed to an unlimited earpiece may well result in a sound level around 100dB(A) with peaks rising above 110dB.

5.0 Loudspeaker Monitoring

5.1 Policy

- The sound output of loudspeaker systems in fixed installations such as control rooms and editing suites must be restricted and/or controlled so that the noise exposure experienced from them by persons working in the vicinity does not reach or exceed the first or peak action levels.
- For the vast majority of purposes loudspeaker-monitoring levels need not exceed an average level of 80dB(A).
- The output level of loudspeaker installations can easily be restricted to a given level by incorporating a simple fixed resistive attenuator at the input to the amplifier.
- Systems where the maximum output capability of an amplifier and loudspeaker combination is attenuated to 85dB(A) are likely to result in noise exposure below the upper exposure action value but require additional actions to be taken;
 1. Such an installation should be set up with the amplifier main gain control calibrated to show the 80 and 85dB(A) positions. In normal use the desk output is set at the 80dB(A) position or below.
 2. Full output level (+85dB(A)) should only used occasionally for critical listening to particularly quiet passages and then returned to the normal listening position.
 3. Visual indication (for example; **Green**: 77-79db(A); **Amber**: 80 –84db(A); **Red**: 85dB(A) and above) plus a notice should be displayed indicating that the installation is set up in this way, together with a reminder that operation at 80dB(A) level or below is the normal operating condition.

This is the basis of a safe system and is perceived to be current best practice.

5.2 Guidance

It should not be necessary to fit attenuators to office listening equipment where normal ambient level in a room is well below the first action value.

6.0 High Amplification Monitoring (Listening Booths)

6.1 Policy

- High amplification monitoring equipment must only be used under the direct control of persons who have received sufficient information instruction and training to understand the risks involved in using this equipment.
- There must be a system of indicating approximate average level in excess of 80dB(A) at the operator's position, (e.g. simple calibration of main gain control)
- There must be some additional visual indication, obvious to all present, to show when the main gain control is in use beyond the 80dB position, (e.g. a self illuminating sign)
- In day-to-day use the desk output should be set at the 80dB position or below. Signs should be displayed saying that only authorised staff may operate the system above the 80dB level and maximum exposure times for other control settings should be displayed.
- Full output level capability should only be used occasionally for critical listening to particularly quiet passages and then the system should be rest to the normal listening position.
- Before loudspeaker monitoring installation capable of delivering a noise dose exceeding the lower exposure action value or peak action value is put into use:
 1. A noise assessment must be conducted.
 2. A written safe system of work must be in place, which ensures that the noise exposure experienced by persons working in the vicinity does not reach or exceed the first or peak action levels.
 3. Records of the measures adopted must be kept.

6.2 Guidance

In some situations there is a requirement to amplify inherently quiet pieces of programme material to a suitable level in order to judge the output critically.

For example, in a programme listening booth in order to listen for foul or offensive language and to make a judgement upon the viewer's perception of that language. Whilst the actual listening level in these circumstances could be moderate, the

capability of the amplifier/loudspeaker combination would need to exceed that outlined above for Loudspeaker Monitoring.

Where this situation arises the amplifier/loudspeakers can be set up as described with the main desk control calibrated at the 80 and 85dB positions but with additional gain capability available for the exceptional listening situations described.

It is accepted that this is not an absolute method of control since there is no 'cut-off' limiter in circuit. Some fault conditions could result in levels exceeding 80dB, e.g. instability/howl round type conditions. However, the incidence of this is likely to be quite minimal and would result in the operator quickly reducing desk output level.

If it is felt that this method of operation might be abused, consideration should be given to installing an automatic monitoring and control system. When listening levels exceed 80dB(A) such a system would lock in an attenuator reducing maximum listening level capability to 80dB(A) as described earlier. Resetting the system to its original state would need the approval of the manager responsible. (Commercial systems to do this are available on the market. They also give visual indication of impending trip level, e.g. Castle Electronic Orange GA 904).

7.0 Acute exposure

7.1 Policy

- Appropriate action must be taken following an episode of acute noise exposure.
- Following any sudden, unexpected loud noise exposure where there may be risk of damage to hearing, the following procedure must be followed:
 1. Injured party to inform their manager/supervisor.
 2. Report incident via the Company accident procedure.
- Reserve and quarantine any equipment for investigation and prevent others using until it has been fully checked by a competent person.
- Reassess the noise control measures for the activity that lead to the acute exposure and check the fault has been rectified to prevent further occurrences.

8.0 Live Performances

8.1 Policy

- Risk assessments from visiting productions should be requested and checked to confirm the type of live performance being planned and to ensure that noise levels will be adequately controlled.
- Managers/Supervisors (Sound Supervisor, Vision Supervisor, etc.) expected to work on the production should be given a copy of the production risk assessment for their information and for the staff under their control.
- Managers/Supervisors must ensure that adequate protective equipment is available for their staff deployed to work on the production (ear defenders, noise limiting/ noise cancelling headphones, etc.)
- The Studio should be designated as a hearing protection zone when high noise productions are taking place within the area.
- The Studio area should have signage indicating that hearing protection should be worn and this protection should be provided to all (this could be easily accommodated by providing ear plug dispensers within the studio, or just outside).
- A hearing health surveillance programme should be instigated for staff that are exposed to high noise levels regularly – sound operators, camera operators, studio riggers, etc.

8.2 Guidance

The Control of Noise at Work Regulations 2005 became applicable for the control of noise at live music events from April 2008. Guidance has been produced by the Health and Safety Executive – Sound advice: Control of noise at work in music and entertainment, ISBN 9780717663071.

All staff employed to work at live music events are subject to the requirements of the regulations and the activities being undertaken by them need to be risk assessed accordingly

Exposure of staff working within the studio area during a live music recording are likely to exceed the First Action Level – 80dB(A), within a very short time of the live performance commencing and appropriate controls must be introduced and actions taken to reduce their noise exposure to the lowest practicable level. The following controls are recommended:

- **Turn the Volume down** - The first, simplest and most effective measure is to turn down the volume wherever practicable. This is often overlooked, however, the simple step of identifying and keeping levels under control at every stage of the instrument/ signal/amplification/reinforcement chain is fundamental.

Loud stage noise levels can compromise the quality of the performance and the sound that is delivered to the audience. The use of in-ear monitoring can significantly improve the overall sound quality.

Turning it down does not necessarily mean reducing the overall output of the main PA, but requires an analysis of why things are so noisy and targeting measures to control the main 'offenders'. This is particularly true on stage where amplification of individual instruments (backline) often competes with on-stage monitoring (fold-back, side-fills) and the PA itself.

- **Substitution** - Consider substituting quieter instruments and amps in the first place. High-quality amplifiers and speakers that operate without distortion are preferable to driving inferior systems at higher rates. Introducing distortion makes the output less intelligible and leads to increases in sound level in attempting to achieve clarity. The result is often a spiral of increasing volume without ever achieving clear monitoring.
- **Distance** - Consider increasing distance, isolation or shielding of noisier instruments where possible. Drum kits can be positioned and shielded/enclosed to minimise noise levels for performers and workers situated close by.
- **Monitors** - A well-balanced monitor system should allow all the players to hear what they need at a comfortable level while maintaining a reasonable work environment for everyone else on the stage. This needs time and planning, as well as a skilful monitor engineer who understands the needs of musicians. Monitor engineers should use their equipment properly and safely.

This means:

- resisting the temptation to allow stage noise levels to creep upwards;
- preparing the system to put the right equipment in the right place;

- 'ringing out' or tuning the system to identify problem frequencies which may cause rapid and unexpected feedback.

- **Monitors Continued** -Perhaps the most effective means of avoiding monitor spill is to use monitor headphones or in-ear monitors (IEMs). IEMs and monitor headphones allow a very quiet stage environment with benefits for all workers. IEMs have many benefits including clarity, controllability and comfort. It should be noted that generally IEMs and monitor headphones are not classified as personal hearing protection, and although they may provide some protection against external noise, their performance in this respect cannot be guaranteed. The use of limiters with IEMs and with monitor headphones is strongly recommended.
- **Speakers** - Position speakers to provide effective listening levels to the performer(s) concerned without causing excessive spill, which makes it harder for everyone else to hear what they need.
- **Layout** - The layout of performers on the stage can radically affect the levels of exposure from spill that musicians experience. Therefore careful planning of the stage layout may avoid the need for noise competition between monitor mixes and other noise sources. The advice of monitor engineers at this stage can be invaluable.
- **Sound checks** - All sound checks should be carried out with the minimum number of people present. The sound check is a good opportunity to identify any unexpected or particularly troublesome noise elements, which can be achieved by monitoring sound levels at specific positions.

From a noise exposure perspective it is essential to limit both the duration and volume of sound checks. Sound checks are a vital part of the event setup process, but they are also a mechanism by which technicians and players receive additional exposure to high noise, particularly if the sound check is not properly managed. Ideally instruments will be individually checked at a realistic volume and then an ensemble piece played at full concert level which can usually be set at a lower on-stage volume. A sound check at full concert levels should only be necessary for balancing sound levels, as distinct from rehearsals or last minute run-throughs of sets.

- **The stage** - Awareness of loud noise as dangerous means that staff should only be in the immediate vicinity of the stage during noisy periods if their job specifically requires it. The stage should not be used as a viewing platform or rest area for off-duty staff. It is a high-risk environment to which access must be strictly controlled.
- **The environment** - High sound levels can be produced throughout a venue, and the noise risk assessment for an event should identify all the people who are at risk, not just the musicians or stage crew.

The way in which work tasks are scheduled can have a significant impact on personal noise exposure over time. Every venue or event should have somewhere quiet for musicians and staff to take breaks or rest periods. Careful planning may mean some tasks can be completed when there is no noise hazard, for example ensuring that lighting focusing and sound checking are carried out at different times. Organise the work to ensure that personal noise doses are kept as low as reasonably practicable. This might be achieved by; balancing loud and quiet activities; ensuring that staff take breaks and rest periods away from loud noise areas; rotating staff to limit exposure time; keeping recorded music as low as practicable, especially between acts, to reduce overall exposure.

Orchestras, Musicians and Performers

Musicians can grow so used to high sound levels that they accept them as a natural part of their working life and therefore may underestimate the risks. In fact they may not even be aware that their hearing is deteriorating until it is too late. The inner ear is damaged, which causes an irreversible deafness that cannot be corrected using a hearing aid.

Some members of orchestras and bands are likely to be subjected to sound levels at or above the Lower Exposure Action Value or even the Upper Exposure Action Value.

Both these situations arise from the sounds generated mainly by their own musical instruments, and those of adjacent players, in the normal course of playing them.

Controlling exposure presents obvious difficulties, and each situation will have its own particular set of problems. A cure-all approach is therefore not practical. However, several options are available and some action is possible in aiding control of high sound levels.

The Musicians Union and the Health and Safety Executive (HSE) recognise that the need to control the high sound levels associated with music pose difficult problems. The aim is to try to solve these problems in a way that will protect musicians' hearing

without adversely affecting their performance or employment. The recommended methods of reducing and controlling their noise exposure are below:

- **Use of personal hearing protection** - This is perhaps potentially the source of the greatest practical help, although it may meet resistance from some musicians on grounds of discomfort and difficulty of maintaining ensemble. Special ear plugs which allow players to perform normally, but which reduce the high sound levels and stop the harmful effects of sudden impulsive noises are available.

Earplugs need to be selected to meet individuals' particular needs, in terms of physical fit and performance.

- **Reduction of total playing time in a day** - This is not usually a practical option since a 3dB reduction in exposure would necessitate halving the playing time. However, as musicians' exposure is measured over a weekly average, so the programming of larger, noisier works balanced out with smaller or quieter pieces, could reduce the noise exposure for the players considerably.
- **Changing position of players** - This seems of limited help for orchestras but may help considerably for smaller bands. Orchestras already take up large areas and are often difficult to accommodate in the space available. However crowding players together has a detrimental effect on exposure as does playing in a confined space. If there is room, separate performers from one another. An average space of 1.7 m² per person is adequate but 2 m² spaces are better. Try to build upwards rather than out, as this helps to maintain contact between players and keeps the sides and back of the orchestra in closer contact with the conductor. Also consider moving noisy instruments to the front of the stage, if at all possible.
- **Use risers** - Height separation of players in some circumstances may provide protection for players in front, as for example where the woodwind section is positioned in front of the brass section.
- **Choice of Repertoire** - The size of venue and the size of concert platform taken together with choice of material also affect the potential noise exposure of orchestra and band members. Consideration should be given to avoiding particularly loud pieces played on a crowded platform.
- **Screens** - Use of screens in some circumstances is of significant benefit particularly when used in conjunction with rostra to increase height separation between players. (For example, a woodwind player positioned in front of the brass section would receive significant protection by placing a screen behind him and having the brass section raised on rostra so that they play over the top of him).

- **Conductors** - The conductor has considerable control over the whole noise output of the orchestra and is able to improve conditions for musicians by being aware of what they are asking of their orchestra. For example;
 1. During rehearsals, once the desired effect can be achieved, allowing the orchestra to play under the marked dynamic (at a 'softer' level).
 2. Avoiding unnecessarily rehearsing very loud sections of the score repeatedly.
 3. In the full orchestral rehearsal, while making corrections, only working with those particular players or sections that need to be playing at the time and avoid asking other instruments to play.

9.0 Audience Noise Exposure

9.1 Policy

- Efforts should be made to keep the audience exposure (i.e. the event Leq) below 96dB(A).
- Where practicable the audience should not be allowed within 3 metres of any loudspeaker. Under no circumstances should the audience and loudspeaker separation be less than 1 metre.
- Where the Event Leq is likely to exceed 96dB(A) advise the audience of the risk to their hearing in advance, either on tickets, via advertising or with notices at entry points.
- Ensure during the sound check that the difference in sound level between the front-of-house sound mixing position and the front-of-stage audience position and (if applicable) where delay/distribution stacks are in use at the audience position for each delay/distribution stack, are established. This will allow a guideline sound level to be established for control at the front-of-house sound mixing position, which will restrict the whole audience sound level to below the Event Leq.
- Where noise level control areas are separate from the listening area, noise level control and/or indication, to indicate to the operators when high noise levels are being approached or exceeded, should be installed.
- Sources of noise other than from music also need to be properly controlled. In particular, noise from pyrotechnics should be restricted so that at head height in the audience area, noise does not exceed the peak sound pressure level.

9.2 Guidance - Audience Noise Exposure

Most members of the audience will not attend events regularly enough to suffer serious hearing damage solely as a result of going to entertainment events. However, louder the events can contribute significantly to the overall sound exposure that members of the audience receive throughout their life, including noise from other leisure activities, at work and at home, therefore increasing the risk of damage to their hearing.

There is no specific legislation setting noise limits for the audience exposure to noise. However, the event continuous sound level (Event Leq) in any part of the audience area should not exceed 107dB(A) and the peak sound pressure level should not exceed 140dB.

The general requirements of health and safety legislation and civil law duties relating to negligence require audiences to be protected against and informed of the risk of damage to their hearing.

10.0 Building Design and Refurbishment

10.1 Policy

- Noise impact, both internal and external, must be considered when planning for property acquisition, new builds or refurbishments.
- When considering a new workplace or modifying an existing one, noise emissions and noise exposure can be limited by careful choice of design, layout and the construction materials used for the building.

10.1 Guidance

Areas that should be considered include:

- Location of buildings
- Materials used in construction
- Design and layouts of space where noise may be an issue

For example, the appropriate use of absorption materials or separate enclosures within the building can reduce or limit the effects of reflected sound (specialist advice may need to be sort to implement this).

Noise risk management is also a lot easier if you limit the number of staff exposed. Careful planning could segregate noisy activities from other areas where quiet activities are carried out, reducing the need for noise control after the workplace has been occupied. The number of staff working in noisy activities / areas should always be controlled and kept to a minimum.

11.0 Purchasing Equipment

11.1 Policy

- Purchasing policies must take into account any noise control requirements and ensure that where specified, only the correct equipment is supplied for use.
- Equipment must be selected that is suitable for the task, as determined by the risk assessment.
- Use noise-limited equipment wherever practicable and enforce its use.
- Manage the type of headphone/earpiece etc., worn by employees – do not allow any piece of kit from an unknown source to be used during work time.

11.2 Guidance

Hearing protection designed to deal with a range of difficult situations is available. For example, electronically controlled hearing protectors are available which allow sounds below about 82dB(A) to be heard quite normally whilst impulse sounds above this level are reduced to a safe level. Conversation at normal levels can take place whilst protection from sudden loud noises is provided at the same time.

Other devices use active noise reduction to reduce all noise components equally by about 25dB for use where it is important that there is no distorted perception of adjacent sounds, merely reduction. (Passive hearing protectors do not attenuate all frequencies equally.)

Both types can be fitted with earphone capsules limited to 88/93dB so that talkback and programme sound feeds are provided at a safe level.

When purchasing replacement equipment consider whether it adds excess noise to the activity – aim to reduce noise at source rather than modify it once bought or have to protect the individual using it.

Consider the procurement of furnishings and materials for offices / studios / rehearsal rooms and auditoria which can be used to reduce or enhance the sound as required.

12.0 Hearing Health Surveillance (Audiometry)

12.1 Policy

- Any staff that may be exposed to high noise levels with regards to the need for health surveillance (Audiometric Tests) and/or in Job roles, identified as putting individuals at risk to high noise exposure should have a baseline audiometric test on employment and subsequent hearing checks as part of the health surveillance programme.
- Hearing tests must also be provided for all employees who are likely to be regularly exposed above the upper exposure action value - 85dB(A), or are at risk for any other reason i.e. already suffering from hearing loss or are particularly sensitive to damage.
- Audiometric tests will be free of charge for all staff who require them.
- Employees are required to attend and co-operate with hearing surveillance as requested, ensuring adequate information and confidentiality.
- Fitness for work must not be determined from the results but will continue to be determined by the individual's ability to do his or her job.
- Refusals to attend statutory parts of the health surveillance programme by an employee will be explored with sensitivity, but unreasonable refusal to co-operate will require further management investigation and action, taking into account the individual's reasons for not complying.
- Records will be held as 'Medical in Confidence'.
- Results will be communicated to the individual and, if there are any anomalies or some hearing loss, appropriate medical advice will be provided.

12.2 Guidance - Hearing Health Surveillance (Audiometry)

Fears over the results affecting future employment will need to be discussed and reassurance given that defective hearing should not be a bar to continuation of their employment, providing that work is still of a satisfactory standard.

Managers will not have access to individual medical records, except where the individual consents directly to the disclosure, but will have a written statistical report of results to enable the manager to target noise reduction, education and compliance practices more accurately.

The manager should be confident that the noise assessment is appropriate and that the individual concerned **does** fall into the at risk group where the health surveillance is mandatory.

Examples of the job roles that could require hearing health surveillance are likely to include –

- sound operators,
- camera operators,
- studio riggers,
- listening booth operators

N.B. this list is non exhaustive

13.0 Information, Instruction and Training

13.1 Policy

- All staff should receive basic information on controlling the hazards from excessive noise exposure whilst at work, including the hazards and risks associated with using unlimited headphones.
- Staff that are likely to be exposed to high noise levels must have adequate information, training and instruction on the hazards and risks associated with being exposed to high noise levels provided to them.

Appendix I - Carrying Out a Noise Risk Assessment

Noise Risk Assessment Process

Managers are responsible for ensuring risk assessments are carried out and appropriate control measures implemented. This will require that a competent person is engaged or trained to undertake these assessments.

1. Competency

To be competent:

An individual must have sufficient training, experience, knowledge and other qualities to enable him to properly discharge his duties in health and safety.

Both the employer and the individual should clearly understand the degree and limits of competence involved and can therefore identify the point at which further advice should be sought.

For assessment in broadcasting environments two levels of training are appropriate;

Basic Competence

A knowledge of the nature and properties of sound gained from formal learning, but not to the extent of an advanced knowledge of acoustics;
An understanding of The Control of Noise at Work Regulations 2005;
The ability to make simple sound level measurements and to exercise judgement on the likely effectiveness of measures in place.

This level of competence is appropriate for staff required to make simple measurements and exercise judgement in potentially noisy environments, e.g. Sound Supervisors, Operational engineering staff etc.

Higher Level Competence

As above plus:

A more advanced knowledge of acoustics and noise acquired by a recognised formal course of training.
The ability to carry out full noise assessments.

This level of competence is appropriate for the few staff required to conduct formal noise risk assessments. In some cases it maybe either necessary or more cost effective to hire in this expertise.

2. Identify who is at risk?

Ask yourself if the noise level is intrusive for most of the day?

Do the employees have to raise their voices to carry out normal conversation?
Do the employees engage in noisy activities – playing loud music, recording loud sounds, working with noisy machinery, listening at loud volumes, using power tools for more than 30 minutes a day?

Are the employees exposed to loud impact noises like detonators, gunfire etc?

This will need a separate risk assessment.

Are employees using limited headphones for more than 4 hours a day?

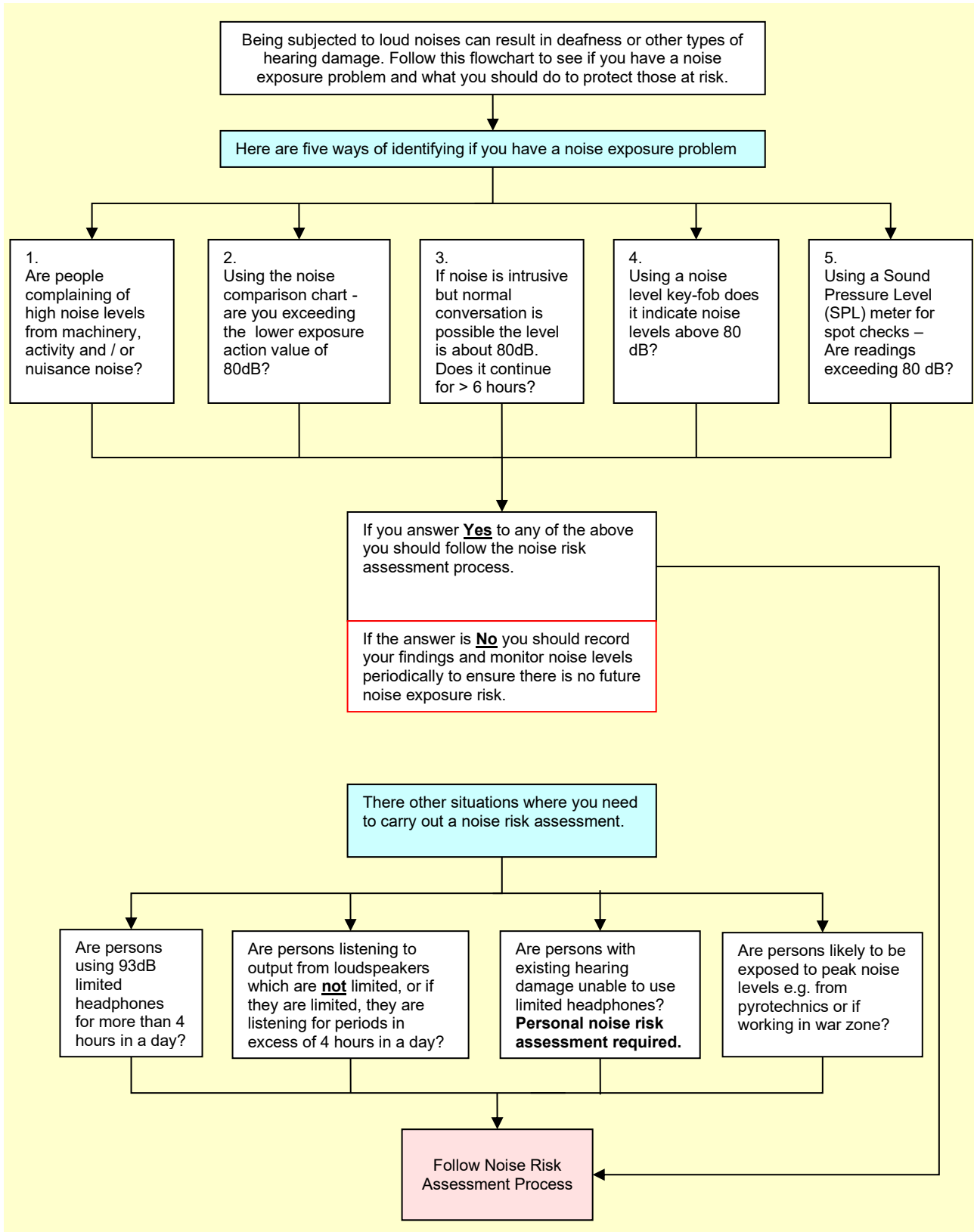
Are employees using un-limited headphones at all?

Is the ambient noise likely to cause a headphone user to increase their monitoring level to compensate (i.e. in an open-plan office)?

Is the programme material being monitored heavily compressed (low dynamic range)?

The following **Who is at risk?** flowchart will help guide you through the initial assessment process.

Who is at risk?



3. Carryout a risk assessment

Take noise measurements and discuss the levels with staff.

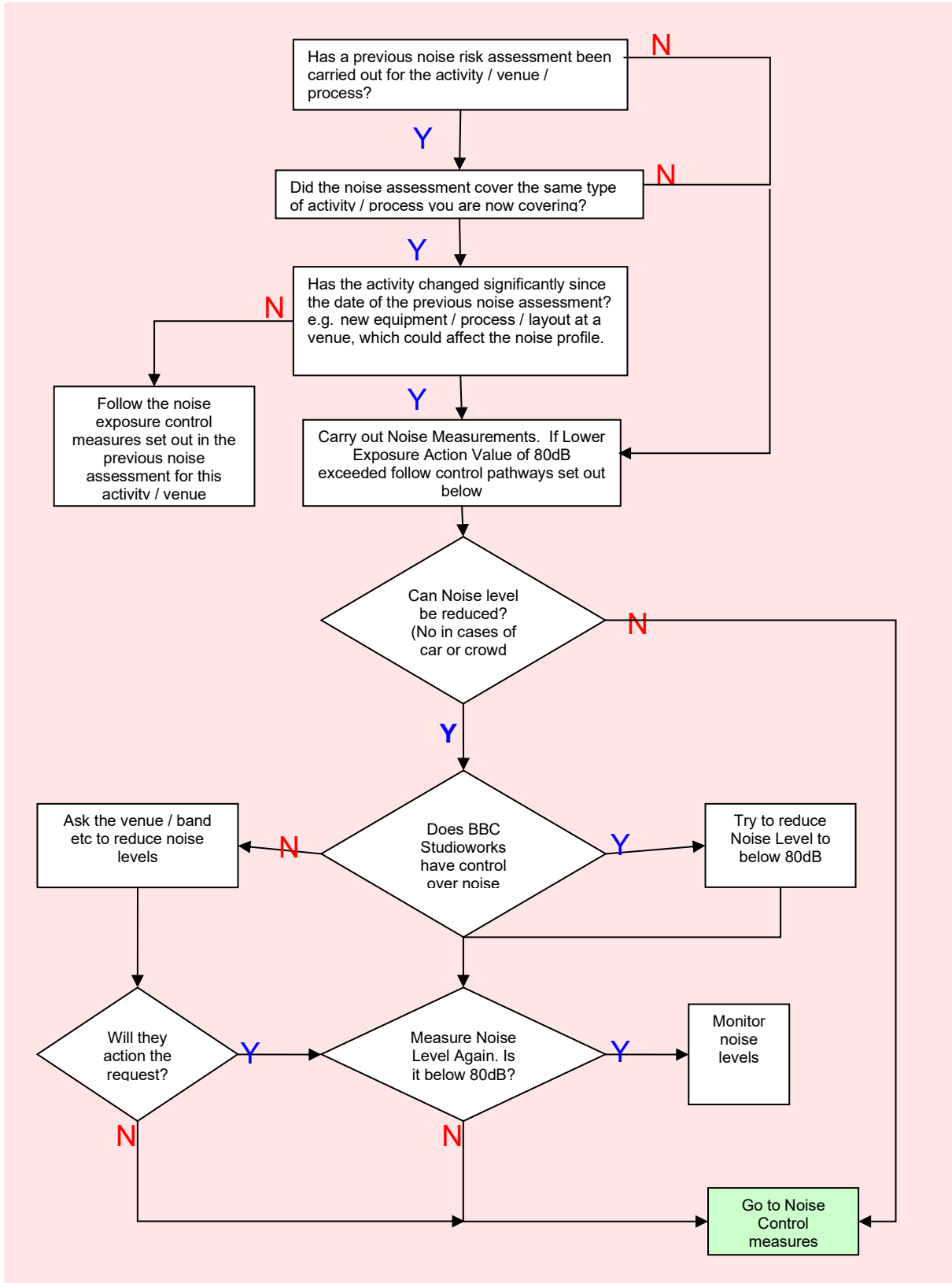
Can the noise levels be immediately reduced?

Group those at risk by area / job role / activity.

Identify individuals who need to work with high noise levels.

The **Noise Risk Assessment Process** flowchart will help guide you through the risk assessment process.

Noise Risk Assessment Process



4. Instigate Control Measures

If the noise levels cannot be immediately and easily reduced then control measures will need to be implemented:

Can those at risk be reduced in number, leaving a smaller number of staff requiring further control measures to be implemented?

Confirm the length of time staff are exposed – if not regular, what is the weekly (7 day) daily time of exposure? – **See Appendix II**

Can the time of exposure of individuals be reduced? – **See Appendix II**

When the average level is found to exceed 80dB(A) staff should be informed and reminded that they may wish to wear ear protection for the duration of the activity or performance, which exceeds this level.

Staff working in such environments should receive basic noise awareness training, which will also include advice on established safe systems of work.

Consideration should be given to providing all staff that are likely to be regularly exposed to the first or peak exposure action values, during the course of their work, with personal issue hearing protection. In addition to helping to ensure that protection is available when it is needed, this measure will also maintain standards of personal hygiene. The issue of such equipment requires that the members of staff be given instruction in its safe use and maintenance.

Staff needing to hear noise (e.g. talkback) should use noise excluding headphones (and the earphone capsules should be limited to 93dB) – **see headphones / earpieces / in-ear headphones**

When the average level is found to exceed an average level of 85dB(A) the following additional actions should be taken:

Where operationally feasible the area should be designated as an ear protection zone and no staff should be allowed to enter unless wearing hearing protection.

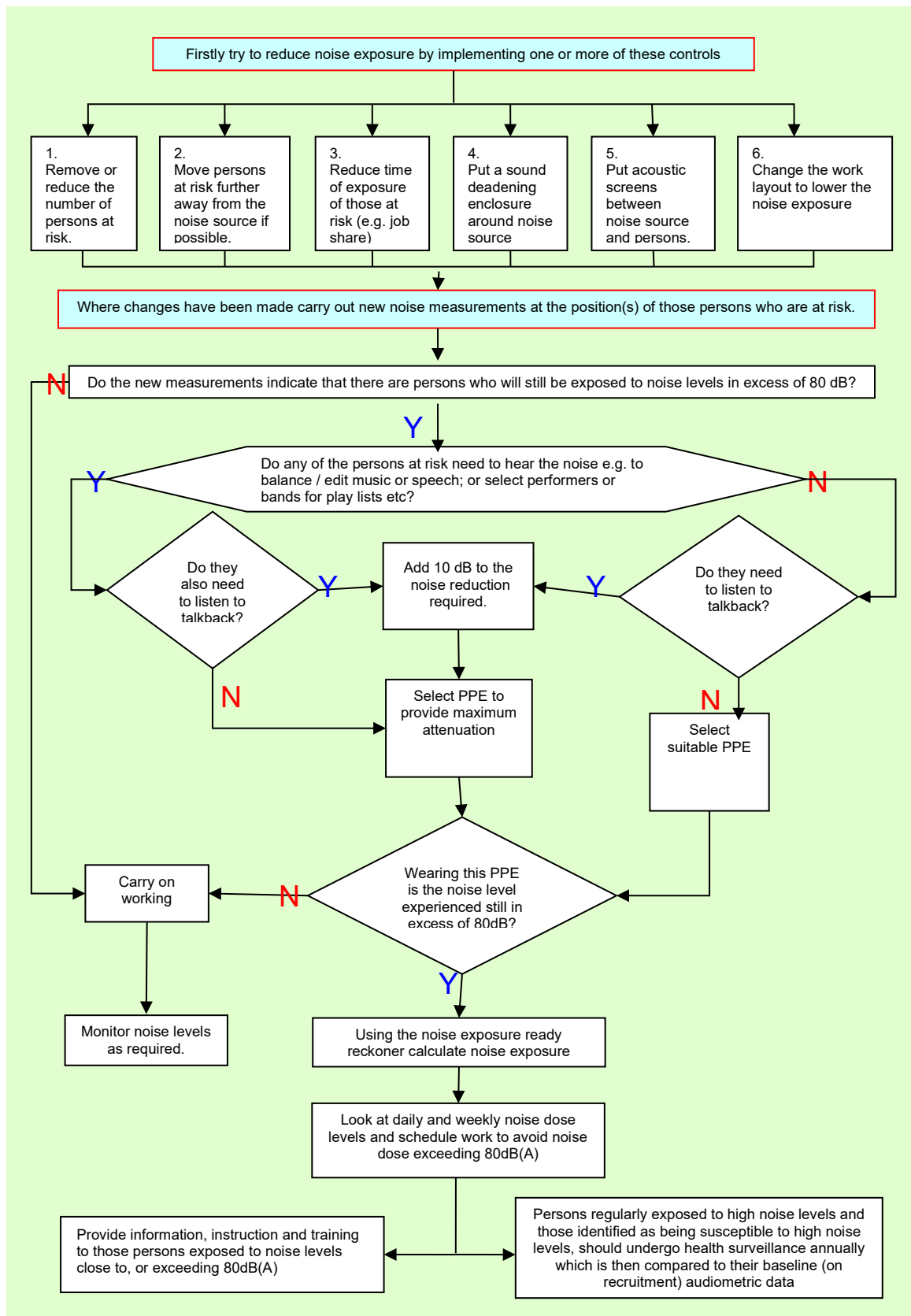
The performer(s) should be encouraged to reduce their sound level to the lowest they can reasonably cope with.

All staff remaining in the vicinity must wear ear protection.

Hearing health surveillance must be introduced for those regularly exposed to high noise levels.

The following **Noise Control Measures** flowchart will help guide you through introducing relevant noise control measures.

Noise Control Measures



Appendix II – Calculating Noise Exposure

Working Example of Noise Exposure (Refer to the exposure table on the following page)

An employee has the following work pattern:

1. Five hours working where a “listening check” suggests the noise level is around 80dB;
2. Two hours operating equipment which has a noise level of 86dB;
3. 45 minutes on a task where the noise measurements have indicated a noise level of 95dB.

<i>Noise Level</i>	<i>Duration</i>	<i>Notes</i>	<i>Exposure points</i>
80	5 hours	No column for 5 hours, so add together values from 4 and 1 hour columns in row for 80dB	16 + 4 = 20
86	2 hours	Directly from table.	32
95	45 minutes	No column for 45 minutes, so add together values from 30 and 15 minutes columns in row for 95dB.	65 + 32 = 97
		Total noise exposure points	149
		Noise Exposure - $L_{EP,d}$	86 to 87 dB

(This noise exposure ready-reckoner, the worked example and the weekly noise exposure ready-reckoner are reproduced by kind permission of the HSE from Guidance L108 Control of Noise at Work Regulations 2005)

Sound pressure level, L_{Aeq} (dB)	Duration of exposure (hours)								Total exposure points	Noise exposure $L_{EP,d}$ (dB)
	1/4	1/2	1	2	4	8	10	12		
95	32	65	125	250	500	1000			800	94
94	25	50	100	200	400	800			630	93
93	20	40	80	160	320	630			500	92
92	16	32	65	125	250	500	625		400	91
91	12	25	50	100	200	400	500	600	320	90
90	10	20	40	80	160	320	400	470	250	89
89	8	16	32	65	130	250	310	380	200	88
88	6	12	25	50	100	200	250	300	160	87
87	5	10	20	40	80	160	200	240	130	86
86	4	8	16	32	65	130	160	190	100	85
85		6	12	25	50	100	125	150	80	84
84		5	10	20	40	80	100	120	65	83
83		4	8	16	32	65	80	95	50	82
82			5	12	25	50	65	75	40	81
81			4	10	20	40	50	60	32	80
80			3	6	12	25	40	48	25	79
79				5	10	20	25	30	20	78
78					5	10	13	15	16	77
75										

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Daily Noise Exposure

The above pattern of noise exposures gives a daily noise exposure value of between 86 and 87dB.

The priority for noise control or risk reduction is the task involving exposure to 95dB for 45 minutes, since this gives the highest individual noise exposure points.

The chart below can be used for working out other daily levels of noise exposure.

Noise exposure ready-reckoner

Sound pressure level, L_{Aeq} (dB)	Duration of exposure (hours)								Total exposure points	Noise exposure $L_{EP,d}$ (dB)
	¼	½	1	2	4	8	10	12		
105	320	625	1250						3200	100
100	100	200	400	800					1600	97
97	50	100	200	400	800				1000	95
95	32	65	125	250	500	1000			800	94
94	25	50	100	200	400	800			630	93
93	20	40	80	160	320	630			500	92
92	16	32	65	125	250	500	625		400	91
91	12	25	50	100	200	400	500	600	320	90
90	10	20	40	80	160	320	400	470	250	89
89	8	16	32	65	130	250	310	380	200	88
88	6	12	25	50	100	200	250	300	160	87
87	5	10	20	40	80	160	200	240	130	86
86	4	8	16	32	65	130	160	190	100	85
85		6	12	25	50	100	125	150	80	84
84		5	10	20	40	80	100	120	65	83
83		4	8	16	32	65	80	95	50	82
82			6	12	25	50	65	75	40	81

81			5	10	20	40	50	60	32	80
80			4	8	16	32	40	48	25	79
79				6	13	25	32	38	20	78
78				5	10	20	25	30	16	77
75					5	10	13	15		

(Reproduced by kind permission of the HSE from Guidance L108 Control of Noise at Work Regulations 2005)

Weekly Noise Exposure

Where the exposure times vary from day-to-day, then exposure time for an average 7 day week can also be calculated:

- Firstly calculate the Noise exposure for each day, over 7 days (including weekends) using the Noise exposure ready-reckoner
- Then refer to the Weekly noise exposure ready-reckoner chart and note the points accrued for each day.
- Add the number of points together to obtain the Total exposure points.
- Compare the Total exposure points totalled column to the Weekly noise exposure column to determine the level of noise exposure.
- Take appropriate actions to reduce the times of exposure, if possible.
- Introduce suitable noise controls to reduce the exposure levels.
- Re-calculate exposure levels / exposure times to confirm that the Weekly noise exposure level has been reduced sufficiently.

The chart below can be used for working out the weekly exposure level.

Weekly noise exposure ready-reckoner

Daily noise exposure <i>L_{EP,d}</i>	Points							Total exposure points	Weekly noise exposure <i>L_{EP,w}</i>
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7		
95	1000	1000	1000	1000	1000	1000	1000	5000	95
94	800	800	800	800	800	800	800	4000	94
93	630	630	630	630	630	630	630	3200	93
92	500	500	500	500	500	500	500	2500	92
91	400	400	400	400	400	400	400	2000	91
90	320	320	320	320	320	320	320	1600	90
89	250	250	250	250	250	250	250	1300	89
88	200	200	200	200	200	200	200	1000	88
87	160	160	160	160	160	160	160	800	87
86	130	130	130	130	130	130	130	630	86
85	100	100	100	100	100	100	100	500	85
84	80	80	80	80	80	80	80	400	84
83	65	65	65	65	65	65	65	320	83
82	50	50	50	50	50	50	50	250	82
81	40	40	40	40	40	40	40	200	81
80	32	32	32	32	32	32	32	160	80
79	25	25	25	25	25	25	25	130	79
78	20	20	20	20	20	20	20	100	78

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