



## Higher National Unit specification: general information

**Unit title:** Sound Production: Sound Reinforcement 2

**Unit code:** H1M0 35

**Superclass:** XL

**Publication date:** June 2012

**Source:** Scottish Qualifications Authority

**Version:** 01

### Unit purpose

The purpose of this Unit is to extend and develop the experience of candidates who have completed the HN Unit *Sound Production: Sound Reinforcement 1*. Candidates will develop a wider knowledge of sound reinforcement technologies whilst extending their system set-up and test techniques. The Unit is also designed to develop candidates' awareness of the variety of sound reinforcement technologies currently available and how to apply the correct techniques necessary for high-power amplification to a variety of sound sources. Candidates will also develop rigorous techniques for system equalisation.

This Unit is intended primarily for candidates who are interested in pursuing a career in sound production where sound reinforcement is used, eg music, theatre, multi-purpose venue and community centres, etc.

On completion of the Unit the candidate should be able to:

- 1 Compare and contrast current sound reinforcement technologies.
- 2 Use spectrum analysis techniques to equalise a sound reinforcement system.
- 3 Operate a sound reinforcement system for a live sound event.

### Recommended prior knowledge and skills

Access to this Unit will be at the discretion of the centre. Candidates should normally have achieved the HN Unit *Sound Production: Sound Reinforcement 1*. It would also be beneficial for candidates to have completed the following HN Units: *Acoustics 1*, *Sound Production Theory 1* and *Sound Production Practice 1*.

## **General information (cont)**

### **Credit points and level**

2 Higher National Unit credits at SCQF level 8: (16 SCQF credit points at SCQF level 8\*)

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

### **Core Skills**

Opportunities to develop aspects of Core Skills are highlighted in the support notes of this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

### **Context for delivery**

This is an optional Unit in the framework for HNC/D Sound Production. It is recommended that this Unit should be taught and assessed within the subject area of the Group Award to which it contributes.

Following on from *Sound Production: Sound Reinforcement 1*, this Unit is designed to allow candidates to build on their live sound experience and explore opportunities to improve sound of the system/ room combination and therefore enhance the experience for performers and the audience.

## Higher National Unit specification: statement of standards

**Unit title:** Sound Production: Sound Reinforcement 2

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The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

### Outcome 1

Compare and contrast current sound reinforcement technologies.

#### Knowledge and/or Skills

- ◆ Purpose and practical use of sound reinforcement
- ◆ Analogue and digital multi-core
- ◆ Technical limitations of sound reinforcement equipment with regard to tone, timbre, dynamic range and the resulting mono/stereo image
- ◆ Operation and use of ground-stacked sound reinforcement systems
- ◆ Operation and use of line-array sound reinforcement systems
- ◆ Self-powered and externally powered speaker systems
- ◆ Operational differences of analogue and digital mixing consoles
- ◆ Radio frequency devices used in sound reinforcement

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by showing that they can describe the core:

- ◆ purpose of sound reinforcement
- ◆ features of analogue and digital multi-core technology
- ◆ features and operation of analogue, digital and control surface mixing consoles
- ◆ factors affecting quality of reproduced sound at a live sound event
- ◆ differences between self-powered and externally powered loudspeakers
- ◆ operational principles of radio in-ear monitoring, microphones and instrument interfaces

Written and/or oral evidence for this Outcome will be generated in open-book conditions at an appropriate point in the delivery of the Unit. The evidence should be augmented with graphical evidence to illustrate appropriate points.

## Higher National Unit specification: statement of standards (cont)

**Unit title:** Sound Production: Sound Reinforcement 2

### Outcome 2

Use spectrum analysis techniques to equalise a sound reinforcement system.

#### Knowledge and/or Skills

- ◆ Role and purpose of front-of-house system equalisation
- ◆ Role and purpose of monitor system equalisation
- ◆ Ability to use spectrum analysis and the associated technologies to equalise a sound reinforcement system
- ◆ Application of acoustic principles to evaluate system performance
- ◆ Use of equalisation and gain structure to avoid feedback

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by undertaking a practical assessment involving the spectrum analysis and subsequent equalisation of a sound reinforcement system. The performance evidence generated must cover the following:

- ◆ the connection and integration of the spectrum analysis equipment into the sound reinforcement system, including: measurement microphone, spectrum analyser, equaliser(s)
- ◆ analysis and recording of the front-of-house system response
- ◆ analysis and recording of the performer's monitoring system response
- ◆ control of gain, EQ and other dynamic parameters to improve the system response
- ◆ measurement and recording of the corrected front-of-house system response
- ◆ measurement and recording of the corrected performer's monitoring system response
- ◆ written and graphical synopsis of the process

Evidence for this Outcome should take the form of an observation checklist.

## Higher National Unit specification: statement of standards (cont)

**Unit title:** Sound Production: Sound Reinforcement 2

### Outcome 3

Operate a sound reinforcement system for a live sound event.

#### Knowledge and/or Skills

- ◆ Implementation of safe working practices when working alone and as part of a team
- ◆ Assemble, test and sound-check a sound reinforcement system
- ◆ Operate a sound reinforcement system in the role of front-of-house engineer
- ◆ Respond professionally and efficiently to the needs of musicians, venue staff, etc
- ◆ Adjust sound reinforcement system controls in response to technical and creative requirements, including stage monitor and front-of-house speaker systems
- ◆ Fault finding and remedial action techniques

#### Evidence Requirements

Candidates will need to provide evidence to demonstrate their Knowledge and/or Skills by successfully assembling, testing and operating a sound reinforcement system showing that they can:

- ◆ assemble, test and operate a sound reinforcement system at a live sound event
- ◆ observe health and safety legislation when working as an individual or part of a team
- ◆ implement required changes to system parameters in response to the performance and technical requirements during the event
- ◆ capture settings for re-call
- ◆ handle all equipment safely and professionally before, during and after the event
- ◆ fault-find and apply remedial action during set-up, sound-check and/or show phases of the event

Evidence for this Outcome should take the form of an observation checklist.

## Higher National Unit specification: support notes

### Unit title: Sound Production: Sound Reinforcement 2

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 80 hours.

### Guidance on the content and context for this Unit

This Unit will allow candidates who have successfully completed the HN Unit *Sound Production: Sound Reinforcement 1* to broaden their skills and knowledge base.

#### Key topics

The following list is not intended to be prescriptive or exhaustive but should form the basic platform for this subject:

- ◆ line-arrays, stacked speaker systems, self-powered and externally powered speaker systems
- ◆ speaker system coverage
- ◆ long throw, short throw, near field and far field
- ◆ speaker management systems
- ◆ spectrum analysis
- ◆ 1/3 octave equalisation
- ◆ notch filtering
- ◆ environmental factors for sound propagation
- ◆ correct gain structure for channel, bus, signal processing and amplifiers
- ◆ equalisation, eg in controlling plosives and sibilants, filtering sound source and room resonances, etc
- ◆ correct equipment handling and storing including cables, microphone stands, equipment racks, etc
- ◆ planning and the need for good communication skills whether oral, written or graphical
- ◆ the need to develop inquisitive and acute listening skills
- ◆ systematic fault-finding techniques

Outcome 1 — allows candidates to research the technologies available. They will discover that differing technical and artistic requirements of events — whether cultural, environmental, or genre-specific — require broad expertise to correctly suggest and operate a suitable type of sound reinforcement system. Comparing the available sound reinforcement systems will highlight the advantages and disadvantages of each. Candidates should be encouraged to observe first hand or by case study as many different types of practical sound reinforcement scenarios as possible. A great deal of information in the form of reviews, manufacturers' implementations, journalistic and technical articles is available on the internet and this should be used as a primary source for candidate research.

Specific practical experience of system equalisation is provided for in Outcome 2. The knowledge and skills gained in the HN Unit *Acoustics 1* will be beneficial when implementing the techniques required for evaluating and then applying system correction.

## Higher National Unit specification: support notes (cont)

### Unit title: Sound Production: Sound Reinforcement 2

Outcome 3 — provides further opportunity to operate a sound reinforcement system in the role of front-of-house engineer allowing the candidate to apply the knowledge and skills developed during *Sound Production: Sound Reinforcement 1*.

#### National Occupational Standards

The relevant Sector Skills Councils (SSCs) that cover standards that could apply to candidates operating in the role of live sound engineer are Creative and Cultural Skills and Creative Skillset.

They have both produced a variety of standards that it would be beneficial for candidates to be aware of. These standards are unlevelled but offer guidance on what someone should know and be able to do in the workplace. They are available on the respective SSC websites and on the UK Standards website.

Below are examples of standards available at the time of writing:

- ◆ Creative Skillset S8: Align the sound system
- ◆ Creative Skillset S10: Provide sound for contributors and audiences
- ◆ Creative Skillset S13: Mix sound live
- ◆ Creative and Cultural Skills (CCSKILLS) CCSTP20.4a: Operating sound for a live performance in the theatre

#### Guidance on the delivery of this Unit

A suggested start to this Unit is to look at case studies, preferably working examples such as at venues, etc. Sound Engineering is a profession that requires the candidate to know about the different technologies available and how to use them in practice. This Unit allows the candidate to develop knowledge of the differing systems and how to adjust and operate the system being used.

The system used by centres must allow the candidate to develop hands-on experience for control of feedback whilst maintaining audio quality, whether in the monitor or front-of-house systems. Negotiating with the performers with regards to backline sound levels is important in realising the best possible sound. A sufficient amount of time should be allowed for the candidate to acquaint themselves with the use of microphone type, speaker placement and equalisation techniques to control feedback. Automatic Feedback Destroyers can be used in a system but should not be used as a substitute for learning how to manually control feedback.

Outcome 2 — should be delivered before Outcome 3.

Developing and implementing professional attitudes when working with the performers and other venue staff is essential. It is recommended that teams undertake shared tasks for Outcomes 2 and 3.

## Higher National Unit specification: support notes (cont)

**Unit title:** Sound Production: Sound Reinforcement 2

### Key topics

The following list is not intended to be prescriptive or exhaustive but should form the basic platform for this subject:

- ◆ Transducers, ie speakers and microphones
- ◆ Electronic circuits, eg the difference between balanced/unbalanced and the difference between signal, line, speaker and mains
- ◆ The definition and use of high and low impedance circuits
- ◆ Wiring and termination conventions used for cables and connectors, eg XLR, Speakon, TS/TRS jack, Phono
- ◆ How to avoid audible glitches, eg electromagnetic interference, ground loops, incorrect signal/phase polarity, etc
- ◆ Correct gain structure for channel, bus, signal processing and amplifiers
- ◆ System dynamics and the need for headroom
- ◆ Equalisation, eg in controlling plosives and sibilants, filtering sound source and room resonances, etc
- ◆ The limitations of using third-octave equalisers for precise and efficient system and room equalisation
- ◆ Correct equipment handling and storing including cables, microphone stands, equipment racks, etc
- ◆ Planning and the need for good communication skills whether oral, written or graphical
- ◆ The need to develop inquisitive and acute listening skills
- ◆ Systematic fault-finding technique

### Guidance on the assessment of this Unit

Outcome 1 — Research results, combined with the observations from lecturer exposition and case studies, should form the basis of the report/presentation. The assessment should take place after class/group research, case studies and/or site visits have been undertaken.

Outcome 2 — Summative assessment should follow on from sufficient opportunities to practise the techniques required to be used.

Outcome 3 — should only be undertaken after successful completion of Outcome 2.

Centres may wish to administer assessments under controlled conditions on certain aspects of this Unit, eg a specific time period allocated to the task of assembling, testing and fault finding. This would simulate the pressures of real-life working conditions.



## Higher National Unit specification: support notes (cont)

**Unit title:** Sound Production: Sound Reinforcement 2

### Assessment Guidelines

#### Outcome 1

A report and/or presentation would be an appropriate Instrument of Assessment for this Outcome.

Candidates should submit a report comparing and contrasting sound reinforcement technologies and system components. This could be a text-based report with diagrams to illustrate key points in the form of an essay, presentation, podcast or other suitable product. The purpose of this Outcome is to look at the wide variety of sound reinforcement technologies as applied to various music/audio industry requirements. Very few centres will have access to the range of technologies available. However, candidates should at least be able to discuss the differences, advantages and disadvantages of loudspeaker technologies, the latest developments in amplifiers and system management techniques and performers monitoring.

Should there be ambiguity regarding a candidate's response, oral questioning may be used to eliminate any doubt as to the candidate's understanding. The lecturer should note questions and responses.

#### Outcome 2

Candidates will need to be observed throughout the process for this Outcome. An assessor's observation checklist is required as evidence. The candidate should supply a copy of their analysis of the before and after measurements of the front-of-house system. This assessment is designed to allow candidates to test and measure the frequency response of a sound reinforcement system/room combination using spectrum analysis techniques. Having carried out basic analysis and recorded the results, corrective equalisation should be introduced using a 1/3<sup>rd</sup> octave graphic equaliser. The system should then be re-assessed and the 'before' and 'after' observations recorded and compared.

There is scope to assess this Outcome with others as part of a small team but centres must be able to ensure that each candidate gains sufficient practical experience at each stage of the process.

#### Outcome 3

Candidates will need to be observed through the process for this Outcome. An assessor's observation checklist is required. This practical Outcome is designed to test the candidate's ability to function in the role of front-of-house engineer. It combines the theoretical and technical aptitudes and gives the candidate the opportunity to put these into practice whilst demonstrating their ability to work efficiently, safely and professionally. It is envisaged that this Outcome will be assessed in a 'real world' situation. However, where this is not practicable, a simulation involving a suitably significant substitute must be provided, ie a range of acoustic and electronic input sources in a non-classroom environment.

There is scope to assess this Outcome with others as part of a small team but centres must be able to ensure that each candidate gains sufficient practical experience at each stage of the process.

## Higher National Unit specification: support notes (cont)

**Unit title:** Sound Production: Sound Reinforcement 2

### Online and Distance Learning

Aspects of this Unit could be delivered by distance or open learning. However, due to the significant practical content of this Unit and the need to underpin the theoretical elements in a practical context, it is unlikely open learning would be practicable.

### Opportunities for developing Core Skills

Candidates will be producing written and/or evidence for Outcome 1, which provides opportunities to develop aspects of the Core Skill of *Communication*. Candidates may produce reports or short essays comparing different sound reinforcement components, eg ground stacked and line arrays. Candidates should be encouraged to use an appropriate referencing method for the Outcome 1 report (and for any formative essays).

Aspects of the Core Skill of *Working with Others* could also be developed in this Unit. Candidates could work in a group to carry out rigging/de-rigging of the system for Outcomes 2 and 3.

It is also likely that aspects of the component 'Using Graphical Information' from *Numeracy* could also be developed in this Unit. Candidates will convey complex information to a range of audiences and for a range of purposes using a range of standard applications to process and obtain data and subsequently use and evaluate numerical and graphical data to measure progress and achieve goals/targets.

### Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

## History of changes to Unit

Version	Description of change	Date

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## General information for candidates

### Unit title: Sound Production: Sound Reinforcement 2

This Unit is intended for those who are interested in pursuing a career in sound production where sound reinforcement is used, eg music, theatre, multi-purpose venue and community centres, etc.

On completion of the Unit you should be able to:

- ◆ compare and contrast current sound reinforcement technologies
- ◆ use spectrum analysis techniques to equalise a sound reinforcement system
- ◆ operate a sound reinforcement system for a live sound event

Outcome 1 — you will study a range of current sound reinforcement technologies. You should be encouraged to observe first hand or by case study as many different types of practical sound reinforcement scenarios as possible. You will produce a report or presentation for the assessment of this Outcome.

Outcome 2 — is about the step-by-step process of system equalisation. If you are undertaking an HNC/D in Sound Production then the knowledge and skills gained in the HN Unit *Acoustics 1* will help you to successfully analyse and tune the system using EQ, gain structure and dynamic controls to provide the best possible experience for the performers and the audience. The assessment for this Outcome is a practical exercise.

Outcome 3 — provides another opportunity for you to operate a sound reinforcement system in the role of front-of-house engineer. It is expected that this will be more challenging than *Sound Production: Sound Reinforcement 1* but, having tuned the system in Outcome 2, your job should be easier. The assessment for this Outcome is a practical exercise.

Your lecturer will recommend a range of resources for increasing your knowledge and skills including books, online articles, manufacturers' websites, case studies and site visits, etc.