



## Higher National Unit specification: general information

**Unit title:** Sound Production Theory 2

**Unit code:** H1M2 35

**Superclass:** XL

**Publication date:** June 2012

**Source:** Scottish Qualifications Authority

**Version:** 01

### Unit purpose

This Unit is designed to give candidates a clear knowledge and advanced understanding of sound production theory. It will prepare them for any practical sound recording by underpinning key sound production knowledge. This Unit is intended primarily for candidates who are interested in pursuing a career in sound production.

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

- 1 Describe advanced microphone techniques and their use for stereo recording and reproduction.
- 2 Describe advanced microphone techniques and their use for multi-channel recording and reproduction.
- 3 Explain audio electrical standards.
- 4 Describe current synchronisation techniques and applications.

### Recommended prior knowledge and skills

Entry to this Unit is at the discretion of the centres. However, candidates should have completed the HN Units *Sound Production Theory 1* and *Sound Production Practice 1*.

### Credit points and level

1 Higher National Unit credit at SCQF level 8: (8 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.*

## **General information (cont)**

### **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 a mandatory Unit in the HND Sound Production. It is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

## Higher National Unit specification: statement of standards

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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

Describe advanced microphone techniques and their use for stereo recording and reproduction.

#### Knowledge and/or Skills

- ◆ Capture of sound sources using spatial microphone techniques
- ◆ Stereo reproduction of sound sources captured by spatial microphone techniques

#### Evidence Requirements

Each candidate will need evidence to show that they can provide an accurate and clear explanation of advanced microphone techniques and applications. A candidate's response can be judged satisfactory where the evidence shows that they can:

- ◆ correctly explain the capture of sound sources using spatial microphone techniques. The explanation should make reference to how the time, level and phase relationships between the signals captured by each microphone will affect the recording and subsequent stereo reproduction of a sound source.
- ◆ correctly explain the stereo reproduction of sound sources captured by spatial microphone techniques. The explanation should make reference to the reproduction requirements, panning and/or summing requirements and mono compatibility issues for the reproduction of spatial microphone techniques.

Evidence should be generated in the form of written and/or oral evidence in response to a brief that requires the candidate to accurately and clearly explain spatial microphone techniques as detailed in the Knowledge and/or Skills above. Diagrams should be used to support evidence.

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

**Unit title:** Sound Production Theory 2

### Outcome 2

Describe advanced microphone techniques and their use for multi-channel recording and reproduction.

#### Knowledge and/or Skills

- ◆ Multi-microphone techniques and microphone arrays
- ◆ Multi-channel capture of sound sources using spatial microphone techniques
- ◆ Multi-channel reproduction of sound sources captured by spatial microphone techniques

#### Evidence Requirements

Each candidate will need evidence to show that they can provide an accurate and clear description of advanced microphone techniques and applications. A candidate's response can be judged satisfactory where the evidence shows they can:

- ◆ correctly describe multi-microphone techniques and microphone arrays. The description should include information about microphone placement within the array, polar responses, relative angles and placement relative to the source.
- ◆ correctly explain the capture of sound sources using spatial microphone techniques intended for multi-channel reproduction. The explanation should make reference to how the time, level and phase relationships between the signals captured by each microphone will affect the recording and subsequent multi-channel reproduction of a sound source.
- ◆ correctly explain the multi-channel reproduction of sound sources captured by spatial microphone techniques. The explanation should make reference to the reproduction requirements, panning and/or summing requirements for the multi-channel reproduction of spatial microphone techniques.

Evidence should be generated in the form of written and/or oral evidence in response to a brief that requires the candidate to accurately and clearly explain spatial multi-microphone techniques and microphone arrays as detailed in the Knowledge and/or Skills above. Diagrams should be used to support evidence.

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

**Unit title:** Sound Production Theory 2

### Outcome 3

Explain audio electrical standards.

#### Knowledge and/or Skills

- ◆ Decibel
- ◆ dB(u), dB(V) and dBFS
- ◆ Balanced/unbalanced cabling and circuits
- ◆ Impedance
- ◆ Signal metering

#### Evidence Requirements

Each candidate will need evidence to show that they can provide an accurate and clear explanation of audio electrical standards. A candidate's response can be judged satisfactory where the evidence shows they can:

- ◆ accurately describe the origins of the decibel and its mathematical properties
- ◆ accurately explain the dB(u), dB(V) and dBFS scales and give examples of their applications
- ◆ accurately explain the properties of balanced and unbalanced audio circuits
- ◆ explain the importance of impedance when interfacing audio equipment
- ◆ describe the main metering formats and their electrical reference standards within the audio industry

Evidence should be generated in the form of written and/or oral evidence which demonstrates that the candidate can accurately and clearly explain audio electrical standards as detailed in the Knowledge and/or Skills above. Diagrams should be used to support evidence, where appropriate.

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

**Unit title:** Sound Production Theory 2

### Outcome 4

Describe current synchronisation techniques and applications.

#### Knowledge and/or Skills

- ◆ MIDI synchronisation
- ◆ Digital synchronisation
- ◆ Longitudinal time code (LTC) and vertical interval time code (VITC) synchronisation

#### Evidence Requirements

Each candidate will need evidence to show that they can provide an accurate and clear explanation of synchronisation techniques and applications. A candidate's response can be judged satisfactory where the evidence shows they can:

- ◆ describe MIDI synchronisation. The explanation should make reference to MIDI clock sync, MIDI time code and MIDI machine control.
- ◆ describe digital synchronisation. The explanation should make reference to word clock and at least two current digital connection protocols.
- ◆ describe LTC and VITC. The explanation should make reference to the advantages/disadvantages of each synchronisation method and the applications of each synchronisation method.

Evidence should be generated in the form of written and/or oral evidence which demonstrates that the candidate can accurately and clearly describe synchronisation techniques and applications as detailed in the Knowledge and/or Skills above. Diagrams should be used to support evidence, where appropriate.

## Higher National Unit specification: support notes

### Unit title: Sound Production Theory 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 40 hours.

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

The Unit is primarily intended to give candidates knowledge of sound production theory for use within, but not exclusively, the HND Sound Production framework.

The delivery of the Unit can be approached holistically but it is envisaged that each Outcome will be assessed individually.

**Outcome 1** — looks at the understanding of spatial microphone techniques. This Outcome covers two key areas of knowledge:

- ◆ Capture of sound sources using spatial microphone techniques
- ◆ Stereo reproduction of sound sources captured by spatial microphone techniques

It is anticipated that many of the following spatial microphone techniques will be covered:

- ◆ Spaced pair
- ◆ Coincident pair
- ◆ Near-coincident pair (ie ORTF, NOS)
- ◆ Mid-side
- ◆ Binaural
- ◆ Decca tree

The Outcome would benefit from practical demonstration of the microphone selection and techniques theory stated within the Knowledge and/or Skills. The Unit *Sound Production Practice 2* would be ideal for augmenting the delivery of this Outcome.

**Outcome 2** — looks at the understanding of spatial microphone techniques and microphone arrays for multi-channel reproduction. This Outcome covers three key areas of knowledge:

- ◆ Multi-channel capture of sound sources using spatial microphone techniques
- ◆ Multi-channel reproduction of sound sources captured by spatial microphone techniques
- ◆ Multi-microphone techniques and microphone arrays

It is anticipated that many of the following spatial microphone techniques will be covered:

- ◆ Fukada tree
- ◆ Hamasaki square
- ◆ IRT cross
- ◆ Double mid-side
- ◆ Ambisonic techniques

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

### Unit title: Sound Production Theory 2

The Outcome would benefit from practical demonstration of the microphone selection and techniques theory stated within the Knowledge and/or Skills. Candidates would also benefit from an understanding of the ITU 775 surround sound standards. The Unit *Sound Production Practice 2* would be ideal for augmenting the delivery of this Outcome.

**Outcome 3** — looks at audio electrical standards. This Outcome covers five key areas of knowledge:

- ◆ Decibel
- ◆ dB(u), dB(V) and dBFS
- ◆ Balanced/unbalanced cabling and circuits
- ◆ Impedance
- ◆ Signal metering

It is anticipated that the Knowledge and/or Skills covered by this Outcome will be contextualised for candidates to relate to equipment within each centre.

**Outcome 4** — looks at synchronisation standards and applications. This Outcome covers three key areas of knowledge:

- ◆ MIDI synchronisation
- ◆ Digital synchronisation
- ◆ Longitudinal time code (LTC) and vertical interval time code (VITC) synchronisation

It is suggested that the two digital protocols covered might include:

- ◆ AES/EBU
- ◆ AES3
- ◆ Ethernet
- ◆ S/PDIF
- ◆ ADAT
- ◆ MADI
- ◆ TDIF
- ◆ S/MUX

It is anticipated that the Knowledge and/or Skills covered by this Outcome will be contextualised for candidates to relate to equipment within each centre.

### Guidance on the delivery of this Unit

This Unit has been developed as a mandatory Unit in the HND Sound Production framework and complements the Unit *Sound Production Practice 2*. It provides much of the necessary theory for the Group Award. It is recommended that this Unit is delivered concurrently with *Sound Production Practice 2* in order for candidates to contextualise and apply some of the concepts covered in the Unit.

If not included in a specific framework, it would be beneficial to run this Unit with other practical Sound Production Units — this would afford candidates the opportunity to use and underpin their knowledge and skills.

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

**Unit title:** Sound Production Theory 2

### **Guidance on the assessment of this Unit**

The assessment of this Unit is designed to test candidates' retained knowledge of sound production theory. Whilst it would be possible to use one Instrument of Assessment that covers all Outcomes it is highly recommended that a single assessment be used for Outcomes 1 and 2 and that Outcomes 3 and 4 are assessed separately.

Appropriate Instruments of Assessment may include a combination of restricted and extended response questions, oral presentations and/or reports.

All Outcomes should be assessed in open-book, supervised conditions where candidates may have access to textbooks, hand-outs or other materials.

Please note that candidates must achieve all the minimum evidence specified for each Outcome, combination of Outcomes, or for the Unit as a whole in order to pass the Unit.

### **Assessment Guidelines**

#### **Outcomes 1 and 2**

These Outcomes could be assessed by a single assessment consisting of a combination of restricted and extended response questions in open-book controlled conditions. As part of the assessment candidates could be asked to identify specific spatial microphone techniques from diagrams and also to produce diagrams for other spatial microphone techniques.

#### **Outcome 3**

This Outcome could be assessed by an extended/restricted response assessment with questions contextualised to reflect the equipment available in the delivering centre.

#### **Outcome 4**

This Outcome could be assessed by a short report based on a brief produced by the centre whereby candidates are required to investigate the synchronisation standards expressed in the Evidence Requirements along with two current digital connection protocols.

### **Online and Distance Learning**

This Unit could be delivered by open learning. However, it would require planning by the centre to ensure the sufficiency and authenticity of candidate evidence. Arrangements would have to be made to ensure that the assessments are delivered in an appropriate manner.

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

**Unit title:** Sound Production Theory 2

### Opportunities for developing Core Skills

Candidates undertaking research and practical activities associated with developing the Knowledge and/or Skills contained within this Unit will have opportunities to develop aspects of the Core Skills of *Numeracy*, *Information and Communication Technology* and *Problem Solving*. Where candidates produce written and/or oral evidence for assessment purposes they will also have opportunities to develop the Core Skill of *Communication*.

### 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 Theory 2

This Unit is designed to give you a clear knowledge and advanced understanding of sound production theory. It will prepare you for any practical sound recording by underpinning key sound production knowledge. This Unit is intended primarily for those who are interested in pursuing a career in sound production.

On completion of the Unit, you should be able to:

- 1 Describe advanced microphone techniques and their use for stereo recording and reproduction.
- 2 Describe advanced microphone techniques and their use for multi-channel recording and reproduction.
- 3 Explain audio electrical standards.
- 4 Describe current synchronisation techniques and applications.

In order to complete this Unit successfully, you will be required to achieve a satisfactory level of performance in all four Outcomes.

Assessment of the Outcomes may include a combination of restricted and extended response questions, oral presentations and/or reports.

All assessments will be undertaken in open-book, supervised conditions where you may have access to textbooks, hand-outs or other materials.