



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **CUSSOU303A Set up and disassemble audio equipment**

**Revision Number: 2**

## CUSSOU303A Set up and disassemble audio equipment

### Modification History

Release	Comments
Release 2	Created to fix formatting errors only. Released with CUS09 Music Training Package version 1.2

### Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to install and disassemble sound equipment in a range of facilities.

### Application of the Unit

People working as audio stagehands and sound technicians apply the skills and knowledge described in this unit. They are responsible for setting up, testing and disassembling audio equipment, such as microphones, sound systems and mixing consoles for a range of productions in the live entertainment, events and broadcasting industries.

The work often involves long or irregular hours and can be physically demanding. The ability to work cooperatively as part of a production team is essential.

Skills associated with operating audio equipment are covered in:

- CUSSOU302A Record and mix a basic music demo.

## Licensing/Regulatory Information

The National Standard for Licensing Persons Performing High Risk Work applies to persons performing dogging and rigging work. Completion of the following units is required for certification at either basic, intermediate or advanced levels.

- CPCCLDG3001A Licence to perform dogging
- CPCCLRG3001A Licence to perform rigging basic level
- CPCCLRG3002A Licence to perform rigging intermediate level
- CPCCLRG4001A Licence to perform rigging advanced level.

Sets and staging for some performances or events may fall within the definition of construction work. If so, people entering a construction site are required to complete the general induction training program specified by the National Code of Practice for Induction Training for Construction Work (Australian Safety Compensation Council, May 2007).

Achievement of the unit CPCCOHS1001A Work safely in the construction industry fulfils this requirement.

## Pre-Requisites

Not applicable

## Employability Skills Information

Not applicable

## Elements and Performance Criteria Pre-Content

<p><i>Elements describe the essential outcomes of a unit of competency.</i></p>	<p><i>Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.</i></p>
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## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for installation of audio equipment	1.1 In consultation with <b>relevant personnel</b> confirm <b>sound equipment</b> requirements, referring to <b>production documentation</b> as required 1.2 Together with relevant personnel, assess the acoustic properties of <b>installation area</b> to ensure that equipment and accessories are appropriate 1.3 Calculate power requirements and identify power locations and patching requirements 1.4 Communicate special requirements to relevant personnel so that they can be organised in a timely fashion
2. Install audio equipment	2.1 Safely and neatly secure and label cabling so that it is clear of moving elements 2.2 Set up power distribution 2.3 <b>Position microphones</b> , mountings, <b>microphone accessories</b> and cabling 2.4 As required, ensure that lapel microphones fitted to personnel meet <b>technical performance standards</b> 2.5 Provide phantom power at microphone inputs as required 2.6 Perform all installation work with due regard to <b>mechanical</b> and <b>electrical safety considerations</b> 2.7 Connect effects rack to mixer as required
3. Align audio equipment	3.1 Match interfaces between source and destination according to level, impedance, phase and frequency 3.2 Route test signals to the correct signal path 3.3 Check that the level of test signal is correct for <b>production requirements</b> 3.4 Check systems for potential feedback frequency problems and make adjustments as required
4. Test audio equipment	4.1 Check all microphone lines for continuity and patching 4.2 Test microphones to ensure that they are functioning correctly to produce the required sound 4.3 Fit microphones to relevant personnel to perform <b>sound cues</b> as required 4.4 Patch, test and tune sound system to suit facility 4.5 Conduct sound check and document adjustments according to organisational procedures 4.6 Inform relevant personnel of problems that arise during testing so that they can be rectified in a timely fashion

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
5. Disassemble audio equipment	5.1 Disassemble equipment safely, giving due consideration to other production requirements 5.2 Ensure that all equipment and accessories are packed and stored according to safety regulations and production requirements 5.3 Check hired equipment against inventory before packing and report lost or damaged equipment to the appropriate personnel 5.4 <b>Pack</b> sound equipment for transit as required 5.5 Clean <b>work environment</b> after use and restore environment to previous condition 5.6 Seek feedback from relevant personnel on own work performance and note areas for improvement

## Required Skills and Knowledge

*This section describes the skills and knowledge required for this unit.*

### Required skills

- communication, literacy and teamwork skills sufficient to:
  - interpret and clarify written and verbal instructions
  - make verbal fault reports to appropriate personnel
  - interpret block diagrams of equipment and system set-ups
  - read and interpret sound documentation
  - read manufacturing specifications and installation manuals
  - work effectively in a team environment
- initiative and enterprise skills in the context of applying critical-listening and aural-discrimination skills when setting up audio equipment
- numeracy skills sufficient to calculate duration and capacity of recording media
- technical skills sufficient to:
  - set up and disassemble audio equipment for playback, mixing and recording in line with manufacturer's manuals and OHS specifications
  - run and patch cables neatly and safely
  - test sound equipment in line with industry standards
- planning and self-management skills sufficient to:
  - prioritise work tasks
  - meet deadlines
  - seek expert assistance when problems arise
- problem-solving skills sufficient to identify typical faults that may occur in audio-production environments

### Required knowledge

- basic audio principles and practice, including:
  - range of microphones and contexts in which they are used
  - microphone characteristics, e.g. frequency response, sensitivity and polar patterns
  - effect of microphone placement on quality of sound
  - characteristics of sound in a range of environments
  - signal-to-noise ratio, signal phase and audio level/headroom control
  - audible defects in analogue and digital technologies
  - features of mixers, amplifiers, speakers and effects racks
- basic principles of acoustics, including:
  - frequency
  - pitch
  - amplitude

- loudness
- velocity
- wavelength
- acoustical phase
- timbre
- sound envelope
- basic understanding of psychoacoustic principles, including:
  - spatial hearing
  - direct sound
  - early sound
  - reverberant sound
  - room design
- techniques for installing, aligning and testing audio equipment, including:
  - understanding electrical power (e.g. voltage, distribution, phasing, load and circuit breaking)
  - knowledge of a range of sound equipment and associated operating principles (e.g. level, impedance, phase and frequency)
  - testing and tagging all electrical fittings in accordance with safety regulations
- issues and challenges that typically arise in the context of setting up and disassembling audio equipment
- OHS requirements, including:
  - licensing requirements for persons performing high risk work and entering building sites
  - safe manual-handling techniques
  - working safely with electricity and hazardous substances
  - principles of safe listening, such as safeguards against hearing loss

## Evidence Guide

*The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.*

<b>Overview of assessment</b>	
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>Evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• install and disassemble audio equipment on at least three occasions</li> <li>• interpret sound plans</li> <li>• test equipment in line with production requirements</li> <li>• work cooperatively in a team environment</li> <li>• apply OHS procedures, particularly in relation to working with electrical equipment and safe manual handling.</li> </ul>
<b>Context of and specific resources for assessment</b>	<p>Assessment must ensure:</p> <ul style="list-style-type: none"> <li>• access to a range of industry-current equipment as listed in the range statement</li> <li>• access to venues in which to install audio equipment</li> <li>• use of culturally appropriate processes, and techniques appropriate to the language and literacy capacity of learners and the work being performed.</li> </ul>
<b>Method of assessment</b>	<p>The following assessment methods are appropriate for this unit:</p> <ul style="list-style-type: none"> <li>• case studies and questioning to assess candidate's understanding of OHS requirements</li> <li>• observation and/or video recordings of the candidate installing, testing and disassembling audio equipment</li> <li>• written or oral questioning to test knowledge of basic principles and techniques of installing and testing audio equipment.</li> </ul>
<b>Guidance information for assessment</b>	<p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, for example:</p> <ul style="list-style-type: none"> <li>• CUESOU01C Repair and maintain audio equipment</li> <li>• CUFIND301A Work effectively in the screen and media industries</li> <li>• CUSIND301A Work effectively in the music industry</li> <li>• CUSOHS301A Follow occupational health and safety procedures</li> </ul>



	<ul style="list-style-type: none"><li>• CUSSOU301A Provide sound reinforcement</li><li>• CUSSOU302A Record and mix a basic music demo.</li></ul>
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## Range Statement

*The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.*

<p><b><i>Relevant personnel</i></b> may include:</p>	<ul style="list-style-type: none"> <li>• artists, musicians and performers</li> <li>• audio and sound engineers</li> <li>• audio and sound technicians</li> <li>• broadcasters</li> <li>• clients</li> <li>• directors</li> <li>• producers</li> <li>• photographers</li> <li>• post-production personnel</li> <li>• program managers</li> <li>• stage managers</li> <li>• sound designers and editors</li> <li>• sound effects personnel</li> <li>• video and sound recorders.</li> </ul>
<p><b><i>Sound equipment</i></b> may include:</p>	<ul style="list-style-type: none"> <li>• amplifiers</li> <li>• sound reinforcement systems, including:             <ul style="list-style-type: none"> <li>• front-of-house</li> <li>• stage foldback</li> </ul> </li> <li>• limiters</li> <li>• compressors</li> <li>• effects rack</li> <li>• turntables</li> <li>• analogue to digital converters</li> <li>• cables</li> <li>• compact disc (CD) and digital versatile disc (DVD) players and burners</li> <li>• computer technology and associated software</li> <li>• digital and analogue recording devices:             <ul style="list-style-type: none"> <li>• hard disk recorder, e.g. digital audio workstation (DAW)</li> <li>• digital audiotape recorder, e.g. S-DAT and R-DAT</li> <li>• digital videotape recorder (DVTR)</li> <li>• mini disc recorder (MD)</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• modular digital multi-track recorder (MDM)</li> <li>• open-reel analogue audiotape recorder</li> <li>• digital audio players, such as: <ul style="list-style-type: none"> <li>• iPod</li> <li>• MP3</li> </ul> </li> <li>• headphones</li> <li>• microphones and accessories</li> <li>• mixing consoles and desks</li> <li>• monitors and speakers</li> <li>• signal processors and plug-ins</li> <li>• sequencers and samplers</li> <li>• musical instruments.</li> </ul>
<b><i>Productions</i></b> may include:	<ul style="list-style-type: none"> <li>• live music or theatre performance</li> <li>• commercial</li> <li>• print advertisement</li> <li>• corporate video</li> <li>• feature film and/or video</li> <li>• filmed event and/or performance</li> <li>• interactive media product</li> <li>• internet production</li> <li>• electronic game production</li> <li>• music recording and/or video</li> <li>• promotional trailer</li> <li>• radio broadcast</li> <li>• television program</li> <li>• voice-over.</li> </ul>
<b><i>Documentation</i></b> may include:	<ul style="list-style-type: none"> <li>• house plans</li> <li>• sound plans</li> <li>• line diagrams</li> <li>• installation schedules</li> <li>• artistic requirements</li> <li>• scripts</li> <li>• musical scores</li> <li>• dubbing sheets</li> <li>• technical/equipment manuals</li> <li>• enterprise operating procedures and standards</li> <li>• stage plans</li> <li>• sound plots</li> <li>• design, director's and sound specifications</li> <li>• production and venue requirements</li> </ul>

	<ul style="list-style-type: none"> <li>• production schedules</li> <li>• OHS requirements and instructions</li> <li>• manufacturer specifications</li> <li>• performers' requirements</li> <li>• fault report sheets.</li> </ul>
<b>Installation area</b> may include:	<ul style="list-style-type: none"> <li>• stage</li> <li>• venues</li> <li>• auditorium</li> <li>• hotels</li> <li>• clubs</li> <li>• front of house.</li> </ul>
<b>Positioning</b> microphones includes taking account of factors, such as:	<ul style="list-style-type: none"> <li>• ensuring that safety procedures are followed</li> <li>• organisational requirements</li> <li>• production requirements</li> <li>• ensuring optimum sound quality</li> <li>• ensuring that cabling is mechanically sound and does not transmit vibration to microphones.</li> </ul>
<b>Microphones</b> may include:	<ul style="list-style-type: none"> <li>• boundary (PZM)</li> <li>• capacitor/condenser, such as: <ul style="list-style-type: none"> <li>• electret</li> <li>• lavalier</li> <li>• mini microphone</li> <li>• transistor</li> <li>• tube</li> </ul> </li> <li>• contact</li> <li>• digital</li> <li>• directional, such as: <ul style="list-style-type: none"> <li>• single entry port</li> <li>• multiple entry port</li> <li>• multi/poly-directional</li> </ul> </li> <li>• dual-element</li> <li>• dynamic, such as: <ul style="list-style-type: none"> <li>• moving coil</li> <li>• ribbon</li> </ul> </li> <li>• headset</li> <li>• lapel</li> <li>• low and/or high impedance</li> <li>• microphone systems, such as: <ul style="list-style-type: none"> <li>• adaptive array</li> <li>• binaural</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• high definition</li> <li>• parabolic</li> <li>• surround sound</li> <li>• wireless</li> <li>• cordless</li> <li>• FM</li> <li>• radio transmitter</li> <li>• noise cancelling</li> <li>• shotgun.</li> </ul>
<p><b><i>Microphone accessories</i></b> may include:</p>	<ul style="list-style-type: none"> <li>• boom poles, including: <ul style="list-style-type: none"> <li>• aluminium</li> <li>• carbon fibre</li> <li>• fisher</li> <li>• hand-held</li> <li>• perambulator</li> <li>• remote panner</li> <li>• tripod</li> </ul> </li> <li>• cables, including: <ul style="list-style-type: none"> <li>• balanced</li> <li>• unbalanced</li> </ul> </li> <li>• clips</li> <li>• connectors, including: <ul style="list-style-type: none"> <li>• female</li> <li>• male</li> <li>• XLR</li> </ul> </li> <li>• housing</li> <li>• pop filters</li> <li>• shock mounts</li> <li>• stands, including: <ul style="list-style-type: none"> <li>• desk</li> <li>• floor</li> <li>• gooseneck</li> </ul> </li> <li>• windscreens.</li> </ul>
<p><b><i>Technical performance standards</i></b> for lapel microphones may include:</p>	<ul style="list-style-type: none"> <li>• ensuring that safety procedures are followed</li> <li>• positioning and connecting aerial optimised pick-up</li> <li>• choosing a transmitter frequency that minimises interference with nearby channels in the frequency band</li> <li>• ensuring that transmitters have appropriate</li> </ul>

	<ul style="list-style-type: none"> <li>sensitivity</li> <li>• rigging microphone within relevant constraints</li> <li>• ensuring that connection of aerial and related cabling is secure</li> <li>• ensuring that transmitter-receiver location is unobtrusive and comfortable for relevant personnel</li> <li>• ensuring that transmitter-receiver location produces optimum output</li> <li>• ensuring that interaction with relevant personnel is discreet, tactful and causes minimum disruption</li> <li>• ensuring that items that may negatively affect transmission are not present on relevant personnel.</li> </ul>
<b><i>Mechanical safety considerations</i></b> may include:	<ul style="list-style-type: none"> <li>• observing OHS requirements when installing and checking equipment</li> <li>• checking that the position of microphones, mountings and other recording equipment is safe</li> <li>• using safety chains</li> <li>• laying cabling to avoid potential mechanical danger and to ensure safety.</li> </ul>
<b><i>Electrical safety considerations</i></b> must include:	<ul style="list-style-type: none"> <li>• following OHS procedures when setting up and checking electrical equipment</li> <li>• checking that mains or generator supply is sufficient for maximum load requirements</li> <li>• ensuring that cables used are correctly rated, including three-phase cable to dimmers</li> <li>• laying cabling so that it does not obstruct the free movement of other equipment or endanger personnel</li> <li>• ensuring that maintenance of cabling and connectors meets OHS requirements</li> <li>• ensuring that all components of sound equipment are connected to the correct voltage supply</li> <li>• ensuring that distribution of electrical loading is within working limits</li> <li>• ensuring that all electrical fittings are tested and tagged in accordance with safety regulations.</li> </ul>
<b><i>Production requirements</i></b> may include:	<ul style="list-style-type: none"> <li>• purpose and style of production</li> <li>• sound specifications</li> </ul>

	<ul style="list-style-type: none"> <li>• venue or location requirements</li> <li>• production schedule</li> <li>• organisational policies and procedures</li> <li>• legislative and/or organisational OHS requirements</li> <li>• manufacturer specifications</li> <li>• performers' requirements</li> <li>• resource constraints</li> <li>• length of the run of the production</li> <li>• attributions</li> <li>• audience</li> <li>• budget</li> <li>• confidentiality</li> <li>• content</li> <li>• contractual arrangements</li> <li>• copyright</li> <li>• deadlines</li> <li>• direct quotes</li> <li>• intellectual property</li> <li>• interviews.</li> </ul>
<b>Sound cues</b> may be required for:	<ul style="list-style-type: none"> <li>• audience PA</li> <li>• effects</li> <li>• foldback to stage.</li> </ul>
<b>Packing</b> sound equipment may involve:	<ul style="list-style-type: none"> <li>• ensuring that containers are suitable for the storage and carriage of the equipment in a safe and secure manner</li> <li>• ensuring that packing of hazardous items complies with current regulations</li> <li>• labelling containers accurately and clearly</li> <li>• checking containers for durability</li> <li>• ensuring documentation for packed equipment is accurate and legible</li> <li>• adhering to strict forward production timelines.</li> </ul>
<b>Work environment</b> may include:	<ul style="list-style-type: none"> <li>• dubbing suite</li> <li>• on location, including interior and exterior</li> <li>• outside broadcast</li> <li>• post-production studio</li> <li>• recording studio</li> <li>• sound stage.</li> </ul>

## **Unit Sector(s)**

Media and entertainment production - audio/sound