CCSMT29
Evaluate acoustics and sound reinforcement systems (PAs)

Overview

Human ears convey information to the brain and nervous system. Sounds starting as air pressure oscillations are transduced into neuronal activity by the mechanisms of the ear by means of a complex series of events. The sensitivity of the human ear and the interpretation of these impulses by the brain (psychoacoustics) is partly a subjective matter but can be underpinned by theory relating to sound and sound waves. Some of these aspects of sound theory are particularly important when applying sound re-enforcement techniques in large rooms, halls and other spaces. This standard is about the nature and physiological make up of the human ear, the nature of sound and sound-waves and how these properties impact on sound reinforcement systems, room acoustics and acoustic treatment. You will be required to evaluate acoustic and electrical instrument groups.

This standard will also build upon experience gained in the equalisation or live performance areas. It is important that individuals clearly understand the Health and Safety aspects of working with large or small systems of PA amplification.

Sound reinforcement is designed to reinforce audio, speech and music in difficult building/venue situations to enable the entire audience to perceive true intelligibility and enjoyment of music and speech throughout the general audience area via PA systems of differing degrees and capacity. You should ensure that personal Health and Safety considerations are taken into account throughout this standard, particularly in relation to:

1 Your wellbeing (hearing)

2 Sound reinforcement systems (practical)

This standard utilises the knowledge and management expected of today's maintenance and tech support engineers, facility staff, acousticians, recording engineers, editing engineers, mastering engineers, mix engineers and programmers.

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Performance criteria

You must be able to:

P1 produce basic calculations to determine pitch, frequency, velocity and amplitude
P2 produce basic calculations to determine sound intensity
P3 undertake research into musical instruments
P4 report on the different features of families of musical instruments
P5 calculate dimensions and features of rooms
P6 evaluate a selection of materials for absorption coefficients
P7 evaluate the building needs and requirements of studios and halls/venues
P8 evaluate acoustic properties of surfaces within rooms/buildings
P9 make acoustic measurements (room/space)
P10 produce an action list to improve acoustic room environments
P11 carry out research into loudspeaker designs and installations
P12 analyse basic characteristics of halls and other venues and devise remedial solutions

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Knowledge and understanding

You need to know and understand:

K1 the structure and working principles of the human ear
K2 the limitations and sensitivity of human hearing
K3 relevant health and safety measures to be considered when working with sound
K4 the nature of sound and sound wave properties
K5 how sound intensity relates to the decibel scale
K6 different features of families of musical instruments
K7 acoustic and electric instruments
K8 instruments that are plucked, struck , strummed or bowed
K9 open and closed-end air column instruments
K10 the relationship between the size of the instrument (mass) and the sound that it makes
K11 acoustic properties of surfaces within rooms/buildings
K12 when to use absorbers or diffusers to eliminate reflected sound
K13 the features of loudspeaker designs
K14 different features of sound reinforcement systems
K15 technical and design principles behind sound reinforcement systems
K16 common manufacturers of live sound equipment
K17 correct terminology related to your work

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Developed by	Creative and Cultural Skills
Version number	1
Date approved	April 2012
Indicative review date	April 2016
Validity	Current
Status	Original
Originating organisation	Creative and Cultural Skills
Original URN	CCSMT29
Relevant occupations	Live sound Engineers; artists; live touring ; Maintenance engineers; technical support; Recording Engineers; recording Producers; mix engineers; assistant engineers; programmers; Mastering Engineers; editing engineers; OB/post engineers; writers; co writers; managers; tape ops; assistants; Studio managers; facility managers; acoustic designers; acoustic building design;
Suite	Music Technology; Live Events Management
Key words	Music technology; sound; sound waves;mechanical waves; longitudinal waves; transverse waves; pressure waves; standing waves and resonance; shock waves;, wave motion; oscillating patterns; wave properties; wavelength; frequency; velocity; amplitude; high air-pressure (compressions); low air-pressure (rarefactions); infrasound; ultrasound; Pitch and frequency; vibration; particle displacement; particle velocity; sound power; sound pressure and intensity; decibel scale; the speed of sound; interference and beats; superposition; reflection; refraction; diffraction; natural frequency; fundamental frequency; octave; harmonics; standing waves; diffusion; sine wave; square wave; pulse wave; triangle wave; sawtooth wave; white noise; noise; timbre; Fourier's theorem; PA sound reinforcement; PA’s; Recording studios; programming/project studios; home studios; broadcast studios; radio suites; edit suites; mastering suite; copy/transfer room; interview booths; vocal booth; machine room; rehearsal rooms; orchestral recording space/areas; theatres; concert venues;

public address spaces; conference venues; stadium and arena spaces; open air concerts/events; restaurants/ambience; churches; religious buildings; halls; tents/marquees/big tops; live events, exhibitions;