Unit 44: Stage Lighting Operations

Unit code: M/502/5639

QCF Level 3: BTEC National

Credit value: 10

Guided learning hours: 60

Aim and purpose

The aim of this unit is to develop learners' skills when working as a lighting operator, and will involve researching types of equipment and colour as well as using control equipment in a stage performance.

Unit introduction

This unit provides learners with the skills necessary to provide lighting services that can enhance performances. The use of light can often enhance a performance and contribute to the gig or concert experience.

Although learners with pre-existing technical skills can take advantage of this unit, it is designed to be available to learners centring on other specialist areas such as dance, music or drama. It allows the development of skills from basic concepts through to those skills required to light a performance. The skills developed in this unit are transferable, and even if learners do not intend a career in a technical area a solid grounding in what can be achieved, and how to implement it, is a very useful ability for any student of the performing arts.

This unit provides learners with the necessary skills to identify, use and maintain a range of stage lighting equipment in common use in venues ranging from small halls to full size major producing houses. It concentrates on equipment often referred to as 'generic' lighting. Such equipment typically consists of fresnel, profile, PAR and flood types. Learners will also be introduced to lighting control and dimming equipment and on completion of the unit should be able to be an effective member of a stage electrics team.

Working individually, as well as within small groups, is a feature of the unit. Learners will be able to produce and use basic scale drawings and documentation typical of work carried out in the industry.

It may be possible for some of the assessed work to be carried out at local venues or other suitable locations. Amateur and professional work experience will enhance learners' opportunities to demonstrate their lighting skills and integrate easily into the unit structure.

Learning outcomes

On completion of this unit a learner should:

1 Know how to use a portfolio of reference material

2 Be able to rig equipment safely

3 Understand the use of colour in a performance context

4 Be able to focus and control luminaires

5 Be able to operate lighting controls.

Unit content

1 Know how to use a portfolio of reference material

Published data: specifications; reviews; images; drawings; price lists; accessories

Analysis: photometric data; comparisons; cost, features; reliability; complexity

Controls and dimmers: types; features; presets; channels; masters; control protocols; power supply and calculations

Luminaires: eg profile spot, fresnels, PAR, floods, LEDs, moving heads

2 Be able to rig equipment safely

Plans: basic scale drawing; symbols; numbering; conventions

Working documentation: colour call; equipment list; patch plan; gobo list; orders list

Access equipment: ladders; A-frames; specialist access equipment

Installation: rigging to bars; booms; truss; cabling; clamps; fittings

Focus: pan; tilt; beam; focus; peaking; zoom

Safety: legislation; equipment; systems; risk analysis

3 Understand the use of colour in a performance context

Colour theory: additive and subtractive mixing; wavelength and transmission

Conventions: mood; realism; effect

Use: types; manufacturers; cutting; identification; installation

4 Be able to focus and control luminaires

Beam control: shutters; barn doors; French flags; gobos; iris diaphragms; rotators; effects; donuts; top hats; diffusion

Power: connectors; cable; grelcos; multiway systems; internally wired bars

Communication: response; reaction; accuracy; speed

5 Be able to operate lighting controls

Dimmers: control cabling; power cabling; patching; fuses/trips

Functions: faders; sub-masters; masters; presets; memories; groups; palettes; playbacks; stacks; highest takes precedence (HTP); lowest takes precedence (LTP); ICBF

Techniques: builds; fades; crossfades; blackouts; move fades; bumps; cues; scripts

Conventions: tab warmers; full up finish; gauze bleed through; cyc washes; working lights

Notes: cue sheets; notes on states; photographs

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria					
To achieve a pass grade the evidence must show that the learner is able to:		**To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:**		**To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:**	
P1	identify key components of lighting equipment using research data [IE]	**M1**	describe types of lighting equipment including technical information using relevant research data	**D1**	critically compare types of lighting equipment and technical information using relevant research data
P2	produce working documentation for the lighting rig and operation [IE]	**M2**	produce accurate working documentation for the lighting rig and operation	**D2**	produce an accurate, fully-annotated range of working documentation for the lighting rig and operation
P3	rig equipment safely under guidance [TW]	**M3**	rig equipment safely with minimal guidance	**D3**	rig equipment safely and competently without guidance
P4	carry out a colour call for a given lighting plan [IE]	**M4**	carry out a colour call, using theatrical conventions, neatly cutting gel, minimising waste and marking up colour	**D4**	carry out a detailed colour call suggesting alternatives and making specialist colour effects
P5	focus luminaires safely with some accuracy [TW]	**M5**	focus luminaires safely, with considerable accuracy	**D5**	focus luminaires safely, showing advanced focusing techniques with accuracy
P6	record and run cues using basic control functions providing a basic cue sheet. [EP]	**M6**	record, edit and run cues using basic control functions with detailed cue sheets.	**D6**	record, edit and run cues using advanced control functions with detailed notes and cue sheets.

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

The unit may be delivered through a combination of workshop sessions combined with work on real productions. Throughout the unit, learners will need to carry out research into equipment available and examples of its use. Manufacturers' websites are a suitable source of accurate information and there are a number of useful web forums and industry websites that will help learners gather the information they require. The nature of the work occasionally requires learners to work individually. This is most appropriate when providing lighting services to other groups of learners within the centre or externally, for example when assisting at a local venue perhaps with an amateur company.

The nature of the unit, and many of the assessment processes required, has health and safety implications. It is imperative that centres ensure all learner activity is carried out with suitable precautions in place.

The essential components of the unit should allow learners to be able to identify equipment, assess its suitability and produce a simple plan for its use. They will then rig the equipment and operate it. This may be for a conventional performing arts production, a shorter segment in a larger performance, or even an assessment session for another group within the centre.

Much of the learning will take place in short theory sessions, with reinforcement and experimentation during the practical sessions that follow. If learners are working on individual projects it is critical that the assessors monitor each learner's progress regularly.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan gives an indication of the volume of learning it would take the average learner to achieve the learning outcomes. It is indicative and is one way of achieving the credit value.

Learning time should address all learning (including assessment) relevant to the learning outcomes, regardless of where, when and how the learning has taken place.

Topic and suggested assignments/activities and/assessment
Introduction to the unit and structure of the programme of learning.
Introduction: tutor • the lighting chain • role of lighting operator/production electrician • types of lighting equipment.
Assignment 1: Research Types of Lighting Equipment – P1, M1, D1 Learners build a portfolio of reference equipment covering types, manufacturers and technical data of: • lanterns • dimmers • lighting control desks.
The lighting plan and role of production electrician: tutor.

Topic and suggested assignments/activities and/assessment
Basic colour theory mood and atmosphere: tutor. Learners: choice of colour exercises: • additive colour • subtractive colour.
Assignment 2: Create Working Documentation from a Given Lighting Plan – P2, M2, D2, P4, M4, D4 Learners create: • patch plan • colour call • equipment list • accessory list • order list • pre-rig checklist.
Assignment 3: Carry out LX Rig and Focus – P4, M4, D4, P3, M3, D3, P5, M5, D5 Learners: • set up lighting system • undertake an LX rig to the plan, using the working documentation created • flash out lanterns • rig lanterns • rig accessories and colour • patch lanterns • focus lanterns.
Assignment 4: Operate Lighting Desk – P6, M6, D6 Learners: • plot lighting desk sub-masters • plot cues • generate notes/cue sheets evaluation.
Feedback from assignment.

Assessment

A portfolio of research material will be collected and this builds into the evidence required for the study components of the unit. A permanent record of learners' achievements can best be made with photographic or video evidence of the effects or processes achieved in practical work.

Many centres may use this unit as a method of providing lighting for their productions and must ensure that sufficient assessment opportunities for the learners will be available. Although a modern memory control desk is advantageous, it is possible to complete this unit successfully with a two preset manual control desk, using a paper-based cue recording system.

Please note that it is not acceptable for learners to direct a member of staff or another learner in the rigging and focusing processes. The individual learner being assessed must carry out the mechanical process on their own. The term 'direction' used in this unit is the industry standard method of instructing another individual to carry out a remote task either directly or via a communications system.

Observation assessment systems may be useful to assess the practical elements of this unit, but must be thorough and carried out over an extended period. As an example, the assessor could be present at, and make an observation record of, a plotting. Assessors should be aware that evidence collection during the production phase is vital. Post-production evidence is unlikely to allow access to the higher grades.

There are five elements to the assessment of work for this unit:

- producing an indexed reference portfolio of lighting and associated equipment
- demonstration of rigging lanterns safely to a lighting plan
- demonstration of using a range of colour in a performance situation
- demonstration of focusing and control of a luminaire to the lighting designer's requirements
- operation of a lighting desk in a performance situation.

Each element can be documented in a number of ways to produce sufficient and reliable evidence for assessment purposes. Evidence of background research material, should include manufacturer and product range research undertaken, either written, spoken or using ICT. The differences and uses of each type of lantern should be identified, and explained, with some technical notation. This should include as a minimum beam angles and wattage of the lantern, and show a clear understanding of the differences between types of lantern and where each type would be used.

Observational evidence from suitably qualified individuals in a professional environment would also be acceptable subject to internal and external verification processes. Witness testimony or assessment should be undertaken and a record placed as evidence in learners' portfolios.

Learning outcome 1 requires learners to develop a portfolio of reference material, showing types of lighting equipment and manufacturers' product ranges.

Differentiation between pass, merit and distinction will be apparent through the depth of research and the factors taken into account when presenting their ideas.

At pass level, learners will identify types of lanterns and types of manufacturers. Research evidence will be presented showing examples of each type. This could be in the form of a report, either written, spoken, or using ICT and should contain a portfolio of research.

At merit level, learners will be describe the lantern types and look at differences. Basic technical information should be used, explained and understood, covering beam angles, wattage and power use.

At distinction level, learners will compare in detail a range of types of lanterns, identifying their uses and comparing a range of technical details and manufacturers' product ranges.

Learning outcome 2 requires learners to demonstrate the role of a production electrician. Learners will use the lighting design and collate key information, including numbers of lanterns required, colour call, gobo list, patch list, channel list and identification of cable requirements, power loading and dimmer requirements

At pass level, learners will be able to produce some working documentation relevant to the production plan. They will be able to rig lighting equipment safely under guidance.

At merit level, learners will be able to provide a full range of working documentation to support the lighting rig. The lighting rig will be completed with minimal guidance and assistance, and fault-finding techniques should be shown.

At distinction level, learners should in addition have annotated the plan with channel numbers and have produced a full channel list for the focus and plotting session. The lighting rig and fault-finding process will be carried out without guidance and the rig will function as designed.

Learning outcome 3 requires learners to understand the use of colour. They will have to produce a colour call and lantern list.

At pass level, learners will provide a written colour call for the lighting plan, and will be able to select and use colour.

At merit level, learners will produce a colour call, to the lighting plan, neatly marking up colour with a chinagraph pencil. To minimise waste, the amount of gel sheets will be calculated and required gel ordered.

At distinction level, learners will be able to produce a comprehensive colour call, with the colour identified, and enveloped up per bar, the organisation and planning of the process will lead to an efficient rig. Specialist colours including split colour, colour scrolls and the suggestion of alternative colours, such as high temperature or ways to make certain colours not in stock by doubling up of gel, will be used as appropriate.

Learning outcome 4 requires learners to focus luminaires.

This should be implemented during one of the focusing sessions undertaken, and will require planning and then execution of the lighting designer's requirements. This could be evidenced through witness testimony, tutor observation records, video, photo and peer testimony, and an overall view of the finished production: an evaluation should indicate how well the actual focus met the lighting designer's brief. This must be undertaken in real life on a real production.

At pass level, learners will be able to focus the luminaires to the lighting designer's requirements.

At merit level, learners will be able to focus with a good degree of accuracy, pre-empting the lighting designer's requirements and providing a luminaire in a rough focus in the right place.

At distinction level, learners should be able to show advanced focusing techniques with the use of top hats, doughnuts, and other antispill devices as appropriate. The positions of the focus knobs should be noted and copied for all general cover and symmetrical effects. The use of peak and flat for even brightness through the luminaires should be done as a matter of course.

Learning outcome 5 requires learners to operate a lighting desk.

This should be implemented during one of the plotting sessions undertaken, and will require planning and then execution of the lighting designer's requirements. This should be evidenced through witness testimony, tutor observation records, video, photo and peer testimony, and an overall view of the finished production. An evaluation should indicate how well the actual plot met the lighting designer's requirements. This must be undertaken in real life on a real production.

At pass level, learners will be able to plot cues, cue states, masters and sub-masters to a basic level to the lighting designer's instructions. They will also be able to demonstrate a basic cue sheet with notes, and the ability to run cues.

At merit level, learners will be able to plot with a good degree of accuracy, using basic copy functions, and produce detailed notes and cue sheets. Basic editing of cues should be demonstrated at the lighting designer's request.

At distinction level, learners should be able to show advanced plotting techniques, including the use of timings, point cues, and chases and other effects (if they have access to a memory board); this should be programmed into the lighting desk. Detailed notes should be kept about the appearance of each lighting state, fade times and notes for the operator including visual and practical cues.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Pearson assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D1	1: Research Types of Lighting Equipment	As a stage lighting technician, learners are required to research types of lighting equipment, looking at differences and similarities between manufacturers.	Presentation. Portfolio of reference material.
P2, M2, D2, P4, M4, D4	2: Create Working Documentation from a Given Lighting Plan	As a stage lighting technician, learners produce required working documentation from a lighting plan.	Working documentation. Patch plan. Colour call. Equipment list. Accessory list. Order list. Pre-rig checklist.
P4, M4, D4, P3, M3, D3, P5, M5, D5	3: Carry out an LX Rig and Focus	As a stage lighting technician, learners rig to given lighting plan, using working documentation and focus lanterns to lighting designer's requirements.	Lighting rig. Checklist. Flash out lanterns. Rig lanterns. Rig accessories and colour. Patch lanterns. Focus lanterns. Diary.

Criteria covered	Assignment title	Scenario	Assessment method
P6, M6, D6	4: Operate a Lighting Desk in Rehearsal and Performance	As a stage lighting technician, learners operate a lighting desk plotting sub-masters and cues.	Observation of plotting session. Plotting of cues. Plotting of sub-masters. Notes and cue sheets. Observation of performance operation. Evaluation of performance. Diary.

Links to other BTEC units

This unit forms part of the BTEC Music and Music Technology sector suite. This unit has particular links with the following unit titles in the BTEC Music and Music Technology suite:

Level 1	Level 2	Level 3
		Live Sound Techniques
		Concert Production and Staging
		Music Events Management

Essential resources

This unit requires a basic level of equipment to be available to learners. As a guide the following list should be used as a guide to the minimum level of equipment needed to allow learners to achieve a full range of grades. Centres should have available at least 12 generic luminaires. A mixture of fresnel, profile, PAR and flood types is recommended. Ideally, a modern memory control desk and dimmers will be available, however, a simple two preset manual control would allow the learning outcomes to be achieved, but will require extra work by learners producing paper-based cue sheets and lists. Single preset controls are not suitable for this unit.

Employer engagement and vocational contexts

There will be limited scope to carry out this work in a professional theatre environment because of health and safety requirements. The majority of this work will, therefore, be centre based.

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	researching lighting equipment types producing working documentation selecting and using colours
Team workers	carrying out a lighting rig focusing luminaires
Effective participators	operating a lighting desk.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Effective participators	carrying out a lighting rig focusing luminaires.

Functional Skills – Level 2

Skill	When learners are …
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	researching types of lighting equipment
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	evaluating use of a lighting desk
Manage information storage to enable efficient retrieval	storing working documentation
Troubleshoot	fault finding on the lighting chain
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	researching types of lighting equipment
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: • text and tables • images • numbers • records	comparing equipment types
Bring together information to suit content and purpose	researching types of lighting equipment
Present information in ways that are fit for purpose and audience	presenting details of research
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	writing cue sheets and working documentation
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	writing cue sheets and working documentation.

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