

# Unit 64: Stage Technology Installation

<b>Unit code:</b>	<b>L/600/0175</b>
<b>QCF Level 3:</b>	<b>BTEC National</b>
<b>Credit value:</b>	<b>10</b>
<b>Guided learning hours:</b>	<b>60</b>

## ● Aim and purpose

This unit will give learners a range of skills to interconnect a range of theatrical equipment, planning the installation and labelling, producing schematic plans, and then making up panels, leads and associated interconnecting equipment.

## ● Unit introduction

Those working within the technical theatre industry will have to interconnect a range of types of equipment. This unit covers the connecting up of a range of theatre equipment, making leads and wiring connectors, carrying out fault finding and planning new installations. Learners will gain knowledge in the use of soldering irons, making cables and panels using different types of connectors, and basic low voltage signal levels and connectors. The fault finding processes and techniques within this unit will also be useful in all areas of electrical maintenance and ICT sectors.

Documenting and planning installations is also vital to comply with current regulations and good practice, and scale drawing and CAD will form part of this unit in relation to producing the planning and documentation required.

This unit introduces learners to electronics as applied to the type of equipment used in the theatre. Learners will be introduced to the fundamentals of theory and process in handling the interconnection, fault finding and maintenance of lighting, sound and video systems.

## ● Learning outcomes

### On completion of this unit a learner should:

- 1 Be able to plan an installation taking into account appropriate regulations
- 2 Be able to demonstrate basic installation techniques in safely controlled circumstances
- 3 Be able to produce a documented plan for a small-scale installation project
- 4 Be able to draw schematic technical plans suitable for distribution to knowledgeable users.

## Unit content

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### 1 Be able to plan an installation taking into account appropriate regulations

*Health and safety:* working at heights; electrical safety; fire safety; noise

*Electrical:* competent persons; portable appliance testing; voltage issues

### 2 Be able to demonstrate basic installation techniques in safely controlled circumstances

*Audio:* balanced; unbalanced analogue; digital; levels; impedance; cable properties; connectors; soldering; crimping

*Lighting:* temporary flexible cable; multicores; Socapex/Harting; 15/16 amp connectors; analogue and digital control circuits; discharge equipment

*Video:* colour systems (PAL/SECAM/NTSC); digital video (DV); Firewire; composite; component; luma/chroma signals (Y/C); computer video; vision mixers; distribution amplifiers; connectors; cameras; monitors; video recording equipment; video projection equipment

### 3 Be able to produce a documented plan for a small-scale installation project

*Planning:* aims; objectives; budgets; performance; availability

*Implementing:* sourcing equipment; producing cabling; set-up and testing

### 4 Be able to draw schematic technical plans suitable for distribution to knowledgeable users

*Scale plans:* cable planning drawings; rack cabinet cabling and equipment detail

*Distribution/wiring plans:* non-scale diagrams; cable schematics; routing planning

## 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:
<b>P1</b> plan a small-scale installation that works in practice showing minimal detail and regulations [IE, CT]	<b>M1</b> plan a workable small-scale installation that shows some attention to detail and highlights the requirements, with some consideration of cost and regulations	<b>D1</b> plan a small-scale installation with attention to detail, clearly stating each project requirement in terms of equipment, regulations and budget
<b>P2</b> implement the plan, with support [TW, EP]	<b>M2</b> implement the plan, with little support and guidance	<b>D2</b> implement the plan, with total independence
<b>P3</b> draw up technical plans for an installation project using scale with some accuracy, with some support and guidance [IE, TW]	<b>M3</b> draw up detailed and clear technical plans for an installation project, with little support and guidance	<b>D3</b> draw up detailed and clear technical plans for an installation project, with total independence
<b>P4</b> provide schematics for an installation project with some support and guidance. [IE, TW]	<b>M4</b> provide detailed schematics for an installation project with little support and guidance.	<b>D4</b> provide detailed schematics for an installation project independently.

**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 emphasis of this unit is on the practical elements needed for a working knowledge of basic electronic systems. Theory sessions allow the practical work to continue, but should not become the focus of the unit. There is a requirement for learners to handle some basic calculation in this unit eg resistances in series, resistances in parallel. The suggestion is that this be taught as another tool of the trade, rather than as a formal mathematics session.

Safe working practices are significant and underpin all the work in this area.

Learners must install at least one audio system, one lighting system and one video system, producing installation and technical plans for each.

## 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 demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction to installation planning <ul style="list-style-type: none"><li>• health and safety</li><li>• working at height</li><li>• electrical safety</li><li>• design aspects</li><li>• regulations.</li></ul>
<b>Assignment 1: Design an Installation of Theatre Equipment – P1, M1, D1</b> Learners: <ul style="list-style-type: none"><li>• find solutions to posed problem</li><li>• identify equipment to be used</li><li>• research sizes/dimensions of equipment to be housed</li><li>• identify housing options</li><li>• identify interconnect requirements</li><li>• servicing potential.</li></ul>
<b>Assignment 2: Carry out Installation Planned in Assignment 1 – P2, M2, D2</b> Learners: <ul style="list-style-type: none"><li>• specify equipment</li><li>• cost the plan</li><li>• order equipment</li><li>• make up panels and interconnects</li><li>• install equipment.</li></ul>

## Topic and suggested assignments/activities and/assessment

### Assignment 3: Introduction to Drawing up Plans and Schematics – P3, M3, D3, P4, M4, D4

- Plans.
- Scale.
- Information required.
- Schematics.
- Fault finding guide.
- Manuals – operation and maintenance.

## Assessment

Evidence for this unit should be generated by learners producing practical work after a period of study of techniques and theory related to the unit. Audio, lighting and video cables can be produced that are actually required by learners during the course. All work areas with a legislative or health and safety element can also be used as opportunities for assessment.

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

- planning a small-scale installation
- implementation of this plan
- production of scale technical location plans
- production of technical schematic drawings.

Each element can be documented in a number of ways to produce sufficient and reliable evidence for assessment purposes. Evidence of planning should include manufacturer and product range research undertaken to identify the types of equipment to be used. This could be the reference manuals produced in the lighting and sound operations units.

Learners should maintain a working log/diary for the practical elements of this unit and should also have supporting evidence in the form of photographic, video and observation records. A permanent record of learners' achievements can best be made with photographic or video evidence. Written evidence from learners would also be valid but it would be difficult to detail adequately the actual processes they used and, whilst acceptable as evidence, the production of this written evidence would be very time consuming.

Witness statements 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 learner's portfolios.

Learning outcome 1 requires learners to develop an installation plan, showing types of equipment and possible locations.

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

At pass level, learners will identify types of equipment and its manufacturers. Locations should be identified showing pros and cons of each option to fulfil the installation brief

At merit level, learners will describe the equipment and locations, but also make reference to cost and regulations and how fit for purpose each option is. It is likely that several options will be suggested.

At distinction level, learners will describe in detail a range of solutions to the problem posed. The installation plan will have a detailed equipment list for the installation, costed and sourced from a manufacturer. Components should include work at height and access equipment requirements, and how these can be overcome. Regulations and health and safety requirements should be identified, and several options will be considered.

Learning outcome 2 requires learners to demonstrate basic installation techniques to a plan, this should be evidenced through witness testimonies, video and photographic evidence and detailed learner logs.

At pass level, learners will be able to implement the plan with support.

At merit level, learners will be able to implement the plan with little support or guidance.

At distinction level, learners should implement the plan with total independence.

Learning outcome 3 requires learners to document the installation they have completed. They will need to produce a documented plan, showing location of outlets, cable runs, connections and equipment within the area. This should be to scale.

At pass level, learners will provide a technical plan to some degree of accuracy with considerable support and guidance.

At merit level, learners will produce a technical plan for the installation project with little support.

At distinction level, learners will be able to produce a detailed and accurate plan, with total independence.

Learning outcome 4 requires learners to produce an equipment schematic drawing.

This should be of the equipment installed, and show how each piece interconnects with the others, which channel inputs and outputs control each input or output, so there is a quick fault-finding guide showing how the system is put together.

At pass level, learners will provide a schematic plan to some degree of accuracy with a lot of support and guidance. At pass level this can be a flow chart showing how each piece of equipment interconnects.

At merit level, learners will produce a schematic plan for the installation project with little support, some indication of controls for each input and output should be provided.

At distinction level, learners will be able to produce a detailed schematic plan, with no guidance. Distinction candidates should produce a fault finding flowchart. The schematic at this level should use images of the equipment and give a detailed indication of controls and fault finding for each input and output: for example channel 1 is controlled by the fader, it outputs to an auxillary which is post fade so needs the fader up, the auxillary needs to be turned on at the channel and the auxillary master to function.

## Programme of suggested assignments

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

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1, D1	1: Design an Installation of Theatre Equipment	Learners design three installations, one lighting, one sound and one video system.	Observation of three designs, and supporting notes, specifications of equipment. List of connections. Costing of equipment/parts.
P2, M2, D2	2: Carry out Installation	Learners carry out the installation planned in Assignment 1, ordering components, and making up interconnects.	Diary. Observation. Finished product. Notes. Video/photo.
P3, M3, D3, P4, M4, D4	3: Draw up Plans and Schematics	Learners create as installed drawings to scale and schematic drawings showing interconnections.	Schematic drawing. Detailed scale plan of venue showing installation.

## Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Performing and Production Arts sector suite. This unit has particular links with the following unit titles in the BTEC Performing and Production Arts suite:

Level 1	Level 2	Level 3
Exploring Technical Support for Stage Performance	Lighting Operations for Stage Performance	Production Arts Workshop
	Sound Operations for Stage Performance	Stage Lighting Operations
	Crewing for Stage Performance	Technical Stage Operations
		Temporary Theatre Electrical Installations
		Automated Stage Lighting
		Stage Sound Operations

This unit also has links with the following National Occupational Standards:

Technical Theatre

- CPD1 – Improving your skills
- CPD2a – TP Keeping up to date with technical and production developments in the live arts
- CPD4a – Contributing to technical production work for performance
- HSI – Working safely
- TP8.2a – Setting up, focussing lighting and checking control systems and accessories
- TP8.4 – Setting up and checking sound equipment
- TP16a – Preparing and assembling rigging and de-rigging
- MTP1 – Using tools and equipment for construction or maintenance.

## Essential resources

This unit requires that learners have access to a range of basic hand tools and soldering equipment. Care should be taken to ensure that adequate ventilation of working areas is possible. Working materials such as audio, lighting, video connectors and appropriate cable are available and wherever possible, crimping and IDC facilities should be provided. Basic testing equipment will be required. Computer-based drawing systems need to be available.

Please note that complex CAD software is not a requirement, but any software used for the unit needs to be capable of working to scale. Basic word-processing and graphics software often pre-installed on computer systems are not sufficient.

## Employer engagement and vocational contexts

It is unlikely that this type of servicing work can be done in a professional theatre due to health and safety implications, and therefore there will be limited vocational content outside the centre.

## Indicative reading for learners

### Textbooks

Fitt B – *A-Z of Lighting Terms* (Focal Press, 1999) ISBN 9780240515304

Fitt B and Thornley J – *Lighting Technology: A Guide for the Entertainment Industry Paperback* (Focal Press, 2001) ISBN 9780240516516

Fitt B and Thornley J – *The Control of Light* (Focal Press, 1992) ISBN 9780240513461

Huntington J – *Control Systems for Live Entertainment* (Focal Press, 2007) ISBN 9780240809373

Palmer S – *Essential Guide to Stage Management: Lighting and Sound (Essential Guides to the Performing Arts)* (Hodder Arnold, 2000) ISBN 9780340721131

Reid F – *The Stage Lighting Handbook* (Theatre Arts, 2002) ISBN 9780878301478

## 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 ...
<b>Independent enquirers</b>	planning an installation drawing up technical plans drawing up schematics
<b>Creative thinkers</b>	planning the installation
<b>Team workers</b>	carrying out the installation drawing up technical plans drawing up schematics
<b>Effective participators</b>	carrying out the installation.

## ● Functional Skills – Level 2

Skill	When learners are ...
<b>ICT – Use ICT systems</b>	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	planning the installation drawing up schematics drawing up scale plans
<b>ICT – Find and select information</b>	
Select and use a variety of sources of information independently for a complex task	researching equipment information
<b>ICT – Develop, present and communicate information</b>	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> <li>• text and tables</li> <li>• images</li> <li>• numbers</li> <li>• records</li> </ul>	planning the installation drawing up schematics drawing up scale plans
<b>Mathematics</b>	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	calculating quantities, length and costs
Identify the situation or problem and the mathematical methods needed to tackle it	planning the installation
Select and apply a range of skills to find solutions	planning the installation
Use appropriate checking procedures and evaluate their effectiveness at each stage	planning the installation
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	planning the installation
Draw conclusions and provide mathematical justifications	planning the installation
<b>English</b>	
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	researching equipment
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	writing up installation notes/manual presenting drawings.