

# Unit 36: Communications Workshop Practice

**Unit code:** L/602/4637  
**QCF Level 3:** BTEC Specialist  
**Credit value:** 10  
**Guided learning hours:** 60

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## Aim and purpose

This unit will give learners an understanding of the operational activities and techniques used by technicians in the communications industries for the manufacturing of support plates and electronic cable connections.

## Unit introduction

As society's reliance on technology increases, so do the complexities of electronic and electrical systems such as computers and network systems. To meet the demands of these electronically based systems in a safe and efficient manner, technicians require significant knowledge of the relevant health and safety issues. They also need to know about the appropriate care that needs to be taken with tools and understand the cabling and connectors that connect sub-systems together. A knowledge of the diverse range of connectors and manufacturing techniques is also required to support the operation of equipment throughout its life cycle.

This unit aims to give learners the opportunity to develop the underpinning knowledge, principles and basic workshop skills needed to operate safely within a communications workshop environment. It considers the primary safety precautions and related procedures associated with any engineering workshop environment and the aspects of safety that relate specifically to a communications equipment workshop.

The unit also develops the skills required for the correct handling and control of tools. Learners will be able to use specialist tools for the manufacture of support plates and a range of electrical cable connections found in communications equipment, using soldering and mechanical connections.

## Learning outcomes and assessment 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 determine the standard required to achieve the unit.

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

Learning outcomes	Assessment criteria
1 Know the health and safety precautions and procedures within an engineering workshop environment	1.1 describe safe workshop working practices 1.3 describe the emergency procedures to be taken in the event of a fire, a chemical spillage and an injury
2 Be able to use tool husbandry and control methods in a workshop environment	2.1 describe and apply tool control procedures when carrying out a communications workshop fitting task 2.2 describe and apply tool care methods for different types of tools
3 Be able to manufacture support plates to hold cables and connectors	3.1 select and use tools to manufacture a metal support plate to a given standard to hold a connector and cable
4 Be able to manufacture electrical cable connections	4.1 select and use appropriate tools to manufacture different types of electrical cable connections

## Unit content

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### 1 Know the health and safety precautions and procedures within an engineering workshop environment

*Safe working practices:* location of emergency equipment eg isolation switches, firefighting appliances, first-aid equipment; types and dangers of hazardous workshop materials eg oils, lubricants, adhesives, fluxes, cleaning solvents, polytetrafluoroethylene (PTFE), cadmium, beryllium, fibreglass; safe handling of materials eg personal protective equipment, barrier protection, hygiene, storage, movement; tool care eg measuring, marking-up, cutting, filing, shaping, crimping, soldering tools; workshop safety precautions eg tidiness, cleanliness, defect reporting

*Emergency procedures:* immediate and subsequent action in the event of each type of incident; types of incidents (fire, chemical spillage, injury); action eg raise the alarm, evacuate area, when not/when and how to fight a fire or contain a spillage, how to make an area safe, accounting for personnel, treating injury (first aid for shock, electrical shock, burns, fractures, amputations); post-emergency reporting

### 2 Be able to use tool husbandry and control methods in a workshop environment

*Tool control:* tool control methods eg shadow boards, tool tagging, tool checking procedures; documentation and responsibilities of users

*Tool care methods:* types of tools (measuring, marking-up, cutting, shaping); condition of tools eg serviceability (tool wear and/or damage), maintenance schedule records; tool storage eg in use, after use; tool cleaning, care and inspection

### 3 Be able to manufacture support plates to hold cables and connectors

*Support plate manufacture:* tool use eg hand file, hand/electrical drill, drill bit, sheet metal punch, engineer's square, scribe; materials eg aluminium, steel

*Manufacturing standards:* working to a given engineering drawing prepared to British Standards eg BS8888-2004; plate prepared in accordance with the specification eg overall dimensions are within specified tolerances, overall dimensions are within geometric tolerances (square, straight, angles free from twists, pitches of mounting holes meet specification requirements), assemblies have secure and firm joints; work is clean and free from burrs

#### **4 Be able to manufacture electrical cable connections**

*Cable connection tools and materials:* tools eg marking-up, cutting, soldering, de-soldering, crimping, insulation/identification sleeve fitting, connector insertion/removal; looming material eg Spirawrap, tie wraps; sleeving material eg Thermofit, Helleman with Helleline lubricant

*Cable connections:* cable eg single/multi-strand conductors, multi-cored insulated cables; cable connector eg mains plug, Bayonet Neill-Concelman (BNC) connector, radio frequency connectors, type 602, Plessey, Canon 'D' type, panel electronic circuit edge connectors; connection preparation eg marking-up, drilling, soldering; joining methods eg screwed, soldered, crimped

## Essential guidance for tutors

### Delivery

This unit takes into account the rapid technological changes that are occurring in communications workshops as well as providing opportunities to experience traditional methodologies used in the workshop environment. Tutors should ensure that learners appreciate traditional skills at the same time as they gain an insight into how the communications workshop is evolving to meet the needs of technology and the sector as a whole.

This unit could be delivered as a stand-alone unit or, in order to enhance learning, could be integrated with other communication technology units.

Tutors should try to use a wide range of delivery techniques. For example, whole-class demonstrations of the use and care of tools, small group sessions to consider tool control methods and one-to-one sessions to use tools and select and handle electrical cables and connectors.

By its very nature, this unit requires learners to spend a significant time in the workshop. Classroom work can be used to develop and expand any issues raised in the workshop, but the majority of time should be focused on practical tasks. Pass criteria 2.2 to 4.1 require learners to undertake practical activities within the workshop and centres will need to consider the provision of suitable tools and equipment.

Many of the workshop skills developed in this unit are not commonly used by professionals in the communications fields. However, an ability to construct small-scale assemblies is important in the event of a professional being required to assemble and modify systems to meet specific contingencies such as emergency repairs.

Learners would benefit from appropriate work experience as this will help them put their subject knowledge and practical skills into context. This may be achieved through industry links established by centres with their learners' employers. However, if the course is full-time, where learners are not yet employed or are undertaking off-line technical training (armed forces), then this might be achieved through work placement opportunities or within training programmes. As a minimum, centres should consider supervised visits to appropriate workshops where learners can see the relevant tool control procedures in action.

If learners are working in a workshop environment as part of a training course, this could be used instead of structured visits. Learners could be asked to use their workplace or placement as the context for their assessment (with permission from the employer/work placement). For example, to research and write a report evaluating current safety hazards and justifying the selection of tools to carry out specific tasks.

It is recommended that learning outcomes 1 and 2 be delivered before learning outcomes 3 and 4. This will enable learners to appreciate the health and safety procedures and precautions and tool husbandry and control methods in a workshop environment before tackling the practical tasks in learning outcomes 3 and 4.

Note that the use of 'eg' in the content is to give an indication and illustration of the breadth and depth of the area or topic. As such, not all content that follows an 'eg' needs to be taught or assessed.

### 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 the unit
<p><b>Know the health and safety precautions and procedures within an engineering workshop environment:</b></p> <ul style="list-style-type: none"> <li>• whole-class exercise – tutor presentation on safe working practices</li> <li>• whole-class exercise – tutor presentation on health and safety, emergency procedures and immediate actions</li> <li>• individual exercise – directed research into hazardous materials</li> <li>• individual exercise – directed research into safety equipment and procedures.</li> </ul>
Assignment 1 - Keeping safe
<p><b>Be able to use tool husbandry and control methods in a workshop environment:</b></p> <ul style="list-style-type: none"> <li>• whole-class exercise – tutor presentation on safe working practices</li> <li>• whole-class exercise – tutor presentation on tool control, followed by practical exercises</li> <li>• whole-class exercise – tutor presentation on tool care and maintenance, followed by practical exercises</li> <li>• whole-class exercise – tutor presentation on tool storage and cleaning, followed by practical exercises</li> <li>• a mixture of directed learning and practical exercises, with access to practical resources and suitable technology.</li> </ul>

Topic and suggested assignments/activities and/assessment
<p><b>Assignment 2 - Preparing the workshop</b></p>
<p><b>Be able to manufacture support plates to hold cables and connectors:</b></p> <ul style="list-style-type: none"> <li>• whole-class exercise – tutor presentation on safe working practices</li> <li>• whole-class exercise – tutor presentation on tool selection and use for different materials, followed by practical exercises</li> <li>• whole-class exercise – tutor presentation on working to a given engineering drawing, followed by practical exercises</li> <li>• a mixture of directed learning and practical exercises, with access to practical resources and suitable technology.</li> </ul>
<p><b>Assignment 3 - The fabrication (Part 1)</b></p>
<p><b>Be able to manufacture electrical cable connections:</b></p> <ul style="list-style-type: none"> <li>• whole-class exercise – tutor presentation on safe working practices</li> <li>• whole-class exercise – tutor presentation on cable connection tools and materials, followed by practical exercises</li> <li>• whole-class exercise – tutor presentation on cable connection types, followed by directed research</li> <li>• whole-class exercise – tutor presentation on cable connection methods, followed by practical exercises</li> <li>• a mixture of directed learning and practical exercises, with access to practical resources and suitable technology.</li> </ul>
<p><b>Assignment 3 - The fabrication (Part 2)</b></p>

### Assessment

Assessment of this unit should, where possible, be practical in nature. The use of case studies, assignments and projects could be used to expand on key aspects of the unit but learners need to demonstrate the ability to use appropriate tools in a safe manner. Tutors should consider how work carried out in other units or the workplace could be used to demonstrate the practical competencies needed in this unit. Such links will reinforce the relevance of this unit and will minimise the production of additional evidence.

Three assignments could be used to assess this unit. The first assignment could cover the pass criteria 1.1 and 1.2. The second assignment could cover 2.1 and 2.2. The final assignment could then cover 3.1 and 4.1.

The assessment of pass criteria 2.1, 2.2, 3.1 and 4.1 will need to be carried out through practical work. Tutor observation will be the main form of assessment evidence for these criteria. However, these observation records will also need to be supported by further written evidence, such as the description of tool care methods and their application, to fully meet the criteria.

For all practical workshop assessment, it is recommended that observation records are supplemented by further documentary evidence in the form of a logbook/diary. This should be a working document and should contain the learner’s notes and records as they are made at the time. This does not need to be a well-presented/neat document but it should be an effective tool to capture events and information as and when they happen. The tutor/assessor could also annotate the logbook to indicate and record their observations and interactions with the learner eg selection and use of tools, outcomes of progress meetings/formative feedback.

To achieve a pass, learners should demonstrate a knowledge and understanding of communication workshop practices, identifying and describing related safe working practices and workshop procedures. Learners need to have a clear understanding of emergency procedures to be taken in the event of fire, chemical spillage and injury. They should be able to describe and apply tool control procedures when undertaking practical activities and also show an awareness of and be able to apply tool care methods during appropriate practical activities.

Learners should also be able to select and use a variety of common communication workshop tools to manufacture a metal support plate to a given standard to hold a connector and cable. Finally, the learner should also be able to select and use appropriate tools to manufacture two different types of electrical cable connections.

**Programme of suggested assignments**

The table below shows a programme of suggested assignments that cover the pass criteria in the outcomes and assessment 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 methods
1.1, 1.2	Keeping safe	An engineering company asks you to produce some training material for new employees.  The material should describe safe working practices and emergency procedures for a communications workshop.	Web pages. Presentation. Posters. Booklet.

Criteria covered	Assignment title	Scenario	Assessment methods
2.1, 2.2	Preparing the workshop	<p>A section of your workshop is to be refitted.</p> <p>You are asked to plan and apply tool control procedures for the refit.</p> <p>Write a short report that:</p> <ul style="list-style-type: none"> <li>describes the control procedures</li> <li>outlines care and maintenance procedures for three tool types.</li> </ul>	<p>Witness statements.</p> <p>Observation records.</p> <p>Activity log.</p> <p>Report.</p>
3.1 4.1	The fabrication	<p>Working from the supplied engineering drawing, you must now:</p> <ul style="list-style-type: none"> <li>manufacture a support plate</li> <li>install, terminate and link the appropriate cables</li> <li>Make notes as you perform the work and write a short report explaining the work that has been done.</li> </ul>	<p>Witness statements.</p> <p>Observation records.</p> <p>Activity log.</p> <p>Report.</p>

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

This unit forms part of the BTEC in IT sector suite. This unit has particular links with:

Level 1	Level 2	Level 3
	Telecommunications Principles	Telecommunications Principles
	Telecommunications Technology	Communication Technologies
		Communications Equipment Installation Techniques
		Fault Diagnosis and Maintenance of Communications Equipment
		Telecommunication Systems

This unit maps to some of the underpinning knowledge from the following areas of competence in the Level 3 National Occupational Standards for IT (ProCom):

- 4.7 Systems Design
- 5.1 Systems Development
- 5.3 IT/Technology Solution Testing.

**Essential resources**

Access to a variety of communications workshop facilities is required to complete the unit successfully. The physical resources should include a range of workshop tools and equipment appropriate for the construction of a range of cable and make-and-break cable connection components. Standard communications workshop equipment, such as the specialist tools identified in the content and suitable workbenches found in a fully operational workshop should be available.

**Indicative reading for learners**

**Textbooks**

Health and Safety Executive – *Health and Safety in Engineering Workshops* (HSE Books, 2004) ISBN 0717617173

Timings R – *Engineering Fundamentals* (Newnes, 2002) ISBN 0750656093

**Functional Skills – Level 2**

Skill	When learners are ...
<b>ICT - Finding and selecting information</b>	
Use appropriate search techniques to locate and select relevant information	describing safe workshop practices describing the emergency procedures.