

# **Unit 10: Developing Skills in Routine Servicing of an Electrical/Electronic System**

**Unit reference number: D/601/0127**

**QCF level: 1**

**Credit value: 3**

**Guided learning hours: 30**

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## **Unit aim**

This unit introduces learners to the skills needed to carry out routine servicing of electrical/electronic systems. It will give them the opportunity to think about the necessary precautions and safety requirements when carrying out a routine service on electrical or electronic systems or equipment by learning about equipment, routine tests and checks, and components. This unit provides some of the knowledge, understanding and skills for the Level 1 Performing Engineering Operations NOS Unit 24: Carrying Out Routine Servicing on Electrical Electronic Equipment.

## **Unit introduction**

In this unit learners will explore the activities involved in the routine servicing of electrical or electronic systems or equipment. When carrying out servicing activities they will learn about the necessary safety requirements, and routine servicing equipment, components and systems.

Learners will be involved in the practical activities associated in the routine servicing of electrical/electronic system or/and equipment. They will be able to demonstrate that they can carry out prepare for the service also take the necessary precautions to ensure the service is carried out safely and correctly. Learners will have an opportunity to carry out routine tests and checks, including visual checks on power leads or extension cables, and to replace components. Having carried out a routine service on an electrical/electronic system or piece of equipment learners will show that they can leave the work area in a safe and tidy situation and that they have carried out the service to a reasonable standard.

## **Essential resources**

A typical centre engineering workshop should be equipped with the basic requirements of this unit including a range of mechanical systems or equipment and components, tools and equipment for servicing operations. All supporting auxiliary equipment should also be available together with appropriate safety equipment.

Workshops should be staffed appropriately to ensure health and safety requirements are met. Technician support may be required during practical work.

## Learning outcomes, assessment criteria and unit amplification

To pass this unit, the learner 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.

Learning outcomes		Assessment criteria		Unit amplification
1	Know about routine electrical/electronic servicing operations	1.1	List what to do for the routine servicing of a given electrical/electronic system/equipment	<ul style="list-style-type: none"> <li>□ <i>Electrical/electronic servicing operations</i>: carrying out routine tests and checks eg carrying out tests on portable tools and equipment, instrumentation, sensors or indicators, carrying out checks on self-diagnostic systems, carrying out tests for correct earthing, insulation resistance and operation of alarm and protection equipment; checking and/or changing 'lived' components eg equipment and/or emergency back up batteries, commutator brushes, overload protection devices, panel/warning lights, checking building and emergency lighting systems and changing lamps or tubes as appropriate; carrying out visual checks eg cuts or damage to cables, cracked, broken or loose plugs and/or connectors, excessive arcing of switches or contactors, overheating or damage to circuit board components, impact damage to casings, entry of water or foreign bodies; removing excessive dirt and grit; making adjustments to components, connections or fastenings</li> </ul>
		1.2	Tell your supervisor what you are going to do when servicing a different given electrical/electronic system/equipment	

Learning outcomes	Assessment criteria		Unit amplification
2 Be able to service electrical/electronic equipment and systems safely	2.1	Follow safe working practices and procedures when carrying out electrical/electronic servicing operations	<ul style="list-style-type: none"> <li>□ <i>Safe working practices and procedures:</i> wearing protective clothing and equipment; complying with regulations and organisational safety procedures eg adhering to risk assessments and COSHH regulations, permit to work procedures, taking anti-static precautions; keeping the work area clean and tidy and in a safe condition; ensuring equipment isolation from electrical supply and that access has been provided; checking that all servicing operations have been completed and the service area is free of tools used and excess materials, all covers have been replaced and, where appropriate, that power has been restored</li> </ul>
	2.2	Carry out a routine service for a given electrical/electronic system/equipment	<ul style="list-style-type: none"> <li>□ <i>Electrical/electronic equipment and systems:</i> examples could include portable power tools, test equipment, low voltage lighting systems, heating or ventilating systems, switchgear and distribution panels, motors and starters, alarm and protection equipment/circuits, electrical plant, wiring enclosures, control systems and components, luminaires; systems including power leads or extension cables; non-serviceable components/'lived' components eg batteries, lights, switches, sockets, plugs/connectors, circuit board, fuses/overload protection devices</li> </ul>

## Information for tutors

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### Delivery

This unit is about preparing for and carrying out routine electrical/electronic servicing operations correctly and safely. It therefore lends itself to be delivered in a holistic way and learners by practising in the workshop and reflecting on the experiences gained relating to safety, carrying out prescribed tests and checks and changing components when carrying out these operations.

A key part of delivery is therefore likely to be demonstration and practice which should be carried out on more than one system or piece of equipment. This is where the major part of the time will be spent during delivery although some awareness raising may be needed in a safe environment such as a classroom. Although the second learning outcome is of practical in nature some underpinning knowledge will need to be established before learners are allowed access to the practical activities. This, in fact, is the essence of the first learning outcome which is knowledge based. Further checking of this may be best achieved through question and answer sessions. Other activities such as 'card games' or 'word searches' etc may also be appropriate and helpful.

### Outline learning plan

The outline learning plan has been included in this unit as guidance.

#### Topic and suggested assignments/activities

Know about routine electrical/electronic servicing operations

Whole-class, tutor-led discussions about the importance of good preparation.

Whole-class, tutor-led demonstration of good practice and preparation in the servicing or electrical/electronic workshop.

Individual practice of routine operations, led by the tutors, individuals working on different servicing operations such as carrying out routine tests and checks and changing components on simple electrical/electronic equipment or systems, such as portable power tools, test equipment, low voltage lighting systems, heating or ventilating systems including power leads or extension cables.

Individual activity listing what learners carried out what safety issues arose and the precautions taken etc.

Whole-class discussion on what each individual carried out during the servicing operations they carried out.

Individual summative assessment activity involving the listing of what was carried out for a given servicing operation addressing 1.1.

Assessment 1.2 is likely to be achieved within activities to meet the requirements of the second learning outcome where learners should be asked what they are going to carry out when servicing a different given electrical/electronic system/ piece of equipment.

## Topic and suggested assignments/activities

Be able to service electrical/electronic equipment and systems safely

Individual activity completing 'gapped handouts' about safety aspects etc.

Further whole-class, tutor-led demonstration of the routine servicing of electrical/electronic systems/equipment.

Further individual activity, learners practise servicing of electrical/electronic systems/equipment, with formative checks until learners show a reasonable level of competence and safety.

Individual summative assessment activity. This will take a large proportion of the time for this part of this learning outcome.

## Assessment

The centre will devise and mark the assessment for this unit.

Learners must meet all assessment criteria to pass the unit.

Due to the nature of the assessment requirements of this unit it is likely that summative assessment will take a large proportion of the 31 hours assigned to the unit. Learners should only be assessed once the tutor is comfortable with their level of competence developed during the formative stages of the practical activities.

Two assignments could be developed to address the assessment criteria. The first assignment could address 1.1 as a stand-alone activity listing what to carry out for a routine service of a given electrical/electronic system/equipment. The second assignment should be based on the practical activity routine servicing an electrical or electronic system or piece of equipment correctly and safely. The given electrical/electronic system or equipment must be different to that given for 1.1. This does mean that most of the evidence for 2.1 and 2.2 will be in the form of witness statements/observation records supported by annotated photographs of what learners carried out, and work area layout and system or equipment serviced, along with notes, servicing logs or listings etc, 1.2 will also require a statement of what the learner said during the activity, and authenticated as such.

The routine service given to each learner must include a range of opportunities for them to take appropriate precautions before they prepare for and start the service activity in a correct and safe manner. The electrical/electronic system/equipment given must include an opportunity for learners to carry out routine tests and checks, including visual checks on power leads or extension cables, and change 'lived' components. Typical systems and equipment are given in the unit content under learning outcome 2. This would add relevance to this activity. When designating the service to be carried out care must be taken to ensure a non-serviceable component is included, and learners have opportunities to show that the service is carried out correctly, checked and returned to use.

## Suggested resources

### Books

Anderson J S – *Electronics Servicing* (Butterworth-Heinemann, 1997)  
ISBN 978-0750635547

Bishop O – *Getting Started in Practical Electronics* (Babani Publishing, 1994)  
ISBN 978-0859343459

Dixon G – *Dishwasher Manual: DIY Plumbing, Fault-finding, Repair and Maintenance* (Hardcover) (Haynes, 2009) ISBN 978-1844255559

Dixon G – *The Electrical Appliance Manual* (Haynes, 2000) ISBN 978-1859608005

Dixon G – *The Washing Machine Manual: DIY Plumbing, Fault-finding, Repair and Maintenance* (Hardcover) (Haynes, 2007) ISBN 978-1844253487

Sinclair I – *Electronic and Electrical Servicing: Consumer and Commercial Electronics* (Paperback) (Newnes, 2007) ISBN 978-0750669887

Sinclair I and Lewis G – *Electronic and Electrical Servicing: Level 2: Consumer and Commercial Electronics Core Units Level 2* (Newnes, 2002) ISBN 978-0750654234

The following are examples of materials that support understanding of more complex equipment and systems.

### Magazines

*Engineering – (The Engineering Magazine)* ISSN 0013-7782

*Engineering & Technology Magazine*

### Other publications

Manufacturers' manuals and data sheets

The following SEMTA publications may not be available for purchase but are still a useful resource.

SEMTA – *Instructors Manual, Training Module for Maintaining Electrical Equipment and Systems* (Training Publications Ltd 2001)

SEMTA – *Trainees Book, Training Module for Maintaining Electrical Equipment and Systems* (Training Publications Ltd 2001)