

<b>Domain</b>	<b>AUTOMOTIVE MECHANICS</b>	<b>Unit ID: 82</b>
<b>Title:</b>	<b>Maintain basic electrical circuits of a vehicle</b>	
<b>Level: 2</b>		<b>Credits: 4</b>

### Purpose

This unit standard specifies the competencies required to maintain the basic electrical circuits of a vehicle. It includes servicing, testing and charging of batteries (including jump-starting) and circuit fault finding procedures. This unit standard is intended for those who work as automotive mechanics.

### Special Notes

1. Entry information:
  - Prerequisite
    - Unit 65 - *Apply safety rules and regulations in an automotive mechanics workshop* or demonstrated equivalent knowledge and skills.
2. To demonstrate competence, at a minimum, evidence is required of servicing, testing and charging two batteries independently; jump-starting a vehicle with booster battery and a vehicle with booster pack; carrying out testing procedures on a prepared electrical circuit to determine open circuit, internal short, short to ground, and high resistance; replacing one of each of the following: relay, circuit protection device (fuse, fusible link, maxi fuse, or circuit breaker), switch and bulb. Perform these tasks ensuring correct identification of requirements, selection and use of appropriate processes, tools and equipment and completing all work to specification.
3. Assessment evidence may be collected from a real workplace or a simulated real workplace or an appropriate simulated realistic environment in which automotive mechanic operations are carried out.
4. All inspection, operation and maintenance procedures associated with the use of tools and equipment shall comply with manufacturers' and company guidelines, instructions and reasonable flat rate time.
5. '*Specifications*' refers to any, or all of the following: manufacturer's specifications and recommendations, workplace specific requirements.
6. Regulations and legislation relevant to this unit standard include the following:
  - Labour Act, No. 6, 1992
  - Occupational Health and Safety Regulations No. 18, 1997
  - Road Traffic and Transport Regulations No. 266, 2000
 and all subsequent amendments.
7. This unit standard applies to passenger and light commercial vehicles with a Gross Vehicle Mass  $\leq 5\,500$  kg (Petrol & Diesel).
8. This unit standard refers to 6 volt, 12 volt, and 24 volt systems.

## **Quality Assurance Requirements**

This unit standard and others within this subfield may be awarded by institutions which meet the accreditation requirements set by the Namibia Qualifications Authority and the Namibia Training Authority and which comply with the national assessment and moderation requirements. Details of specific accreditation requirements and the national assessment arrangements are available from the Namibia Qualifications Authority and the Namibia Training Authority on [www.nta.com.na](http://www.nta.com.na)

## **Elements and Performance Criteria**

### **Element 1: Plan and prepare for work**

#### **Range**

Planning and preparation may include but are not limited to workplace inspection, equipment defect identification, assessment of conditions and hazards and determination of work requirements.

Tools and equipment may include but are not limited to tool set, battery terminal puller, battery carry handle or strap, hydrometer, jumper leads, battery charger, battery load tester and multimeter (analogue or digital).

Materials may include but are not limited to distilled water, pole grease, circuit breaker, and fuses.

#### **Performance Criteria**

- 1.1 Work instructions, including repair order forms, specifications and operational details are obtained, confirmed and applied.
- 1.2 Safety requirements are followed in accordance with safety plans and policies.
- 1.3 Tools and equipment selected to carry out tasks that are consistent with the requirements of the job, are checked for serviceability and any faults rectified or reported prior to commencement.
- 1.4 Materials appropriate to the work application are identified, obtained, prepared, safely handled and located ready for use.
- 1.5 Environmental protection requirements are identified and applied in line with environmental plans and regulatory obligations.

### **Element 2: Service batteries**

#### **Range**

Adjustments to be made may include clock and radio.

#### **Performance Criteria**

- 2.1 Information is accessed and correctly interpreted from manufacturers' specifications.

- 2.2 Material, components, tools and equipment to complete work are identified, selected and prepared in accordance with workplace procedures.
- 2.3 Electrolyte levels are checked and topped up in accordance with workplace procedures.
- 2.4 Batteries and terminals are cleaned in accordance with workplace procedures.
- 2.5 Technical and tool requirements for removal and/or replacement of battery are identified and support equipment is identified and prepared.
- 2.6 Methods for removal and/or replacement of battery are implemented in accordance with workplace procedures and manufacturers' specifications.
- 2.7 All adjustments made during the replacement are in accordance with manufacturers' specifications.

### **Element 3: Charge batteries**

#### **Range**

Battery charging is limited to normal and fast charging methods.

#### **Performance Criteria**

- 3.1 Information for charging the battery is accessed and correctly interpreted from manufacturers' specifications.
- 3.2 Components, tools and equipment to complete work are identified, selected and prepared in accordance with workplace procedures.
- 3.3 Electrolyte levels are checked and topped up in accordance with workplace procedures.
- 3.4 Batteries are charged in accordance with workplace procedures and manufacturer recommendations.

### **Element 4: Test batteries**

#### **Range**

Battery tests are hydrometer testing and load testing.

#### **Performance Criteria**

- 4.1 Information on procedure for battery testing is accessed and correctly interpreted from product and vehicle manufacturer manual.
- 4.2 Components, tools and equipment are identified, selected and prepared in accordance with workplace procedures.
- 4.3 Battery tests are performed and results analysed in accordance with workplace procedures and manufacturers' specifications.

- 4.4 Battery testing procedures are carried out in accordance with manufacturers' procedures.

### **Element 5: Jump-start vehicle**

#### **Range**

Jump-start methods are from booster battery and booster pack.

#### **Performance Criteria**

- 5.1 Information on procedure for jump-starting a vehicle is accessed and correctly interpreted from manufacturers' specifications.
- 5.2 Leads are connected and disconnected in correct sequence and polarity.
- 5.3 All work is carried out without causing damage to vehicle components or systems.
- 5.4 Workplace documents are completed in accordance with company procedures.

### **Element 6: Test circuits and/or components and identify faults**

#### **Range**

Circuit and/or component tests are open circuit, internal short, short to ground and high resistance tests.

#### **Performance Criteria**

- 6.1 Correct information on procedures is accessed and correctly interpreted from manufacturers' specifications.
- 6.2 Tests are carried out to determine faults using correct tools and techniques.
- 6.3 Circuits and/or components are tested without causing damage to vehicle components or systems.
- 6.4 Faults are identified and reported.

### **Element 7: Replace electrical units and/or assemblies**

#### **Range**

Electrical units and/or assemblies to be replaced are relays, circuit protection devices (fuse, fusible link, maxi fuse, or circuit breaker), switches and bulbs.

#### **Performance Criteria**

- 7.1 Correct information is accessed and correctly interpreted from manufacturers' specifications.
- 7.2 Electrical units and/or assemblies are replaced using approved methods, tools and equipment.

- 7.3 Replacement is completed without causing damage to vehicle components or systems.
- 7.4 Replacement activities are carried out according to manufacturers' procedures.

**Element 8: Complete work and clean up**

**Range**

Work completion details may include but are not limited to work schedule or appointment sheet, vehicle drop-off form, repair order form, service record book, service plan form and sign-out form for equipment.

**Performance Criteria**

- 8.1 Work is completed and appropriate personnel notified in accordance with workplace procedures.
- 8.2 Work area is cleared of waste, cleaned, restored and secured in accordance with workplace procedures.
- 8.3 Reusable material is collected and stored in accordance with workplace procedures.
- 8.4 Tools and equipment are cleaned, checked and maintained in accordance with workplace procedures.
- 8.5 Work completion details are finalised in accordance with workplace procedures.

**Registration Data**

<b>Subfield:</b>	Automotive Engineering
<b>Date first registered:</b>	28 September 2006
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<b>Body responsible for review:</b>	Namibia Training Authority