

SERVICE VEHICLE ELECTRICAL SYSTEMS

UNIT CODE: ENG/AUT/CR/8/6

UNIT DESCRIPTION:

This unit specifies competencies required to service vehicle electrical system. It involves, carrying out diagnostics, rectifications, replacements and installations of vehicle electrical systems and components.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make the workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1 Diagnose <i>electrical systems</i>	1.1 Electrical defect(s) are identified according to client's report. 1.2 Electrical diagnostic tools and equipment are used as per the service manual 1.3 Diagnostic procedures are used as per service manual 1.4 Cause and location of defects is identified as per service manual
2 Service vehicle ignition system	2.1 Battery <i>condition and functionality</i> is checked according to manufacturer's specification. 2.2 Ignition coil is checked/ replaced according to manufacturer's specification. 2.3 Ignition distributor and distributor cap is

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	serviced according to manufacturer's specification. 2.4 Ignition spark plug and high tension (HT) cables are serviced as per manufacturer's manual. 2.5 Ignition switch/key is serviced/ replaced according to manufacturer's specification. 2.6 Ignition timing is carried out as per manufacturer's specification. 2.7 Electronic ignition fault diagnosis is performed as per manufacturer's manual.
3 Service vehicle electrical accessories	3.1 Electrical accessories are checked to confirm compatibility with the vehicle as per manufactures specifications 3.2 Electrical accessories are checked for compatibility with legal legislations as per state policies. 3.3 Location and fitting is identified in accordance with legislations and manufactures' specification 3.4 Accessories are installed in accordance with manufacturer's specification 3.5 Accessories are tested for correct operation as per manufacturer's

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	specification.
4 Service vehicle air-conditioning system	4.1 Air-con condenser and condenser cooling fans are checked/ serviced according to manufacturer's specifications. 4.2 Evaporator and heater blower fans are checked/ serviced according to manufacturer's specifications. 4.3 Compressor and pressure switch are checked/ serviced according to manufacturer's specifications. 4.4 Drier and expansion valve are checked/ serviced according to manufacturer's specification. 4.5 Air conditioner is recharged according to manufacturer's specification. 4.6 Air conditioner leakages are checked according to manufacturer's specification.
5 Service vehicle charging systems	5.1 Alternator is checked /serviced as per manufacturer's specification. 5.2 Alternator control box is checked/ serviced as per the manufacturer's specifications. 5.3 Charging system is tested according to manufacturer's specifications.
6. Service vehicle	6.1 Vehicle alarms and horns are

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auxiliary systems	<p>checked / serviced according to manufacturer's specification.</p> <p>6.2 Vehicle gauges are checked/ serviced according to manufacturer's specification.</p> <p>6.3 Vehicle central locking is checked / serviced according to manufacturer's specification.</p> <p>6.4 Radio and television are checked/ serviced / installed according to manufacturer's specification.</p> <p>6.5 Power windows and power mirrors are checked/ serviced according to manufacturer's specifications.</p> <p>6.6 Air bags are checked and replaced according to manufacturer's specifications.</p>
7. Service vehicle lighting system	<p>7.1 Main beam and dip beam switch is checked/ replaced according to manufacturer's specifications.</p> <p>7.2 Connectors and wire harness are checked/ replaced according to manufacturer's specifications.</p> <p>7.3 Main headlight, interior lights and reverse lights are checked/ serviced / replaced according to</p>

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	manufacturer's specifications. 7.4 Direction indicator lights and <i>flasher unit</i> are checked/ serviced/ replaced according to manufacturer's specifications. 7.5 Headlight beam setting is performed according to manufacturer's specifications.
8. Service vehicle electrical motors	8.1 Electrical motor faults are identified according to manufacturer's specifications. 8.2 Electrical motors are removed from the vehicle according to manufacturer's manual. 8.3 Electrical motors are serviced according to manufacturer's specifications. 8.4 Tests are performed on serviced electrical motors according to manufacturer's manual. 8.5 Electrical motors are installed on the vehicle as per manufacturer's specifications.
9. Install Vehicle safety systems	9.1 Install Airbags according to manufacturer's manual 9.2 Connect Safety belts according to workshop procedures

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	9.3 Mount electrical components related to vehicle safety according to manufacturer's manual 9.4 Fit anti-roll components according to manufacturer's manual 9.5 The vehicle tracker according to manufacturer's manual

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Electrical Diagnostic Tools and equipment may include but is not limited to:	1.1 General workshop equipped for servicing vehicle electrical systems; 1.2 Electronic diagnostic equipment; 1.3 Multi-meters; 1.4 Ignition test equipment. 1.5 Hydrometer 1.6 High rate discharge tester 1.7 Feeler gauge
2. Service Manual may include but is not limited	2.1 Instructions provided by the manufacturer on how to remove,

Variable	Range
to:	disassemble, repair and refit components
3. Condition and functionality may include but is not limited to:	3.1 Specific gravity/hydrometer test 3.2 High rate discharge test
4. Technical information. may include but is not limited to:	3.1 Vehicle technical data; 3.2 Manufacturers' online information; 3.3 On-board diagnostics (OBD) displays; 3.4 Accessory manufacturers technical data
5. Electrical systems may include but is not limited to:	5.1 Starting system including motors and battery terminals; 5.2 Charging system including alternators; 5.3 Ignition system components including steering lock switches; 5.4 Audio systems including speakers; 5.5 Electrical wiring; 5.6 Lighting system including bulbs and sockets; 5.7 Electrical and electronic sensors; 5.8 Auxiliary motors including wipers, heater blowers, and window actuators.
6. Gauge may include but is not limited to:	6.1 Speedometer 6.2 Temperature gauge 6.3 Fuel level gauge 6.4 Oil pressure gauge
7. Electrical motors may include but is not limited to:	7.1 Starter motor 7.2 Wiper motor
8. Aftermarket accessories	8.1 GPS systems;

Variable	Range
may include but is not limited to:	8.2 Cameras; 8.3 Radios and speakers; 8.4 Auxiliary lights;
9. Headlights may include but is not limited to:	9.1 Sealed beam 9.2 Non-sealed beam
10. Flasher unit may include but is not limited to:	10.1 Hazard warning 10.2 Electronic type

REQUIRED KNOWLEDGE

The individual needs to demonstrate knowledge of:

- Legislative and organizational requirements and procedures
- Kenyan legislation and workplace procedures relevant to:
 - health and safety;
 - the environment (including waste disposal);
 - appropriate personal and vehicle protective equipment
- Legal requirements relating to the vehicle and its construction including brake operation and efficiencies
- Workplace procedures for:
 - recording fault location and correction activities;
 - reporting the results of tests;
 - the referral of problems;
 - reporting delays to the completion of work
- The importance of working to recognized assessment and rectification procedures and obtaining the correct information for rectification
- The importance of documenting assessment and rectification information.
- The importance of working to agreed timescales and keeping others informed of progress.
- The relationship between time, costs and profitability
- The importance of reporting anticipated delays to relevant person(s) promptly. The use of technical information including

- How to find, interpret and use sources of technical information for brake servicing activities
- The importance of using the correct sources of technical information
- The purpose of, and how to use identification codes
- Vehicle earthing principles and earthing methods
- Electrical and electronic principles associated with transmission systems, including types of sensors and actuators, their application and operation
- Types of circuit protection and why these are necessary.
- Electrical safety procedures electric symbols, units and terms
- Electrical and electronic control system principles
- The hazards associated with *high energy electrical component*.
- Operation of brake systems
- How brake and their related units and components are constructed, removed and replaced for the classification of vehicle worked upon
- Brake units and components removal and replacement
- How to remove and replace brake system mechanical, electrical and hydraulic units and components for the classification of vehicle worked upon
- How to select and use sealants, seals, fittings and fasteners
- How to test and evaluate the performance of replacement brake system units and components and the reassembled system against the vehicle
- Operating specifications and any legal requirements
- The use of appropriate test methods
- When replacement units and components must meet the original equipment specification (OES) for warranty or other requirements
- How to work safely avoiding damage to other vehicle systems, units and components and contact with leakage and hazardous substances

Required Skills

The individual needs to demonstrate the following skills

- Proficient in ICT;
- Time management;
- Problem solving;
- Communications (verbal and written);
- Planning;
- Decision making;
- Multitasking;
- First aid;
- Report writing;
 - Driving

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Problem solving;
- Planning;
- Decision making;
- Multitasking;
- First aid;
- Report writing;
 - Driving.

EVIDENCE GUIDE

This provides advice on assessment and must be in conjunction with the performance criteria, required skills and knowledge and range.

<p>1. Critical Aspects of Competency</p>	<p><i>Assessment requires evidence that the candidate:</i></p> <p>1.1 Worked in a safe and clean environment</p> <p>1.2 Diagnosed vehicle electrical system</p> <p>1.3 Rectified electrical defects</p> <p>1.4 Installed aftermarket accessories</p> <p>1.5 Generated and shared electrical system serving report</p>
<p>2. Resource Implications</p>	<p><i>The following resources must be provided:</i></p> <p>General workshop equipped for servicing vehicle electrical systems;</p> <p>2.2 Electronic diagnostic equipment;</p> <p>2.3 Multi-meters;</p> <p>2.4 Ignition test equipment.</p>
<p>3. Methods of Assessment</p>	<p><i>Competency may be assessed through:</i></p> <p>3.1 Observation with the use of checklists;</p> <p>3.2 Verbal questioning during practical activities to test underpinning knowledge;</p> <p>3.3 Short-answer tests to assess understanding of vehicle electrical systems, their construction and operating principles.</p>
<p>4. Context of Assessment</p>	<p>Competency may be assessed individually in an actual workplace or in work-simulated conditions within accredited institutions</p>
<p>5. Guidance information for</p>	<p>This unit may be assessed on an</p>

assessment	integrated basis with others within this occupational sector.
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