

Domain	AUTOMOTIVE ELECTRICAL AND ELECTRONICS	Unit ID: 485
Title:	Sketch and interpret low-voltage electrical circuit diagrams	
Level: 2		Credits: 9

Purpose

This unit standard specifies the competencies required to sketch and interpret low-voltage electrical circuit diagrams. It includes procedures for reading, interpreting and sketching electrical circuit diagrams for low voltage circuits. This unit standard is intended for those who work as automotive electricians.

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 reading and interpreting two (2) electrical circuits, comprising of a minimum of four of the following circuit symbols: direct and alternating current, positive and negative voltage, power source, levers and buttons operated by pushing, switches operated by turning, boundary line, filament of a lamp, signal lamp, electrical buzzer, capacitor, transistor, diode, gauges, spark plug, fuse and other circuit protection devices, heating element, horn, solid-state circuits, starter motor and alternator (generator), variable and fixed resistors, inductance, secondary cell, ground terminal, frame or chassis connection, high voltage, mechanical coupling, manually operated.
It includes sketching of two (2) of the following electrical circuits: lighting circuit with or without fog lights, indicator and hazard circuit, alternator circuit, starter motor circuit, and ignition circuit (contact breaker or solid-state triggered).
3. Assessment evidence may be collected from a real workplace or a simulated real workplace or an appropriate simulated realistic environment in which automotive electrical and electronic operations are carried out.
4. Glossary of terms:
 - *'low-voltage circuits'* refers to electrical circuits in which the power source does not exceed 42 volt
5. Performance of all elements in this unit standard must comply with manufacturers' specifications, workplace specific requirements and reasonable flat rate time.

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.

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. All approved unit standards, qualifications and national assessment arrangements are available on the Namibia Training Authority website www.nta.com.na.

Elements and Performance Criteria

Element 1: Plan and prepare for work

Range

Planning and preparation may include but is 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 pencils in various sizes (0.35 – 0.7 mm), eraser, workbook, calculation pad, chalk, drawing stencil, ruler and drawing board.

Materials may include but are not limited to white blank or grid paper in A3 or A4 format.

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 are consistent with the requirements of the job, checked for serviceability and any faults rectified or reported prior to commencement.
- 1.4 Environmental protection requirements are identified and applied in line with environmental plans and regulatory obligations.

Element 2: Read and interpret electrical circuit diagrams of low voltage circuits

Range

Electrical circuit diagrams and their common symbols may include but are not limited to direct and alternating current, positive and negative voltage, power source, levers and buttons operated by pushing, switches operated by turning, boundary line, filament of a lamp, signal lamp, electrical buzzer, capacitor, transistor, diode, gauges, spark plug, fuse and other circuit protection devices, heating element, horn, solid-state circuits, starter motor and alternator (generator), variable and fixed resistors, inductance, secondary cell, ground terminal, frame or chassis connection, high voltage, mechanical coupling, manually operated.

Cable colour and number codes, terminal numbers refer to manufacturers' specific requirements.

Electrical circuit diagrams may include but are not limited to block diagrams, circuit diagrams and wiring diagrams.

Performance Criteria

- 2.1 Procedures and information required for reading and interpreting electrical circuit diagrams of low voltage circuits are identified and sourced in line with workplace procedures.
- 2.2 Electrical circuit diagrams and their common symbols are interpreted in line with manufacturers' specifications.
- 2.3 Cable colour codes and cross section are interpreted in line with manufacturers' specifications.
- 2.4 Terminal numbers are interpreted in line with manufacturers' specifications.
- 2.5 Electrical circuit diagrams are identified in line with manufacturers' specifications.

Element 3: Sketch electrical circuit diagrams of low-voltage circuits

Range

Sketching electrical circuit diagrams may include but are not limited to lighting circuit with or without fog lights, indicator and hazard circuit, alternator circuit, starter motor circuit, and ignition circuit (contact breaker or solid-state triggered).

Symbols are limited to SAE (Society of Automotive Engineers), JSAE (Japanese Society of Automotive Engineers), DIN (German National Organisation for Standardisation) standards and manufacturers' specifications.

Performance Criteria

- 3.1 Procedures and information required for sketching electrical circuit diagrams for low voltage circuits are identified and sourced in line with workplace procedures.
- 3.2 Procedures and information are conveyed in line with workplace procedures and manufacturers' specifications.
- 3.3 Electrical circuit diagrams are sketched using correct symbols according to manufacturers' specifications.
- 3.4 Confirmation of correctness and operability is sought from supervisor.

Element 4: Complete work and clean up

Range

Work completion details may include but are not limited to repair order form and sign-out form for equipment.

Performance Criteria

- 4.1 Work is completed and appropriate personnel notified in accordance with workplace procedures.
- 4.2 Work area is cleared of waste, cleaned, restored and secured in accordance with workplace procedures.
- 4.3 Reusable material is collected and stored in accordance with workplace procedures.
- 4.4 Equipment used is cleaned, checked, maintained and stored in accordance with workplace procedures.
- 4.5 Work completion details are finalised in accordance with workplace procedures.

Registration Data

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