

<b>Domain</b>	<b>AUTOMOTIVE ELECTRICAL AND ELECTRONICS</b>	<b>Unit ID: 476</b>
<b>Title:</b>	<b>Demonstrate knowledge of electrical fundamentals</b>	
<b>Level: 1</b>		<b>Credits: 6</b>

### **Purpose**

This unit standard specifies the competencies required to demonstrate knowledge of electrical fundamentals. It includes procedures for demonstrating knowledge of inductance and resistors. People are also able to create series-parallel circuits using resistors, calculate voltage and current distribution, and calculate values of power, given any two (2) of voltage, current, or resistance values. 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. 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.
3. Glossary of terms:
  - *'inductance'* refers to the magnetic process of inducing an electromotive force as the result of changing magnetic flux
4. Performance of all elements in this unit standard must comply with manufacturers' specifications, workplace specific requirements and reasonable flat rate time.
5. 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](http://www.nta.com.na).

## **Elements and Performance Criteria**

### **Element 1: Demonstrate knowledge of inductance for automotive applications**

#### **Range**

Types of magnetic fields may include but are not limited to magnetic fields around coils, around magnets, and around conductors.

The principle of inductance is limited to self inductance and mutual inductance.

Magnetic properties of materials may include but are not limited to air and ferrite.

#### **Performance Criteria**

- 1.1 Types of magnetic fields are described by showing the lines of flux.
- 1.2 The principle of inductance is described according to Lenz's Law.
- 1.3 Magnetic properties of materials are identified.

### **Element 2: Demonstrate knowledge of resistors used in automotive electronic applications**

#### **Performance Criteria**

- 2.1 Types of resistors used for automotive electronic circuits are identified from manufacturers' manuals and catalogues.
- 2.2 Operational characteristics of each of the range of resistors are explained according to manufacturers' specifications.
- 2.3 The effects of temperature change on positive temperature co-efficient (PTC) and negative temperature co-efficient (NTC) resistors are explained according to manufacturers' specifications.

**Element 3: Create series, parallel and series-parallel circuits using resistors, and calculate voltage and current distribution**

**Range**

Circuit assembly may include but is not limited to drawing a diagram.

Calculation of voltage and current may include but is not limited to using Ohm's Law, and using test instruments.

**Performance Criteria**

- 3.1 Circuits are physically assembled with three resistors and with four resistors.
- 3.2 The voltage across each resistor is calculated and measured.
- 3.3 The current through each resistor is calculated and measured.

**Element 4: Calculate values of power, given any two of voltage, current, or resistance values**

**Range**

Values of power are limited to series circuits, parallel circuits, and series-parallel circuits.

Answers expressed using the correct multiples are limited to mega, kilo, milli, and micro.

**Performance Criteria**

- 4.1 Formulas chosen are correct for the values given.
- 4.2 Answers are expressed using correct multiples and sub-multiples of the unit.

**Registration Data**

<b>Subfield:</b>	Automotive Engineering
<b>Date first registered:</b>	15 November 2007
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<b>Body responsible for review:</b>	Namibia Training Authority