Australian Government

AURETR2007 Demonstrate knowledge of automotive electrical circuits and wiring systems

Release 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

AURETR2007 Demonstrate knowledge of automotive electrical circuits and wiring systems

Modification History

Release	Comment
Release 1	New unit of competency

Unit Descriptor

Unit descriptor	This unit describes the performance outcomes required to demonstrate knowledge of electrical principles that enable structured testing of basic circuits in electrical systems, components and technologies found in motor vehicles. The unit involves applying Ohm's, Watts and Kirchhoff's laws to enable basic structured problem solving to locate a range of common faults in vehicle electrical circuits and wiring systems. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Application of the Unit

Application of the unit	Work applies to light and heavy vehicle, mining, construction, agricultural, motorcycle, outdoor power equipment and marine environments. It involves the application of knowledge of fundamental elements of electricity and vehicle electrical circuit theory and electrical wiring systems.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

Employability skills	This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Develop knowledge of vehicle electrical circuits and wiring systems	1.1. Relevant ***sources of information*** are located to assist with understanding of vehicle electrical circuits and wiring systems 1.2. Knowledge of the operating principles of ***electrical circuits*** and ***wiring systems*** is developed
2. Demonstrate knowledge of vehicle electrical circuits and wiring systems	2.1. Knowledge of the relationship of volts, amps and ohms in a vehicle electrical circuit is applied 2.2. Knowledge of circuit components, their function and operation in a vehicle electrical circuit is applied 2.3. Knowledge of basic principles for testing and processes for checking a vehicle's electrical circuits and wiring systems is applied
3. Demonstrate knowledge of electrical circuits as applied to vehicle fault identification	3.1. Components of a vehicle's electrical circuit and wiring system are identified 3.2. Basic electrical principles are applied to practical inspection and service activities 3.3. Knowledge of a vehicle's electrical circuit and wiring system is practically applied when identifying potential faults

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- communication skills to:
  - follow verbal and written instructions
  - communicate ideas and information relating to electrical terminology and procedures verbally and in writing
  - apply questioning and active listening skills, e.g. when obtaining factual information from sources
- initiative and enterprise skills to recognise a workplace problem or potential problem and take action
- learning skills to:
  - identify sources of information, assistance and expert knowledge to expand skills, knowledge and understanding
  - participate in self-improvement activities
- literacy skills to:
  - understand workplace safety procedures
  - read and follow information in written instructions, specifications and other applicable reference documents
- numeracy skills to:
  - understand measurement, units of measure, formulae, testing and proportions
- planning and organising skills to:
  - identify risk factors and take action to minimise them
  - plan and organise activities that implement and follow standard procedures
- problem-solving skills to:
  - refer problems outside area of responsibility to appropriate person
  - use and communicate basic mathematical ideas and techniques that relate to automotive systems and components
- self-management skills to:
  - recognise limitations and seek timely advice
  - follow workplace documentation, such as workplace safe operating procedures
- technical skills to:
  - collect, organise and understand technical information relating to:
    - identifying, locating and determining function of vehicle electrical circuit components and wiring systems
    - recognising and reporting unsafe situations
  - collect, organise and apply knowledge of vehicle electrical circuit and wiring information and concepts

REQUIRED SKILLS AND KNOWLEDGE

- technology skills to use information technology equipment to assist with research

Required knowledge

- principles of vehicle electrical circuits and wiring systems
- principles of electricity, including:
  - alternating current (AC)
  - direct current (DC)
  - Ohm's law
  - Watts law
  - Kirchhoff's voltage law
  - Kirchhoff's current law
- range of sources of information available to assist with understanding basic principles and elements of electricity as they relate to automotive applications
- range of sources of information available to service, maintain and repair light vehicles
- industry and workplace practice in relation to working safely in an automotive workplace
- identification, location and function of major components of common automotive:
  - engine electrical systems, including:
    - battery systems
    - ignition systems
    - charging systems
    - starting systems
  - vehicle body electrical systems, including:
    - exterior lighting systems
    - internal lighting systems
    - vehicle access systems
    - wiper and washer systems
    - vehicle entertainment systems
    - wiring harness and loom assembly

Evidence Guide

EVIDENCE GUIDE	
The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, required Skills and Knowledge, the Range Statement and the Assessment Guidelines for the Training Package.	
Overview of assessment	
Critical aspects for assessment and evidence required to demonstrate competency in this unit	The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy all of the requirements of the performance criteria and required skills and knowledge. A person who demonstrates competency in this unit must be able to apply and demonstrate knowledge of: • location of relevant sources of information on vehicle electrical circuits and wiring systems • operating principles of electrical circuits and wiring systems • relationship of volts, amps and ohms in a vehicle electrical circuit • relationship of current flow and necessary wire gauge • relationship of voltage dropping across a resistive load and the current flowing in the circuit • circuit components, their function and operation in a vehicle electrical circuit • testing principles and processes for checking a vehicle's electrical circuits and wiring systems.
Context of, and specific resources for assessment	Competency is to be assessed in the workplace or a simulated workplace environment that accurately reflects performance in a real workplace setting. Assessment is to occur: • using standard workplace practices and procedures • following safety requirements • applying environmental constraints. Assessment is to comply with relevant: • regulatory requirements • Australian standards • industry codes of practice. The following resources must be made available for the assessment of this unit: • technical reference library with various information resources • a range of functioning vehicle electrical circuits, components

EVIDENCE GUIDE	
	and wiring systems • functioning light vehicle or vehicles • automotive tools and electrical test equipment.
Method of assessment	Assessment must satisfy the endorsed Assessment Guidelines of this Training Package. Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with the application of required skills and knowledge. Assessment methods must be by direct observation of tasks and include questioning on required skills and knowledge to ensure correct interpretation and application. Competence in this unit may be assessed in conjunction with other units which together form part of a holistic work role. Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate the needs of diverse clients. Assessment processes and techniques must be culturally sensitive and appropriate to the language, literacy and numeracy capacity of the candidate and the work being performed.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
Sources of information may include:	• workplace service information • automotive electrical texts • original equipment manufacturer information • vehicle workshop manuals • service bulletins • magazine technical articles.
Electrical circuits may include:	• voltage • current • resistance • series circuits • parallel circuits • series and parallel circuits • open circuit to power, signal or ground • short circuit to power, signal or ground • high resistance to power, signal or ground.
Wiring systems may include:	• common multi-stand conductor • various wire gauges and insulation types • twisted pair (CAN-bus network wiring) • shielded wire (audio speaker wiring).

Unit Sector(s)

Competency field	Electrical
Unit sector	Technical – Electrical and Electronic

Custom Content Section

Not applicable.