



**Australian Government**

# **AURETR3028 Diagnose and repair instruments and warning systems**

**Release 1**

## AURETR3028 Diagnose and repair instruments and warning systems

### Modification History

Release	Comment
Release 1	Replaces AURE318966A Repair instruments and warning systems Performance Criteria and Range Statement updated to reflect technologies

### Unit Descriptor

<b>Unit descriptor</b>	<p>This unit describes the performance outcomes required to diagnose and repair instruments and warning systems fitted in light and heavy vehicle, mining, construction, agricultural, motorcycle, outdoor power equipment and marine environments. It involves diagnosing deviations from correct operation, repairing vehicle instruments and warning system components and associated systems; and undertaking post-repair testing procedures.</p> <p>The unit also involves identifying and confirming work requirements, preparing for work, and completing work finalisation processes, including clean-up and documentation.</p> <p>Licensing, legislative, regulatory or certification requirements may apply to this unit in some jurisdictions. Users are advised to check with the relevant regulatory authority.</p>
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### Application of the Unit

<b>Application of the unit</b>	<p>Work applies to instruments and warning systems fitted in light and heavy vehicle, mining, construction, agricultural, motorcycle, outdoor power equipment and marine environments.</p> <p>Work requires individuals to demonstrate some judgement and problem-solving skills in managing own work activities and contributing to a productive team environment.</p>
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## Licensing/Regulatory Information

Not applicable.

## Pre-Requisites

Not applicable.

## Employability Skills Information

<b>Employability skills</b>	This unit contains employability skills.
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## 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.
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## Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare to diagnose and repair instruments and warning systems	1.1. <i>Workplace instructions</i> are used to determine <i>job requirements</i> 1.2. <i>Workplace health and safety (WHS) requirements</i> are observed throughout the work 1.3. <i>Procedures and information</i> are sourced and interpreted 1.4. <i>Options for diagnosing faults</i> are identified and used, using appropriate tools and diagnostic techniques 1.5. <i>Tools and equipment</i> are identified for effective repair methods
2. Diagnose instruments and warning systems	2.1. <i>Instruments and warning systems</i> are tested to isolate faults according to workplace procedures and without causing damage to components or systems as a result of <i>inappropriate testing procedures</i> 2.2. <i>Faults</i> are identified from test results and causes of faults are determined 2.3. Diagnosis findings are reported according to workplace procedures, including recommendations for necessary repairs or adjustments
3. Repair instruments and warning systems	3.1. <i>Repair options</i> are analysed and those most appropriate to the circumstances are selected 3.2. Appropriate tools, techniques and materials are selected and prepared 3.3. Repairs and component replacements and adjustments are carried out without causing damage, according to workplace procedures and manufacturer and component supplier specifications 3.4. <i>Post-repair testing</i> is carried out according to workplace procedures and relevant legislation
4. Prepare vehicle for delivery to customer	4.1. Final inspection is made to ensure work is to workplace expectations 4.2. Vehicle is cleaned to workplace expectations and presented ready for use 4.3. Workplace documentation is processed according to workplace procedures
5. Clean up work area and finalise work processes	5.1. Material that can be reused is collected and stored according to workplace sustainability practices 5.2. Waste and scrap are removed according to workplace practices 5.3. Tools, equipment and the work area are cleaned and

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
	inspected according to workplace procedures 5.4.Tools and equipment are maintained according to workplace procedures 5.5.Faulty equipment is identified, tagged and isolated according to workplace procedures

## 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
  - clarify workplace instructions and determine job requirements
  - gain information from appropriate persons and assistance as required
- initiative and enterprise skills to:
  - apply learning when diagnosing and repairing various instrument and warning systems
  - 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
- literacy skills to:
  - read and follow information in written job instructions, specifications, standard operating procedures, charts, lists, drawings and other applicable reference documents
  - obtain and record measurements
  - document required repairs and parts
- numeracy skills to:
  - test, measure and analyse test equipment results compared to desired system performance
  - assess tolerances and apply accurate measurements and adjustments
- planning and organising skills to:
  - plan own work requirements and prioritise actions to achieve required outcomes and ensure tasks are completed on time
  - identify risk factors and take action to minimise them
- problem-solving skills to:
  - determine the underlying causes of faults
  - refer problems outside area of responsibility to appropriate person and suggest possible causes
  - seek information and assistance as required to solve problems
- self-management skills to:
  - select and use appropriate equipment, materials, processes and procedures
  - follow workplace documentation, such as codes of practice and operating procedures
- teamwork skills to apply knowledge of own role to complete activities efficiently to support team activities and tasks
- technical skills to use workplace technology and tools relating to repairing instrument and warning systems, including:
  - specialist tools and equipment
  - measuring equipment

## REQUIRED SKILLS AND KNOWLEDGE

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

- computerised technology
- technology skills to:
  - operate diagnostic and test equipment
  - use technology to collect, analyse and provide information

### Required knowledge

- WHS regulations, requirements, equipment, material and personal safety requirements, including:
  - codes of practice
  - personal protection needs when working on vehicles in an automotive workshop
  - individual state and territory legislation and regulatory requirements, including:
    - LPG/CNG/LNG systems and components
    - air conditioning and HVAC systems and components
- principal types of vehicle instrument and warning systems, including:
  - hazard flashers
  - horns or alarms
  - driver display instruments
  - reversing alert systems
- application, purpose and operation of instruments and warning systems
- techniques for reading and interpreting automotive technical information, graphic symbols and wiring diagrams
- diagnostic and testing procedures, including:
  - diagnostic procedures for instruments and warning systems, including:
    - accessing and interpreting diagnostic trouble codes
    - diagnostic flow charts
  - analysis of system operation using electrical test equipment, scan tools, oscilloscopes and other industry-relevant test equipment
  - visual, aural and functional assessments, including:
    - component damage and wear
    - component or connector corrosion
    - component water or moisture ingress
- repair procedures, including:
  - component removal and replacement procedures
  - component and associated system adjustment procedures

## Evidence Guide

<b>EVIDENCE GUIDE</b>	
<p>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.</p>	
<b>Overview of assessment</b>	
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>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.</p> <p>A person who demonstrates competency in this unit must be able to:</p> <ul style="list-style-type: none"> <li>• observe safety procedures and requirements</li> <li>• select methods and techniques appropriate to the circumstances</li> <li>• complete preparatory activity in a systematic manner</li> <li>• diagnose and repair a range of vehicle instruments and warning systems</li> <li>• conduct diagnosis and repair procedures according to workplace, manufacturer and component supplier requirements</li> <li>• present vehicle or equipment in a condition that complies with workplace requirements.</li> </ul>
<b>Context of, and specific resources for assessment</b>	<p>Competency is to be assessed in the workplace or a simulated workplace environment that accurately reflects performance in a real workplace setting.</p> <p>Assessment is to occur:</p> <ul style="list-style-type: none"> <li>• using standard workplace practices and procedures</li> <li>• following safety requirements</li> <li>• applying environmental constraints.</li> </ul> <p>Assessment is to comply with relevant:</p> <ul style="list-style-type: none"> <li>• regulatory requirements</li> <li>• Australian standards</li> <li>• industry codes of practice.</li> </ul> <p>The following resources must be made available for the assessment of this unit:</p> <ul style="list-style-type: none"> <li>• workplace location or simulated workplace</li> <li>• vehicles with instrument and warning system faults relevant to the qualification being sought</li> <li>• equipment appropriate for the testing of vehicle instruments and warning systems</li> </ul>

## 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

- specifications and workplace instructions
- tools appropriate for repairing, replacing and adjusting vehicle instruments and warning systems.

### 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

<b>RANGE STATEMENT</b>	
<p>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.</p>	
<p><b><i>Workplace instructions</i></b> may include:</p>	<ul style="list-style-type: none"> <li>• electronic or hard copy instructions</li> <li>• verbal instructions</li> <li>• written instructions.</li> </ul>
<p><b><i>Job requirements</i></b> may include:</p>	<ul style="list-style-type: none"> <li>• diagnosis and repair methods, processes and equipment.</li> </ul>
<p><b><i>Workplace health and safety requirements</i></b> may include:</p>	<ul style="list-style-type: none"> <li>• workplace first aid equipment</li> <li>• workplace safety policies and procedures</li> <li>• safe handling of material</li> <li>• hazard control, including control of hazardous materials and toxic substances</li> <li>• personal protective clothing and equipment</li> <li>• use of fire-fighting equipment</li> <li>• safe use of tools and equipment.</li> </ul>
<p><b><i>Procedures and information</i></b> may include:</p>	<ul style="list-style-type: none"> <li>• verbal, written and graphical instructions</li> <li>• signage</li> <li>• work schedules, plans and specifications</li> <li>• work bulletins and memos</li> <li>• material safety data sheets (MSDS)</li> <li>• diagrams and sketches</li> <li>• safe work procedures relating to repairing and replacing instrument and warning systems</li> <li>• regulatory and legislative requirements relating to automotive industry</li> <li>• Australian Design Rules</li> <li>• engineer's design specifications and instructions</li> <li>• workplace work specifications and requirements</li> <li>• instructions issued by authorised workplace or external persons</li> <li>• Australian standards</li> <li>• vehicle service requirements and repair manuals.</li> </ul>
<p><b><i>Options for diagnosing faults</i></b> may include:</p>	<ul style="list-style-type: none"> <li>• obtaining vehicle service history</li> <li>• isolating faults</li> <li>• inspecting and evaluating components.</li> </ul>
<p><b><i>Tools and equipment</i></b> may</p>	<ul style="list-style-type: none"> <li>• hand tools</li> </ul>

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include:	<ul style="list-style-type: none"> <li>• vehicle lifting devices</li> <li>• power tools</li> <li>• specialist tools for vehicle trim removal and replacement</li> <li>• dynamometer</li> <li>• electronic testing equipment, including: <ul style="list-style-type: none"> <li>• multimeter</li> <li>• oscilloscope</li> <li>• scan tools.</li> </ul> </li> </ul>
<b><i>Instruments and warning systems</i></b> may include:	<ul style="list-style-type: none"> <li>• driver information instruments and gauges</li> <li>• warning lights and dash lamps</li> <li>• engine shutdown systems</li> <li>• audible reverse warning systems in all types of vehicles, craft and equipment.</li> </ul>
<b><i>Inappropriate testing procedures</i></b> may include:	<ul style="list-style-type: none"> <li>• intrusive testing (which must not be performed as it is not a recommended test and repair method), which includes:</li> <li>• back probing terminals and connectors and fuse holders with inappropriate test probes <ul style="list-style-type: none"> <li>• probing terminal and connectors with inappropriate test probes</li> <li>• pushing sharp probes and objects into wiring insulation.</li> </ul> </li> </ul>
<b><i>Faults</i></b> may include:	<ul style="list-style-type: none"> <li>• gauge and instrument warning system not working</li> <li>• incorrect gauge and instrument readings</li> <li>• wiring circuit faults, including: <ul style="list-style-type: none"> <li>• open circuit</li> <li>• short circuit</li> <li>• reference circuit</li> <li>• ground earth circuit.</li> </ul> </li> </ul>
<b><i>Repair options</i></b> may include:	<ul style="list-style-type: none"> <li>• removal, replacement and adjustment procedures</li> <li>• dismantling, repair, re-assembly and adjustment procedures</li> <li>• fault finding using aural, visual and functional assessments for damage, corrosion, wear and electrical short and open circuits</li> <li>• electrical measurements</li> <li>• diagnosing and determining repair requirements and electronic systems data, including fault codes, sensors, actuator measurement, and control unit input and output signals</li> </ul>

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	<ul style="list-style-type: none"> <li>• reading and interpreting wiring diagrams.</li> </ul>
<i>Post-repair testing</i> may include:	<ul style="list-style-type: none"> <li>• validating effectiveness of repair action</li> <li>• confirming that reported fault has been rectified</li> <li>• confirming that no other faults are present as a result of repair action.</li> </ul>

**Unit Sector(s)**

<b>Competency field</b>	Electrical
<b>Unit sector</b>	Technical – Electrical and Electronic

**Custom Content Section**

Not applicable.