



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **AURE321771A Service and repair electronic compression ignition engine management systems**

Release: 1

## **AURE321771A Service and repair electronic compression ignition engine management systems**

### **Modification History**

Not Applicable

### **Unit Descriptor**

|                        |                                                                                                                                                                                                                                                                          |
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| <b>Unit descriptor</b> | This unit covers the competence to service and repair electronic compression ignition engine management systems and associated components. Engine management systems are systems where the ECU incorporates control over both fuel injection and timing control systems. |
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### **Application of the Unit**

|                                |                                                                                                                                                                                                                                   |
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| <b>Application of the unit</b> | Work requires individuals to demonstrate some judgement and problem-solving skills in managing own work activities and contributing to a productive team environment.<br>Work is carried out in accordance with award provisions. |
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### **Licensing/Regulatory Information**

Not Applicable

### **Pre-Requisites**

|                           |  |  |
|---------------------------|--|--|
| <b>Prerequisite units</b> |  |  |
|                           |  |  |
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## Employability Skills Information

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

|                                                                   |                                                                                                                                                                                                                                                                                                                  |
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| Elements describe the essential outcomes of a unit of competency. | Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and 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 for work                                                                        | <ul style="list-style-type: none"><li>1.1. Work instructions are used to determine job requirements, including method, process and equipment</li><li>1.2. Job specifications are read and interpreted</li><li>1.3. OHS requirements, including personal safety needs, are observed throughout the work</li><li>1.4. Electronic system protection devices, processes and precautions are identified appropriate to application</li><li>1.5. Equipment and tooling are identified and checked for safe and effective operation</li><li>1.6. Procedures are determined to minimise task time</li></ul>                                                                                               |
| 2. Service and repair electronic SI engine management systems and/or associated components | <ul style="list-style-type: none"><li>2.1. Correct information is accessed and interpreted from manufacturer/component supplier specifications</li><li>2.2. Tests on electronic fuel injection and engine management systems are carried out to determine faults using tooling, equipment and techniques</li><li>2.3. Service and repairs, component replacement and adjustments are carried out using tooling, techniques and materials</li><li>2.4. Service and repairs are completed without causing damage to component or system</li><li>2.5. Service and repairs are carried out according to industry regulations/guidelines OHS, legislation and enterprise procedures/policies</li></ul> |
| 3. Clean up work area and maintain equipment                                               | <ul style="list-style-type: none"><li>3.1. Material that can be reused is collected and stored</li><li>3.2. Waste and scrap is removed following workplace procedure</li><li>3.3. Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures</li><li>3.4. Unserviceable equipment is tagged and faults identified in accordance with workplace requirements</li><li>3.5. Operator maintenance is completed in accordance with manufacturer/component supplier specifications and site procedures</li><li>3.6. Tooling and equipment is maintained in accordance with workplace procedures</li></ul>                                      |

## Required Skills and Knowledge

## **REQUIRED SKILLS AND KNOWLEDGE**

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

### **Required skills**

- collect, organise and understand information related to work orders, plans and safety procedures for servicing and repairing electronic compression ignition engine management systems
- communicate ideas and information to enable confirmation of work requirements and specifications, coordination of work with site supervisor, other workers and customers, and the reporting of work outcomes and problems
- plan and organise activities, including preparation and layout of worksite and obtaining of equipment and material to avoid backtracking or workflow interruptions
- work with others and in a team by recognising dependencies and using cooperative approaches to optimise workflow and productivity
- establish safe and effective work processes which anticipate and/or resolve problems and downtime, to systematically develop solutions to avoid or minimise reworking and avoid wastage
- use mathematical ideas and techniques to correctly complete tests and measurements to determine serviceability and/or parts for the work
- use workplace technology related to the service and repair of electronic compression ignition engine management systems, including the use of specialist tooling and equipment, measuring equipment, computerised technology and communication devices and the reporting/documenting of results

### **Required knowledge**

A working knowledge of:

- OHS regulations/requirements, equipment, material and personal safety requirements
- national environment protection measure for diesel vehicles, as applicable
- operating principles of electronic compression ignition engine management systems/components
- construction and operation of electronic compression ignition engine management systems/components relevant to application
- relationship to other electronically controlled systems, including shared components (e.g. ECU, sensors)
- test, diagnosis and fault determination procedures
- service/repair, removal, replacement and adjustment procedures of electronic engine compression ignition engine management systems
- work organisation and planning processes
- enterprise quality processes

## 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, 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

It is essential that competence is fully observed and there is ability to transfer competence to changing circumstances and to respond to unusual situations in the critical aspects of:

- observing safety procedures and requirements, including those for high-pressure diesel systems
- communicating effectively with others involved in or affected by the work
- selecting methods and techniques appropriate to the circumstances
- completing preparatory activity in a systematic manner
- testing electronic compression ignition engine management systems and identifying faults
- determining the repair/replacement/adjustment requirements to rectify faults
- servicing/repairing/adjusting electronic compression ignition engine management systems to workplace and manufacturer/component supplier requirements.

#### Context of, and specific resources for assessment

Application of competence is to be assessed in the workplace or simulated worksite.

Assessment is to occur using standard and authorised work practices, safety requirements and environmental constraints.

Assessment is to comply with regulatory requirements, including Australian Standards.

The following resources should be made available:

- workplace location or simulated workplace
- material relevant to the service and repair of electronic compression ignition engine management systems
- equipment, hand and power tooling appropriate to the service and repair of electronic compression ignition engine management systems
- activities covering mandatory task requirements

|                       |                                                                                         |
|-----------------------|-----------------------------------------------------------------------------------------|
| <b>EVIDENCE GUIDE</b> |                                                                                         |
|                       | <ul style="list-style-type: none"><li>• specifications and work instructions.</li></ul> |

## EVIDENCE GUIDE

### Method of assessment

- Assessment must satisfy the endorsed Assessment Guidelines of AUR05 Automotive Industry RS&R Training Package
- Assessment methods must confirm consistency and accuracy of performance together with application of underpinning knowledge
- Assessment must be by direct observation of tasks, with questioning on underpinning knowledge and it must also reinforce the integration of key competencies
- Assessment may be applied under project related conditions and require evidence of process
- Assessment must confirm a reasonable inference that competence is able to be under the particular circumstance, and is able to be transferred to other circumstances
- It is preferable that assessment reflects a process rather than an event and occurs over a period of time to cover varying quality circumstances. Evidence of performance may be provided by customers, team leaders/members or other persons subject to agreed authentication arrangements
- Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role

### Guidance information for assessment

## 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, if used 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.

### Engine management systems

Engine management systems are systems where the ECU incorporates control over both fuel

| RANGE STATEMENT |                                      |
|-----------------|--------------------------------------|
|                 | injection and timing control systems |

| <b>RANGE STATEMENT</b>                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Electronic compression ignition engine management systems</b> | Electronic compression ignition engine management systems may be fitted to heavy vehicles, including road transport vehicles                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Faults</b>                                                    | Faults may include: <ul style="list-style-type: none"> <li>engine will not start, engine misfiring and poor engine performance</li> </ul>                                                                                                                                                                                                                                                                                                                                                      |
| <b>Fault finding methods</b>                                     | Fault finding methods are to include: <ul style="list-style-type: none"> <li>diagnosis and determining faults, including interpretation of exhaust emissions</li> <li>pre- and post-repair testing of system and component operation</li> <li>service and repair/replacement of system components</li> <li>service and repair adjustments</li> <li>removal, dismantling, reassembly and refitting</li> <li>retrieval and assessment of electronic systems data, such as fault codes</li> </ul> |
| <b>Variables</b>                                                 | Other variables may include: <ul style="list-style-type: none"> <li>testing fuel pressure, cleaning injectors and emission testing</li> </ul>                                                                                                                                                                                                                                                                                                                                                  |
| <b>Critical precautions</b>                                      | Critical precautions include: <ul style="list-style-type: none"> <li>manufacturer/component supplier procedures which must be applied as poor working practices are likely to damage electronic system ECUs and/or other components</li> </ul>                                                                                                                                                                                                                                                 |
| <b>OHS requirements</b>                                          | OHS requirements are to be in accordance with legislation/regulations/codes of practice and enterprise safety policies and procedures, and may include: <ul style="list-style-type: none"> <li>protective clothing and equipment, use of tooling and equipment, workplace environment and safety, handling of material, use of fire fighting equipment, enterprise first aid, hazard control and hazardous materials and substances</li> </ul>                                                 |
| <b>Personal protective equipment</b>                             | Personal protective equipment is to include that prescribed under legislation/regulation/codes of practice and workplace policies and practices                                                                                                                                                                                                                                                                                                                                                |

| <b>RANGE STATEMENT</b>                  |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Safe operating procedures</b>        | <p>Safe operating procedures are to include, but are not limited to:</p> <ul style="list-style-type: none"> <li>the conduct of operational risk assessment and treatments associated with vehicular movement, high-pressure diesel systems, electrical safety, machinery movement and operation, manual and mechanical lifting and shifting, working in proximity to others and site visitors</li> </ul>                                   |
| <b>Emergency procedures</b>             | <p>Emergency procedures related to this unit are to include, but may not be limited to:</p> <ul style="list-style-type: none"> <li>emergency shutdown and stopping of equipment, extinguishing fires, enterprise first aid requirements and site evacuation</li> </ul>                                                                                                                                                                     |
| <b>Environmental requirements</b>       | <p>Environmental requirements are to include, but are not limited to:</p> <ul style="list-style-type: none"> <li>waste management, noise, dust and clean-up management</li> </ul>                                                                                                                                                                                                                                                          |
| <b>Quality requirements</b>             | <p>Quality requirements are to include, but are not limited to:</p> <ul style="list-style-type: none"> <li>regulations, including Australian Standards, internal company quality policy and standards and enterprise operations and procedures</li> </ul>                                                                                                                                                                                  |
| <b>Statutory/regulatory authorities</b> | <p>Statutory/regulatory authorities may include:</p> <ul style="list-style-type: none"> <li>federal, state/territory and local authorities administering acts, regulations and codes of practice</li> </ul>                                                                                                                                                                                                                                |
| <b>Tooling and equipment</b>            | <p>Tooling and equipment may include:</p> <ul style="list-style-type: none"> <li>hand tooling, testing equipment, including multimeters, exhaust gas analyser, vacuum gauge, pressure gauge, tachometer, multimeter, vehicle lifting equipment, power tooling, air tooling, specialist tooling for removal/adjustment, specialised system testers, oscilloscope and scan tooling, LED test light and injector testing equipment</li> </ul> |
| <b>Materials</b>                        | <p>Materials may include:</p> <ul style="list-style-type: none"> <li>spare parts and cleaning material</li> </ul>                                                                                                                                                                                                                                                                                                                          |

| <b>RANGE STATEMENT</b>       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Communications</b>        | <p>Communications are to include, but are not limited to:</p> <ul style="list-style-type: none"> <li>• verbal and visual instructions and fault reporting and may include site specific instructions, written instructions, plans or instructions related to job/task, telephones and pagers</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Information/documents</b> | <p>Sources of information/documents may include:</p> <ul style="list-style-type: none"> <li>• verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets, diagrams or sketches</li> <li>• safe work procedures related to the service and repair of electronic compression ignition engine management systems</li> <li>• regulatory/legislative requirements pertaining to automotive industry, including Australian Design Rules and National Environmental Protection Measure for diesel vehicles</li> <li>• engineer's design specifications and instructions</li> <li>• organisation work specifications and requirements</li> <li>• instructions issued by authorised enterprise or external persons</li> <li>• Australian Standards</li> </ul> |

## Unit Sector(s)

|                    |            |
|--------------------|------------|
| <b>Unit sector</b> | Electrical |
|--------------------|------------|

## Co-requisite units

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|---------------------------|--|--|
| <b>Co-requisite units</b> |  |  |
|                           |  |  |
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## Competency field

|                  |  |
|------------------|--|
| Competency field |  |
|------------------|--|