



Australian Government

AURETR5033 Develop and apply electronic systems modification

Release 1

AURETR5033 Develop and apply electronic systems modification

Modification History

Release	Comment
Release 1	Replaces AURT576620A Develop and apply electronic systems modification Unit code updated to meet policy requirements Reference to OHS legislation replaced with new WHS legislation Licensing statement added to unit descriptor

Unit Descriptor

Unit descriptor	This unit covers the competence to develop, apply and validate significant modifications to existing electronic systems in order to sustain, vary or enhance performance. Licensing, legislative, regulatory or certification requirements may apply to this unit in some jurisdictions. Users are advised to check with the relevant regulatory authority.
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Application of the Unit

Application of the unit	This includes the preparation and application of specifications and processes complying with safety, legal and commercial obligations.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

Employability skills	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. Identify and confirm the modification requirement	<p>1.1.WHS requirements, including regulatory requirements, equipment and system isolation requirements and personal protection needs are observed throughout the work.</p> <p>1.2.Purpose and objectives of the modification are identified from an analysis of inputs and confirmed with the customer.</p> <p>1.3.Outline options for achieving the required purpose and objectives are identified, framed and presented to the customer prior to proceeding.</p> <p>1.4.Possible legal and safety impacts of the modification are considered and responded to in accordance with regulatory and enterprise obligations and practices.</p>
2. Develop and validate the modification specification	<p>2.1.Benchmark specifications for the existing electronic system are accessed and interpreted.</p> <p>2.2.Criteria to be used in the selection of the modification method and in the evaluation of the outcomes are identified and documented.</p> <p>2.3.Proposed modification method is selected following the identification, consideration and evaluation of the full range of available and relevant options.</p> <p>2.4.Selected option, including material choices and processes, is developed in detail and progressively validated against the established criteria.</p> <p>2.5.Modification specification is documented to industry and enterprise standards.</p>
3. Apply and test the modification specification	<p>3.1.Selected modification method and process is followed in accordance with the established specifications.</p> <p>3.2.Modification is completed using equipment, tooling and materials in accordance with accepted industry standards and practices.</p> <p>3.3.Tests and testing equipment are applied in accordance with regulatory requirements, manufacturer/component supplier specifications and modification specification.</p> <p>3.4.Test results and other diagnostic findings are verified, if necessary, by using reliable alternate or optional processes.</p> <p>3.5.Variations necessitated during the modification process or as a result of testing are incorporated into the modification specification.</p> <p>3.6.Information and detail related to the modification is documented and provided to the appropriate parties in accordance with regulatory and commercial obligations.</p>

ELEMENT	PERFORMANCE CRITERIA
4. Clean up work area and maintain equipment	<p>4.1. Materials that can be reused is collected and stored.</p> <p>4.2. Testing equipment and support materials are cleaned, maintained and prepared ready for further use or stored in accordance with manufacturer/component supplier specifications and enterprise requirements.</p> <p>4.3. Waste and scrap is removed following workplace procedures.</p> <p>4.4. Unserviceable equipment is tagged and faults identified in accordance with workplace procedures.</p> <p>4.5. Equipment and work area are cleaned and inspected for serviceable condition in accordance with workplace procedures.</p>

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 legal and technical information related to contemporary automotive electronic systems modifications.
- communicate ideas and information to enable confirmation of work requirements and specifications, coordination of work with site supervisor, other workers and customers, reporting of work outcomes and completion of regulatory, commercial and vehicle information systems inputs.
- plan and organise activities, including the development and planning of modification processes, preparation and layout of the worksite and the obtaining of tooling, equipment, materials and testing equipment to avoid backtracking, workflow interruptions or wastage.
- work with others and in a team by recognising dependencies and using cooperative approaches to optimise workflow and productivity.
- use mathematical ideas and techniques to complete measurements, calculate specifications, calibrate and establish testing equipment and evaluate modification results against pre-established criteria.
- establish modification methods and processes which anticipate and allow for risks and avoid or minimise reworking and avoid wastage.
- use the full range of workplace technology related to electronic systems modification, including testing equipment, maintenance equipment, tooling, calculators and measuring devices and information management systems.

Required knowledge

- general knowledge of the types, functions, operations and limitations of the main automotive industry electronic systems.
- general knowledge of automotive digital computing systems.
- detailed knowledge of electrical theory and operation covering, laws, theorems, dc and ac voltage and current, resistance, power, capacitance, electrostatics, electromechanics, magnetism, inductance, reactance, time constants, resonance, filtering, discrete semi-conductor electronic components, colour codes, analogue electronics, analogue IC, binary, logic families, digital IC, memory types and functions, microprocessor principles, micro-controller principles, analogue to digital conversion, signal processing, output control and characteristics, automotive digital computers, programming, networked vehicles and radio frequency.
- detailed knowledge of the types, functions, operations and limitations of diagnostic testing equipment.
- general knowledge of the methods and processes for documenting and reporting modification specifications and outcomes.

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

- Interpret work order and locate and apply information.
- Apply safety requirements, including the isolation of equipment and use of personal protective equipment.
- Follow work instructions, operating procedures and inspection processes to:
 - minimise the risk of injury to self and others
 - prevent damage and wastage of goods, equipment and products
 - maintain required production output and product quality.
- Modify a significant electronic system or sub-system including:
 - external modification (not within the computer) to a digital computer management system enhancing the system performance
 - external modification (not within the computer) to a digital computer management system, utilising electronic circuit design, development, manufacture, trial, evaluation, improvement and commissioning, enhancing the system performance
 - internal modification (within the computer) to a digital computer management system, utilising electronic circuit design, reprogramming, development, manufacture, trial, evaluation, improvement, and commissioning enhancing the system performance.
- Work effectively with others.
- Modify activities to cater for variations in workplace context and environment.

Context of, and specific resources for assessment

Assessment may occur on the job or in a workplace simulated facility with process equipment, materials, work instructions and deadlines.

Access to operational electronic systems requiring modification, testing equipment as stipulated in the Range Statement, technical information and a work environment.

Method of assessment

Assessment of this unit of competence is most likely to be project related and require portfolios or other forms of indirect evidence of

EVIDENCE GUIDE

	<p>process. Direct evidence will include certification of compliance of the final outcome/product or authorisation for use by a competent authority.</p> <p>Assessment must confirm the inference that competence is able not only to be satisfied under the particular circumstances, but is able to be transferred to other projects.</p> <p>Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.</p>
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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.

Electrical modifications

Electronic modifications to be covered by this unit may include computer controlled systems where the process relates to three categories:

- Modification carried out external to the computer, utilising 'off the shelf' components and modification to wiring circuitry.

Example:

- Modification to an electronic engine management system, improving the performance of an ECU controlled engine cooling fan system necessitating changes to relay circuitry.
- Modification carried out external to the computer, utilising electronic circuit design, development, manufacture, trial, evaluation, improvement, and commissioning.

Example:

- Development of an electronic control unit to delay engine crank while sounding an alarm warning of impending start of hazardous equipment.
- Modification carried out internally in the computer, utilising electronic circuit design, reprogramming, development, manufacture, trial, evaluation, improvement, and commissioning.

Examples are:

- Rectification of an original internal computer design/operating deficiency
- Modification to an electronic engine management computer, to enhance the performance of an engine
- Modification to a computerised system, to disable a function no longer required by customer
- Inputs to the modification method and processes may be obtained from customer requirements, manufacturer/component supplier specifications, outcomes of diagnostic processes or from regulatory, licensing, intellectual property legislation, safety requirements and Australian Design Rules

Unit context

- WHS requirements include legislation, vehicle industry regulations, safety management systems, hazardous substances

RANGE STATEMENT	
	<p>and dangerous goods code and safe operating procedures.</p> <ul style="list-style-type: none"> • Work is carried out in accordance with legislative obligations, Australian Design Rules, environmental legislation, health regulations, manual handling procedures and organisation insurance requirements. • Work requires individuals to demonstrate research, analytical, judgement and problem-solving skills in the diagnosis of faults.
Evaluation criteria	Evaluation criteria, sometimes referred to as success factors, are to be established prior to a modification being undertaken and are to cover safety, functionality, survivability, maintainability life cycle cost and aesthetics.
Isolation procedures	Equipment isolation procedures are to be to industry and enterprise standards.
Equipment	Equipment is to include that appropriate to the modification being carried out, including electronic work station, desoldering station, electronic variable power supply, simulated vehicle system test facility, multimeters, lab oscilloscopes, logic probe and data scanners, and it should include computer-based diagnostic systems.
Personal protective equipment	Personal protective equipment is to include that prescribed under legislation, regulations and enterprise policies and practices.
Information and procedures	<ul style="list-style-type: none"> • Workplace procedures relating to the use of tooling and equipment. • Workplace procedures relating to reporting and communication. • Manufacturer/component supplier specifications and application procedures for testing equipment and materials. • Manufacturer/component supplier specifications, schematics and operational procedures related to electronic systems modification. • Australian Design Rules. • Vehicle industry regulations. • Vehicle industry publications related to emerging electronic technology and technology changes.

Unit Sector(s)

Unit sector	Technical
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Co-requisite units

Not applicable.

Competency field

Competency field	Technical - Electrical and Electronic
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