



Australian Government

AURETR120 Diagnose and repair network electronic control systems

Release: 1

AURETR120 Diagnose and repair network electronic control systems

Modification History

Release	Comments
Release 1	This version first released with AUR Automotive Retail, Service and Repair Training Package Version 6.0

Application

This unit describes the skills and knowledge required to diagnose and repair network electronic control systems. These systems include two-wire high and low speed (CAN-bus) and single wire low speed (LIN-bus) networked circuits essential to control engine powertrain, vehicle dynamic control functions and body control functions. They include vehicle infotainment and climate control systems. The systems used vary based on the work context. The unit involves preparing for the task, sourcing a diagnostic testing strategy, diagnosing the cause of the fault, carrying out the repair, performing post-repair testing, and completing workplace processes and documentation.

The unit applies to those who work in the automotive service and repair industry. Embedded networked systems include those in agricultural machinery, heavy commercial vehicles, light vehicles, marine vessels, mobile plant machinery, motorcycles or outdoor power equipment.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Unit Sector

Electrical Technical – Electrical and Electronics

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Prepare to diagnose and repair network electronic control system	1.1 Identify job requirements from workplace instructions 1.2 Identify required information for diagnosis activity 1.3 Analyse diagnostic options and source testing strategy to identify cause of fault using workplace and manufacturer procedures

ELEMENT	PERFORMANCE CRITERIA
	1.4 Identify hazards and environmental issues associated with diagnose and repair activity, assess potential risks and implement control measures in line with workplace policies and procedures 1.5 Identify tools and equipment required for testing strategy and establish serviceability according to workplace procedures
2. Diagnose network electronic control system	2.1 Implement diagnostic tests set out in testing strategy according to manufacturer and workplace procedures, and workplace health and safety requirements 2.2 Identify cause of fault through analysis of diagnostic test results 2.3 Confirm and report cause of fault according to workplace procedures 2.4 Develop and report recommendations for necessary repairs according to workplace procedures
3. Repair network electronic control system	3.1 Identify required information for repair activity 3.2 Identify required repair tools, equipment and materials required for repair activity and establish serviceability according to workplace procedures 3.3 Carry out repairs according to workplace and manufacturer procedures, manufacturer specifications, workplace health and safety and environmental requirements 3.4 Carry out post-repair testing according to workplace procedures, workplace health and safety and environmental requirements
4. Complete work processes	4.1 Conduct final inspection according to workplace procedures and confirm vehicle is ready for use 4.2 Clear work area and dispose of or recycle materials according to workplace procedures 4.3 Complete documentation according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Learning	- Locates required sources of information efficiently - Develops a sequenced plan for a specific task

SKILL	DESCRIPTION
Reading	• Organises and interprets technical information from workplace procedures, manufacturer procedures and manufacturer specifications • Interprets text, symbols and wiring diagrams in information relating to electrical system testing and repair equipment from manufacturer specifications and workplace instructions and procedures
Oral communication	• Clarifies instructions • Obtains information from customers and supervisors
Numeracy	• Matches electrical components and part identification numbers to workplace instructions, vehicle, machinery and component part lists, and manufacturer specifications • Reads and interprets vehicle electrical measurements and readings • Measures voltage, current and resistance and uses mathematical operations • Calculates deviations from manufacturer specifications
Planning and organising	• Plans own work requirements • Prioritises actions to achieve required outcomes • Ensures tasks are completed within workplace timeframes
Technology	• Uses specialised diagnostic equipment.

Unit Mapping Information

Supersedes and is equivalent to AURETR020 Diagnose and repair network electronic control systems.

Links

Companion Volume Implementation Guide is found on VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>

Assessment Requirements for AURETR120 Diagnose and repair network electronic control systems

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Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- diagnose and repair a fault in at least three different network electronic control circuits that set network communication diagnostic trouble codes (DTCs), including one single wire circuit (LIN-bus) and one two-wire circuit (CAN-bus).
- carry out a diagnostic test in the course of the above work for at least one of the following faults:
 - high resistance in an input system
 - worn or damaged wiring or connectors
 - shorted system components.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- methods to locate and interpret information required to diagnose and repair network electronic control systems, including:
 - information provided by customers and supervisors
 - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to diagnose and repair network electronic control systems, including:
 - establishing serviceability of tools and equipment
 - documentation procedures
 - housekeeping procedures, including:
 - examination of tools and equipment
 - storage of equipment
 - identification, tagging and isolation of faulty equipment
 - disposal of excess materials

- recycling procedures
- workplace health and safety (WHS) requirements relating to diagnosing and repairing network electronic control systems, including procedures for identifying hazards and controlling risks associated with:
 - working on vehicle high voltage ignition systems
 - wearing jewellery while working around high current wiring systems
- environmental procedures relating to diagnosing and repairing network electronic control systems.
- diagnostic testing procedures for network electronic control systems, including:
 - using diagnostic flow charts
 - accessing and interpreting scan tool system data, including:
 - DTCs, including 'U' type communication codes
 - live data
 - freeze frame data
 - waveforms
 - testing electrical systems, including procedures for:
 - accessing electrical terminals and using test probes without damaging connectors, fuse holders or wiring
 - determining damage to system wiring and connectors
- repair procedures for network electronic control systems, including:
 - connector removal and replacement procedures
 - removal and replacement procedures for vehicle network electronic control system components
- post-repair testing procedures for network electronic control systems, including:
 - confirming fault rectification
 - DTC clearing procedures
 - checking for electrical connector mating
- operating principles of network electronic control systems and associated components, including:
 - assurance of message delivery, non-conflicting messages, minimum time of delivery, and electromagnetic field (EMF) noise resilience
 - network topographies
 - network protocols, including characteristics and data speeds
- purpose and operation of network electronic control systems and components, including:
 - controlled area network (CAN), including:
 - nodes: host processor, CAN controller, and transceiver
 - gateway modules
 - terminating resistors
 - data transmission
 - vehicle data logic connector (DLC)
 - local interconnect network (LIN), including:

- master and slaves
- data transmission.

Assessment Conditions

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Assessment must include direct observation of tasks.

Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to the network electronic control systems that they have worked on, e.g. repair orders.

Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application.

The following resources must be made available:

- automotive repair workplace or simulated workplace
- workplace instructions
- manufacturer specifications for network electronic control systems
- two different network electronic control circuits
- diagnostic equipment for network electronic control circuits, including:
 - multimeter
 - scan tool
 - oscilloscope
- tools, equipment and materials appropriate for repairing network electronic control circuits.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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