



Australian Government

AURETR031 Diagnose and repair ignition systems

Release: 1

AURETR031 Diagnose and repair ignition systems

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to diagnose and repair faults in the ignition systems of vehicles, vessels or machinery. It involves preparing for the task, selecting the correct diagnostic procedure, carrying out the diagnosis and the repair, performing post-repair testing, and completing workplace processes and documentation.

It applies to those working in an automotive service and repair industry. The ignition 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.

Competency Field

Electrical

Unit Sector

Technical - Electrical and Electronic

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
1. Prepare to diagnose and repair ignition system	1.1 Job requirements are determined from workplace instructions 1.2 Diagnostic information is sourced and interpreted 1.3 Diagnostic options are analysed and those most appropriate to the circumstances are selected

Elements Elements describe the essential outcomes.	Performance Criteria Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
	1.4 Hazards associated with the work are identified and risks are managed 1.5 Diagnostic tools and equipment are selected and checked for serviceability
2. Diagnose ignition system	2.1 Diagnostic tests are carried out according to workplace procedures and safety requirements without causing damage to components or systems 2.2 Faults are identified from diagnostic test results and causes of faults are determined 2.3 Diagnosis findings and recommendations for necessary repairs or adjustments are reported according to workplace procedures
3. Repair ignition system	3.1 Repair information is sourced and interpreted 3.2 Repair options are analysed and those most appropriate to the circumstances are selected 3.3 Repair tools, equipment and materials are selected and checked 3.4 Repairs and component replacements and adjustments are carried out according to manufacturer specifications, workplace procedures and safety requirements, and without causing damage to components or systems 3.5 Post-repair testing is carried out according to workplace procedures to confirm fault rectification, and any further problems detected as having been introduced during the repair process are rectified
4. Compete work processes	4.1 Final inspection is made to ensure work is to workplace expectations and vehicle, vessel or machinery is presented ready for use 4.2 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 4.3 Tools and equipment are checked and stored and any faulty equipment is identified, tagged and isolated according to workplace procedures 4.4 Workplace documentation is processed according to workplace procedures

Foundation Skills

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

Skills	Description
Learning skills to:	identify and locate various sources of information efficiently.
Reading skills to:	interpret text, symbols and wiring diagrams in information relating to ignition system testing and repair equipment from manufacturer specifications and workplace instructions and procedures.
Writing skills to:	legibly and accurately fill out workplace documentation when reporting diagnostic findings, making repair recommendations, and recording parts and material used.
Oral communication skills to:	- clarify instructions - report diagnostic findings and make repair recommendations.
Numeracy skills to:	- match ignition system components and identification numbers to workplace instructions, vehicle and component part lists, and manufacturer specifications - interpret vehicle ignition system voltages and readings - measure voltage, current and resistance and use basic mathematical operations, including addition and subtraction, to calculate deviations from manufacturer specifications.
Planning and organising skills to:	plan own work requirements and prioritise actions to achieve required outcomes and ensure tasks are completed within workplace timeframes.
Technology skills to:	use specialised equipment, including multimeters, scan tools and oscilloscope.

Range of Conditions

This section specifies work environments and conditions that may affect performance.

Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

<i>Safety requirements</i> must include:	- work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures for: - using specialised tools and equipment - using appropriate personal protective equipment (PPE) - identifying hazards and controlling risks associated with: - working on high voltage ignition systems
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	wearing jewellery while working around high current wiring systems.
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Unit Mapping Information

Equivalent to AURETR3031 Diagnose and repair ignition systems

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for AURETR031 Diagnose and repair ignition systems

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Performance Evidence

Before competency can be determined, individuals must demonstrate they can perform the following according to the standard defined in the unit's elements and performance criteria, range of conditions and foundation skills:

- diagnose and repair a fault in the ignition systems of two different vehicles, vessels or machinery, including faults in two of the following:
 - magneto with contact points
 - magneto with solid state trigger
 - capacitive discharge ignition
 - distributor with contact points
 - distributor with hall effect sensor
 - distributor with induction magnetic trigger
 - distributor with optical sensor
 - waste spark
 - coil on plug.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to diagnosing and repairing ignition systems, including procedures for:
 - using specialised tools and equipment
 - using appropriate personal protective equipment (PPE)
 - identifying hazards and controlling risks associated with:
 - working on high voltage ignition systems
 - wearing jewellery while working around high current wiring systems
- operating principles of ignition systems and associated components, including:

- generating principles, including Faraday's law and inducing an electromotive force (EMF)
- application, purpose and operation of ignition systems and components, including:
 - ignition coils, including:
 - internal component function and operation: primary windings, iron core and secondary windings
 - electromagnetic induction in the coil
 - spark plugs: identification, thread size, reach, heat range, resistance-type plugs, and type and number of earth electrodes
 - ignition leads
 - Kettering ignition system, including:
 - primary section: battery, ignition switch, ballast resistor, ignition coil primary windings, contact breaker point and capacitor
 - secondary section: ignition coil secondary windings, coil high tension lead, rotor button and distributor cap, spark plug high tension leads and spark plugs
 - firing order
 - ignition timing and methods of varying timing according to engine load and speed
 - electronic ignition systems, including:
 - pulse generator systems: stator and rotor units, ignition control units, current limiting and dwell control
 - Hall effect systems: Hall effect device, and permanent magnet and signal waveform
 - optical ignition systems: light emitting diodes (LEDs), rotating disc and optical electronic semiconductors
 - magneto ignition systems: shuttle and inductor magnetos, and energy transfer ignition systems
 - capacitive discharge ignition (CDI) systems:
 - transformer, charging circuit, triggering circuit, main capacitor and rectifier
 - alternating current CDI
 - direct current CDI
 - waste spark ignition systems
 - coil on plug ignition systems
- diagnostic testing procedures for ignition systems, including:
 - using diagnostic flow charts
 - testing electrical systems, including procedures for:
 - accessing electrical terminals and using test probes without damaging connectors, fuse holders or wiring
 - checking resistance, current flow and voltage drop of ignition system circuits
 - testing ignition coils
 - using oscilloscopes, including interpreting ignition system primary and secondary waveforms
- repair procedures for ignition systems, including:

- removing and replacing faulty or damaged components
- setting contact breaker gap and checking dwell
- adjusting ignition system timing
- removing, replacing and re-timing distributors
- post-repair testing procedures for ignition systems, including static and dynamic performance tests of ignition systems.

Assessment Conditions

Assessors must satisfy NVR/AQTF assessor requirements.

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 ignition 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 ignition system specifications
- two different vehicles, vessels or machinery with ignition system faults
- diagnostic equipment for ignition systems, including:
 - multimeter
 - scan tool
 - oscilloscope
- tools, equipment and materials appropriate for repairing vehicle, vessel or machinery ignition systems.

Links

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