



Australian Government

AURETR130 Diagnose and repair starting systems

Release: 2

AURETR130 Diagnose and repair starting systems

Modification History

Release	Comments
Release 2	This version released with the Automotive Service and Repair Training Package Version 7.0. Updated to resolve typographical errors.
Release 1	This version first released with the Automotive Retail, Service and Repair Training Package Version 6.0

Application

This unit describes the skills and knowledge required to diagnose and repair starting 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. The starting systems include those in agricultural machinery, heavy commercial vehicles, light vehicles, marine vessels, mobile plant machinery, 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 starting 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 starting 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 starting system	3.1 Identify required information for repair activity 3.2 Identify 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 starter motor types and part identification numbers to workplace instructions, vehicle, machinery and component part lists, and manufacturer specifications - 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 AURETR030 Diagnose and repair starting 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 AURETR130 Diagnose and repair starting 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 the starting system of two different vehicles, vessels or machinery in which the fault in each system is within one of the following:
 - vehicle starter motor and solenoid circuit
 - vehicle ignition switch to solenoid control circuit
 - vehicle battery to starter motor circuit
 - machinery starting system circuit
- carry out a diagnostic test in the course of the above for at least one of the following faults:
 - high resistance in an input system
 - loose or damaged connectors or wiring
 - broken or worn solenoids.

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 starting systems, including:
 - information provided by customers and supervisors
 - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to diagnose and repair starting 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 starting 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 starting systems and associated components, including:
 - producing movement due to the force between magnetic fields
 - producing magnetic fields due to current flow through conductors
 - basic direct current motor operation, including simple armature, magnetic field and commutator
- purpose and operation of starting systems and components, including:
 - high current systems, including:
 - armature, commutator, field windings
 - starter motor windings, including series wound, shunt wound, and compound wound
 - permanent magnet starter motors
 - direct drive and reduction-type starter motors
- starting electrical systems, including:
 - solenoids
 - shift levers
 - overrunning clutch flywheel ring gears
 - control circuits systems including:
 - ignition switching, including key start, push-button start, remote start and start-stop systems
 - safety switches, including inhibitor switches and clutch neutral switches
- diagnostic testing procedures for starting systems, including:
 - accessing and interpreting scan tool system data, including:
 - diagnostic trouble codes (DTCs)
 - live data
 - freeze frame data
 - waveforms
 - using diagnostic flow charts

- testing electrical systems, including procedures for:
 - accessing electrical terminals and using test probes without damaging connectors, fuse holders or wiring
 - load testing starting systems
 - resistance, current flow and voltage drop checks of starting system circuits
- solenoid test
- field winding tests
- armature tests, including using a growler
- commutator tests
- brushes and holder tests
- overrunning clutch and pinion tests
- flywheel ring gear tests
- starter motor bench tester operation
- repair procedures for starting systems, including:
 - tightening connections
 - replacing faulty or damaged cable connections
 - removing and replacing faulty or damaged components
- post-repair testing procedures for starting systems, including:
 - DTC checking procedures
 - checking for electrical connector mating
 - static and dynamic performance tests of starting systems.

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 starting 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 vehicle, vessel or machinery starting systems
- two different vehicles, vessels or machinery with starting system faults
- diagnostic equipment for vehicle, vessel or machinery starting systems, including multimeter
- tools, equipment and materials appropriate for repairing vehicle, vessel or machinery starting systems.

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

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