



Australian Government

AURBTR104 Diagnose and repair electric bicycles

Release: 1

AURBTR104 Diagnose and repair electric bicycles

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 faults in electric bicycles. This unit involves preparing for the work, selecting and using specialist tools and equipment, diagnosing the bicycle condition, interpreting manufacturer specifications, performing repairs and testing on electric bicycle components, and completing workplace processes and documentation.

The unit applies to those working in the bicycle retail, service and repair industry. Electric power-assisted bicycles are throttle and pedal assist sensor (PAS) bicycles with 250 watts rated power at the wheel.

Licensing, legislative, regulatory or certification requirements may apply to this unit in some jurisdictions. Users are advised to check with the relevant regulatory authority.

Unit Sector

Bicycle Technical - Electrical and Electronic

Elements and Performance Criteria

ELEMENTS	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 electric bicycle	1.1 Determine job requirements from workplace instructions 1.2 Source and interpret diagnostic information 1.3 Analyse diagnostic options and source testing strategy, selecting those required by the circumstances 1.4 Identify hazards and manage risks associated with the work 1.5 Select and check diagnostic tools and equipment required by testing strategy for serviceability
2. Diagnose electric bicycle system	2.1 Carry out diagnostic tests according to workplace procedures and safety requirements without causing damage to

ELEMENTS	PERFORMANCE CRITERIA
	components or systems 2.2 Identify faults from diagnostic test results and determine causes of faults 2.3 Confirm and report diagnosis findings and develop recommendations for required repairs or adjustments according to workplace procedures
3. Repair electric bicycle system	3.1 Source and interpret repair information 3.2 Analyse and select repair options required by the circumstances 3.3 Check and select repair tools, equipment and materials 3.4 Carry out repairs and component replacements and adjustments according to manufacturer specifications, workplace procedures and safety requirements, and without causing damage to components or systems 3.5 Carry out post-repair testing according to workplace procedures to confirm fault rectification, and rectify any further problems introduced during the repair process
4. Complete work processes	4.1 Conduct final inspection according to workplace procedures and confirm bicycle 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.
Numeracy	- Matches electric bicycle system components and identification numbers to workplace instructions, bicycle and component part lists, and manufacturer specifications - Interprets electric bicycle drivetrain and control system voltages and readings - Measures voltage, current and resistance and uses mathematical operations - Calculates deviations and tolerances from manufacturer specifications.

Skill	Description
Oral communication	• Clarifies instructions • Obtains information from customers and supervisors.
Reading	• Interprets text, symbols and wiring diagrams in information relating to electric bicycle drivetrain system testing and repair equipment from manufacturer specifications and workplace instructions and procedures.
Planning and organising	• Plans own work requirements • Prioritises actions to achieve required outcomes • Ensures tasks are completed within workplace timeframes.
Technology	• Uses specialised equipment in line with workplace procedures.

Unit Mapping Information

New unit.

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 AURBTR104 Diagnose and repair electric bicycles

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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 electric drivetrain system of two different electric bicycles, each time repairing a different fault from the following:
 - wheel speed sensor
 - charging system
 - battery pack
 - wiring harness and connectors
 - electric motor
 - controller.

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 electric bicycles, including:
 - information provided by customers and supervisors
 - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to diagnose and repair electric bicycles, 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
- work health and safety (WHS) requirements relating to diagnosing and repairing electric bicycles, including procedures for:
 - using specialised tools and equipment, including multimeters
 - using appropriate personal protective equipment (PPE)
 - identifying hazards and controlling risks associated with:
 - working on high voltage electric drivetrain systems
 - wearing jewellery while working around high current wiring systems
- operating principles of electric bicycles and associated components, including:
 - generating principles, including Faraday's law and inducing an electromotive force (EMF)
- application, purpose and operation of electric bicycle systems and components, including:
 - battery packs:
 - chemistry and associated hazards and risks associated with each type
 - mounting and securing battery packs
 - electric drive motors:
 - brushless electric motors
 - brushed electric motors
 - wiring connectors
 - electric controllers:
 - interface display units
 - adjustment and calibration requirements
 - harness connections
 - wiring harnesses:
 - mounting and routing of wiring harnesses
 - continuity of electrical system
 - wiring gauges and capacity
 - measuring voltage, resistance and current across two points
 - throttle control systems
- diagnostic testing procedures for electric bicycle drivetrain 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 electric bicycle driveline system circuits
 - electric motors
- repair procedures for electric bicycle systems, including:
 - removing and replacing faulty or damaged components
 - adjusting bicycle control system speed restrictors

- removing and replacing electric motors and batteries
- post-repair testing procedures for electric bicycles, including static and dynamic performance tests of electric bicycle.

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 electric bicycles 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:

- bicycle workplace or simulated workplace
- workplace instructions
- manufacturer electric bicycle specifications
- two different bicycles with electric driveline system faults
- diagnostic equipment for electric bicycle systems, including:
 - multimeter
 - tools, equipment and materials appropriate for repairing electric bicycle driveline 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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