

Title	Demonstrate knowledge of electronic components and their application in the automotive industry		
Level	3	Credits	5

Purpose	People credited with this unit standard are able to demonstrate knowledge of: resistors and thermistors used in automotive electronic applications; diodes used in automotive electrical and electronic applications; transistors used in automotive circuits; and sensors and actuators in automotive circuits; and describe operational amplifier application for automotive circuits; silicon controlled rectifiers (SCRs) in automotive circuits
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Classification	Motor Industry > Automotive Electrical and Electronics
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Available grade	Achieved
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Guidance Information

- 1 It is recommended that people hold credit for Unit 30571, *Demonstrate knowledge of the principles and testing of automotive electrical circuits* before being assessed against this unit standard.
- 2 Evidence presented for assessment against this unit standard must be consistent with safe working practices and be in accordance with applicable service information, and company requirements and legislative requirements. This includes the knowledge and use of suitable tools and equipment.
- 3 Performance of the outcomes of this unit standard must comply with the following: Health and Safety at Work Act 2015.
- 4 Any new, amended or replacement Acts, regulations, standards, codes of practice, guidelines, or authority requirements or conditions affecting this unit standard will take precedence for assessment purposes, pending review of this unit standard.
- 5 Definitions
Company requirements refer to instructions to staff on policy and procedures that are available in the workplace. These requirements may include – company policies and procedures, work instructions, product quality specifications and legislative requirements.
Service information refers to information such as technical information for a vehicle, machine, or product detailing operation; installation and servicing procedures; manufacturer instructions; technical terms and descriptions; and detailed illustrations.

Suitable tools and equipment means industry approved tools and equipment that are recognised within the industry as being the most suited to complete the task in a professional and competent manner with due regard to safe working practices.

- 6 Information on automotive electrical principles can be found from: training providers, industry and/or manufacturer courses; vehicle workshop manuals; automotive electrical and electronic textbooks (contact a local book retailer, school or polytechnic library or the public library lending service).

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of resistors and thermistors used in automotive electronic applications.

Range light dependent resistor (LDR), voltage dependent resistor (VDR), temperature dependent resistor (TDR).

Performance criteria

- 1.1 Types of resistors and thermistors used for automotive electronic circuits are identified.
- 1.2 Operational characteristics of each of the range of resistors and thermistors are explained.
- 1.3 The effects of temperature change on resistors and thermistors are explained.
- Range positive temperature co-efficient (PTC), negative temperature co-efficient (NTC).

Outcome 2

Demonstrate knowledge of diodes used in automotive electrical and electronic applications.

Performance criteria

- 2.1 p-n junction characteristics are described.
- Range positive and negative charged electron transfer, forward bias, reverse bias.
- 2.2 Diode operation is described.
- Range rectifier diode, Zener diode, light emitting diode (LED), photo diode.
- 2.3 Rectification patterns are identified by sketching alternating current (ac) halfwave and fullwave forms.

- 2.4 Diode ratings for a given automotive application are identified.
Range current, forward and reverse voltage.
- 2.5 Use of diodes in an automotive application is described in terms of a dual charging system, transient protection, and a Zener diode as a voltage stabiliser.
- 2.6 Replacement procedure for a diode in an automotive circuit is described in accordance with diode manufacturer specifications.
Range rectifier diode, LED.

Outcome 3

Demonstrate knowledge of transistors used in automotive circuits.

Performance criteria

- 3.1 The symbols, operation, and terminal layout of transistors are described.
Range bipolar junction transistor (BJT), field effect transistor (FET), Darlington transistor.
- 3.2 The use of a BJT as a switch in an automotive circuit is described.
Range on and off, high and low resistance.
- 3.3 Common emitter amplifier function is described in terms of signal inversion and application.
- 3.4 Automotive transistor testing procedures are described.
Range forward and reverse junction resistance specifications.
- 3.5 Transistor bias is explained.
Range forward and reverse junction.
- 3.6 Transistor gain is explained.
Range single bipolar, Darlington pair.

Outcome 4

Describe operational amplifier application for automotive circuits.

Performance criteria

- 4.1 Amplifier circuit symbols are described.

4.2 Amplifier function and operation are described in terms of current gain and application.

Range inverting, non-inverting.

Outcome 5

Describe SCRs in automotive circuits.

Performance criteria

5.1 Basic SCR operation in automotive circuits is described.

Range symbol, action in ignition circuits and electric motor speed control.

5.2 SCR ratings for automotive circuits are described.

Range voltage and current handling.

Outcome 6

Demonstrate knowledge of sensors and actuators in automotive circuits.

Performance criteria

6.1 The kinds of changes that are detected by the sensors are identified.

Range changes in – pressure, temperature, position, fluid level, flow rate, speed (linear and rotary), chemical content of a gas, magnetism.

6.2 The most common types of sensor used to detect each kind of change are identified by their method of measuring the change.

Range pressure, temperature, position, fluid level, flow rate, speed (linear and rotary), chemical, magnetic.

6.3 The types of electrical components that are used as actuators are identified and their method of operation described.

Range motors, stepper motors, solenoids, relays.

Replacement information	This unit standard, unit standard 24129, unit standard 24130, and unit standard 24132 replaced unit standard 5464. This unit standard and unit standard 24132 replaced unit standard 8187. This unit standard and unit standard 24134 replaced unit standard 15375. This unit standard and unit standard 24135 replaced unit standard 15376.
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Planned review date	31 December 2025
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Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	25 January 2008	31 December 2022
Review	2	25 March 2021	N/A
Revision	3	16 December 2021	N/A

Consent and Moderation Requirements (CMR) reference	0014
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.

Comments on this unit standard

Please contact Hanga-Aro-Rau Manufacturing, Engineering and Logistics Workforce Development Council qualifications@hangaarorau.nz if you wish to suggest changes to the content of this unit standard.