

Title	Demonstrate and apply knowledge of d.c. principles for electronics technicians		
Level	4	Credits	7

Purpose	People credited with this unit standard are able to: <ul style="list-style-type: none"> – demonstrate and apply knowledge of network theorems; – demonstrate knowledge of the Wheatstone bridge circuit; – demonstrate knowledge of electromagnetism; and – apply knowledge of d.c. principles.
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Classification	Electronic Engineering > Core Electronics
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Available grade	Achieved
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Guidance Information

1 References

Electricity Act 1992;
 Electricity (Safety) Regulations 2010;
 Electrical Workers Registration Board (EWRB) *Rules of the Board and Teaching Guidelines* available at www.ewrb.govt.nz;
 Health and Safety at work Act 2015 and associated regulations;
 and all subsequent amendments and replacements.

2 Definitions

d.c. – direct current.

Industry practice – those practices that competent practitioners within the Electronic Engineering industry recognise as current industry best practice.

m.m.f. – magnetomotive force.

3 Range

a Electrical, radiation, and workshop or laboratory safety practices are to be observed at all times.

b All measurements are to be expressed in Système Internationale (SI) units and multipliers.

c Use of non-programmable calculators is permitted during assessments.

d All activities and evidence presented for all outcomes and performance criteria in this unit standard must be in accordance with:

i legislation;

ii policies and procedures;

iii ethical codes;

iv Standards – may include but are not limited to those listed in Schedule 2 of the Electricity (Safety) Regulations 2010;

v EWRB Rules of the Board;

vi safe and sound practice;

vii applicable site, company and industry practice.

Outcomes and performance criteria

Outcome 1

Demonstrate and apply knowledge of network theorems.

Range network theorems – Kirchhoff's voltage and current laws, superposition theorem, Thévenin's theorem, Norton's theorem.

Performance criteria

1.1 Define network theorems.

1.2 Apply network theorems to analyse parameters in complex d.c. circuits.

Range parameters may include – voltage across any component, current at any point, power in any component; complex d.c. circuit – two voltage sources, up to six resistances; evidence of analysis of two circuits, emphasising two different theorems, is required.

Outcome 2

Demonstrate knowledge of the Wheatstone bridge circuit.

Performance criteria

2.1 Explain the operation of a balanced bridge circuit with the aid of a labelled circuit diagram.

2.2 Determine the value of one unknown resistor in a balanced bridge by calculation.

2.3 Explain the use of a Wheatstone bridge circuit for sensing change and describe at least one application.

Range applications may include but are not limited to – strain, temperature, pressure, light.

Outcome 3

Demonstrate knowledge of electromagnetism.

Performance criteria

3.1 Define the parameters relating to the magnetic circuit.

Range m.m.f., magnetising force, reluctance, magnetic flux, flux density.

- 3.2 Draw the flux patterns for simple shaped coils.
Range single and twin conductors, short coil, solenoid, toroid.
- 3.3 Calculate the force on a current carrying conductor in a magnetic field.
- 3.4 Calculate reluctance for simple series shapes with and without an air gap, ignoring leakage.
- 3.5 Calculate flux density for simple magnetic circuits both with and without air gaps.
- 3.6 Describe hysteresis using a sketch of a hysteresis loop, and with reference to saturation and remanence.
- 3.7 Calculate magnetic pull in a U-shaped electromagnet with bar armature.
- 3.8 Describe two typical applications with reference to construction and operating principles.

Outcome 4

Apply knowledge of d.c. principles.

Range application must relate to outcomes 2 and 3; may include but is not limited to – circuit construction, experiment, fault finding, project.

Performance criteria

- 4.1 Apply knowledge of d.c principles to use instruments, tests, and experimental procedure.
- 4.2 Produce measurements and observations relevant to the application.
- 4.3 Record purpose, method, observations, measurements, and conclusions in accordance with a given format.

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	26 July 2004	31 December 2012
Review	2	21 July 2011	31 December 2022
Review	3	24 June 2021	N/A

Consent and Moderation Requirements (CMR) reference	0003
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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 The Skills Organisation reviewcomments@skills.org.nz if you wish to suggest changes to the content of this unit standard.