

Title	Demonstrate and apply intermediate knowledge of microcontroller engineering concepts		
Level	5	Credits	15

Purpose	<p>This unit standard covers the basics of microcontroller architecture, applications and interfacing requirement.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> – demonstrate and apply knowledge of microcontroller hardware; and – demonstrate practical microcontroller software development methods.
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Classification	Electronic Engineering > Core Electronics
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Available grade	Achieved
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Guidance Information

- 1 This unit standard is intended for use in engineering courses at diploma level.
- 2 This unit standard is one of two that cover knowledge of electrical circuit engineering and provides a basis for Unit 22730, *Demonstrate and apply advanced knowledge of microcontroller engineering concepts*. It is recommended that competency in this unit standard be achieved before assessment against unit standard 22730 is attempted.
- 3 It is recommended that competency in Unit 22726, *Demonstrate and apply introductory knowledge of electronic engineering*; and Unit 22734, *Demonstrate and apply introductory knowledge of electrotechnology engineering mathematics*; be achieved before assessment against this unit standard is attempted, or equivalent knowledge and skills demonstrated.
- 4 Reference
Health and Safety in Employment Act 1992;
and all subsequent amendments and replacements.
- 5 Definitions
A/D – analogue to digital.
ADC – analogue digital converter.
CPU – central processing unit.
d.c. – direct current.
D/A – digital to analogue.
I/O – input/output.
IDE – integrated development environment.

Industry practice – practice used and recommended by organisations involved in the electrotechnology industry.

Intermediate knowledge – means employing a broad knowledge base, with substantial depth in some areas of the subject matter, to analyse and interpret a wide range of information.

- 6 All measurements are to be expressed in Système International (SI) units, and, where required, converted from Imperial units into SI units.
- 7 All activities must comply with: any policies, procedures, and requirements of the organisations involved; the standards of relevant professional bodies; and any relevant legislative and/or regulatory requirements.
- 8 Range
 - a performance in relation to the elements of this unit standard must comply with the Health and Safety in Employment Act 1992;
 - b laboratory and workshop safety practices are to be observed at all times.

Outcomes and performance criteria

Outcome 1

Demonstrate and apply knowledge of microcontroller hardware.

Performance criteria

- 1.1 Typical microcontroller architecture is described and operation is explained.

Range architecture and functions of a microcontroller to include – CPU, registers, resets and interrupts, I/O, parallel.
- 1.2 Microcontroller on-board subsystems are described and configured to perform simple industrial functions in accordance with industry practice.

Range serial ports, timers, counters, A/D, D/A.
- 1.3 A microcontroller is interfaced to practical devices in accordance with industry practice.

Range may include but is not limited to – switches, LEDs, keypads, d.c. motors, relays, analogue sensors.

Outcome 2

Demonstrate practical microcontroller software development methods.

Range assembly language, a high-level language.

Performance criteria

- 2.1 An IDE is used to demonstrate practical software development methods for microcontrollers in accordance with industry practice.
- 2.2 Programs for a microcontroller are written and documented based on given specifications in accordance with industry practice.

Range may include but is not limited to – accessed and decoded a simple matrix keypad; a binary number is displayed on a 7-segment display; ADC data is scaled into engineering units and displayed; the frequency of an incoming signal is measured, scaled into engineering units, and displayed; the accuracy of input data is improved by simple digital processing; data is received or sent using a serial link; evidence of three is required.

Replacement information	This unit standard replaced unit standard 11571.
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This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 December 2006	31 December 2024
Review	2	25 May 2023	31 December 2024

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>.