Title	Demonstrate and apply fundamental knowledge of microcontrollers
Level	3	Credits	5

Purpose	This unit standard is intended for use in the training of electronics technicians. It covers knowledge of microcontroller basics and the use of a microcontroller. People credited with this unit standard are able to: – demonstrate knowledge of a typical microcontroller system; and – control a physical process using a microcontroller.

Classification	Electronic Engineering > Core Electronics

Available grade	Achieved

Guidance Information

1   This unit standard has been developed for learning and assessment off-job.

2   References
Electricity Act 1992;
Electricity (Safety) Regulations 2010;
Health and Safety at Work Act 2015 and associated regulations;
and all subsequent amendments and replacements.

3   Definitions
CPU – central processing unit
EEPROM – electrically erasable programmable read-only memory.
Enterprise practice – those practices and procedures that have been promulgated by the company or enterprise for use by their employees.
Fundamental knowledge – for the purposes of this unit standard means having some relevant theoretical knowledge of the subject matter with the ability to use that knowledge to interpret available information.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.
Microcontroller – an integrated circuit that contains most of the components needed to control physical processes. Typically this includes a CPU, RAM, some kind of ROM, timers, interrupt control, and analogue/digital converters, all on the same chip. Some microcontrollers also incorporate interpreter software, and additional support circuitry such as EEPROM, voltage regulator, and ceramic oscillator.
RAM – random access memory.
ROM – read-only memory.

4   Range
     a   Any commercially available microcontroller may be used for the purposes of this unit standard.
     b   Electrical, radiation, and workshop or laboratory safety practices are to be observed at all times.
     c   All activities and evidence presented for all outcomes and evidence requirements in this unit standard must be in accordance with legislation, policies, procedures, ethical codes, Standards, applicable site and enterprise practice, and industry practice; and, where appropriate, manufacturers' instructions, specifications, and data sheets.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of a typical microcontroller system.

Performance criteria

1.1   The architecture of a typical microcontroller is described with the aid of a given functional block diagram.

       Range   description includes – the purpose of each functional block and the flow of information and data.

1.2   An outline is given of how a typical microcontroller is programmed.

Outcome 2

Control a physical process using a microcontroller.

Range   examples of processes – data logging, environmental control, motor control and/or motion, security system.

Performance criteria

2.1   Specification is produced based on a given outline for a microcontroller controlled physical process.

       Range   specification includes – description of process, operation, operating limits, circuit diagram, programme flow chart.

2.2   All functions are performed by the microcontroller and associated circuits and hardware as intended in the specification.

2.3   An analysis is provided of the advantages and/or disadvantages of using a microcontroller over other methods of controlling the same process.

       Range   other methods – mechanical controls, relay circuits, analogue electronic circuits.

2.4 Documentation is produced to enable others to understand and operate the microcontroller in order to repeat the process.

Range documentation includes – description of process, operation, definition of inputs and outputs, limits, logic, circuit diagram, programme listing.

Planned review date	31 December 2028

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	27 November 2002	31 December 2011
Revision	2	17 March 2004	31 December 2011
Review	3	25 May 2007	31 December 2012
Review	4	21 July 2011	31 December 2027
Review	5	24 March 2022	31 December 2027
Review	6	24 August 2023	N/A

Consent and Moderation Requirements (CMR) reference	0003

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact Waihanga Ara Rau Construction and Infrastructure Workforce Development Council qualifications@waihangaararau.nz if you wish to suggest changes to the content of this unit standard.