Title	**Diagnose and repair a faulty microprocessor or microcontroller system**		
Level	**4**	**Credits**	**6**

Purpose	This unit standard covers diagnosis and repair of faults in microprocessor or microcontroller systems to component level for electronics technicians. People credited with this unit standard are able to: – diagnose a faulty microprocessor or microcontroller system; and – repair, test, and restore microprocessor or microcontroller equipment to service.

Classification	Electronic Engineering > Electronic Installation and Maintenance

Available grade	Achieved

Guidance Information

1 This unit standard has been developed for learning and assessment off-job and is suitable for use in conjunction with computer assisted learning equipment.

2 Definitions
Enterprise practice – those practices and procedures that have been promulgated by the company or enterprise for use by their employees.
Industry practice – those practices that competent practitioners within the industry recognise as current industry best practice.

3 Range
- a Competence may be demonstrated on one type of microprocessor or microcontroller system.
- b The type of diagnosis and repair work must include:
  - i diagnosis and repair of equipment to component level;
  - ii use of test instruments to identify faults, measure and adjust equipment, and confirm proper performance. Typical instruments include multimeters, oscilloscopes, logic pulsers, signal tracers, and logic probes. Logic analysers or signature analysers may also be used.
- c All diagnostic and repair work must be completed within an *industry acceptable timeframe*, ie the length of time within which a competent person at this level could reasonably be expected to perform the task. In the electronics service industry, time is a significant factor in judging competence. Assessors must therefore ensure that the time taken is representative of industry expectations for the type of work.

d Candidates are expected to meet the outcomes of this unit standard without direct technical supervision, and with complete responsibility for quality and quantity of output.

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

f 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.

g Evidence is required of a minimum of five faults each from a different microprocessor functional area, which are to include: microprocessor timing and control signal circuitry, data transfer circuitry, address circuitry, interface circuitry, input/output devices, software, peripherals, power supplies. Fault symptoms to include incorrect or no display, incorrect or no response to keyboard, incorrect system outputs, no response or communication with peripheral devices, and incorrect or no response to external service requests.

4 Recommended skills and knowledge:
It is recommended that this unit standard be assessed after competency in Unit 20714, *Demonstrate and apply knowledge of digital principles for electronics technicians*, has been achieved, or demonstrate equivalent knowledge and skills.

Outcomes and performance criteria

Outcome 1

Diagnose a faulty microprocessor or microcontroller system.

Performance criteria

1.1 Fault symptoms and/or substandard performance are identified.

1.2 The faulty sub-system is identified by diagnosis.

Range for a system crash – visual inspection; observation of key indicators; measurement of power supplies; initialisation of the central processing unit (CPU); measurement of external CPU signals; monitoring of CPU control signals, data transfer control signals, or handshake signals;
additionally for a partially operational system with displays available – retention of static data and settings by re-powering; testing of display and keyboard functions; use of built in test equipment (BITE).

1.3 The faulty component is identified by diagnosis using efficient diagnostic techniques, tools, instruments, BITE where available, and servicing data.

1.4 All observations, test results, and conclusions are recorded.

1.5 Components are protected from static damage by following anti-static precautions.

1.6 The equipment is not damaged by diagnostic processes.

Outcome 2

Repair, test, and restore microprocessor or microcontroller equipment to service.

Performance criteria

2.1 Replacement or repair of faulty units or components is done in accordance with servicing data and enterprise practice.

2.2 The other components are not damaged by replacement or repair.

2.3 The restoration of the microprocessor or microcontroller equipment to proper operation is confirmed by testing.

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	29 October 1996	31 December 2011
Revision	2	3 April 2001	31 December 2011
Review	3	26 July 2004	31 December 2012
Review	4	21 July 2011	31 December 2027
Review	5	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.