

<b>Title</b>	<b>Demonstrate and apply knowledge of real-time programming in electrotechnology engineering</b>		
<b>Level</b>	<b>6</b>	<b>Credits</b>	<b>15</b>

<b>Purpose</b>	<p>This unit standard covers real-time programming for electrotechnology engineering.</p> <p>People credited with this unit standard are able to demonstrate and apply knowledge of real-time programming in electrotechnology engineering.</p>
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<b>Classification</b>	Electronic Engineering > Core Electronics
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 This unit standard is intended for use in engineering courses at diploma level with assessment primarily against laboratory assignments.
- 2 It is recommended that competency in Unit 22718, *Demonstrate and apply intermediate knowledge of programming techniques for electrotechnology*, be achieved before assessment against this unit standard is attempted, or equivalent knowledge and skills demonstrated.
- 3 Reference  
Health and Safety in Employment Act 1992;  
and all subsequent amendments and replacements.
- 4 Definitions  
*ADC* – analogue-to-digital converter.  
*HLL* – high-level language.  
*Industry practice* – practice used and recommended by organisations involved in the electrotechnology industry.  
*PIO* – programmed input/output.  
*RTE* – rich text editor.  
*UART* – universal asynchronous receiver/transmitter.
- 5 All measurements are to be expressed in Système International (SI) units, and, where required, converted from Imperial units into SI units.
- 6 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.

- 7 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.

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## Outcomes and performance criteria

### Outcome 1

Demonstrate and apply knowledge of real-time programming in electrotechnology engineering.

### Performance criteria

- 1.1 The philosophy of real-time programming is explained with reference to examples.
- 1.2 A range of abstract data types are described and used in practical applications in accordance with industry practice.
- Range control and monitoring applications.
- 1.3 The development of a real-time control system is explained in accordance with industry practice for any small RTE for a chip/computer for which there is an HLL compiler available or an appropriate operating system.
- 1.4 Hardware-assisted protection methods in mission critical systems are described in accordance with industry practice.
- Range paged and segmented virtual memory, bus fault exception, access rights and attributes and related memory access exceptions, task control instructions, protection violation exception, the role of the operating system.
- 1.5 Device drivers for interface devices suitable for access from a high-level language are implemented in accordance with industry practice.
- Range may include but is not limited to – UART, synchronous serial interface, PIO, ADC cards/chips, voice chips, modems and similar; service calls to device drivers made from an HLL program. Evidence of two or more different devices is required.

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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	24 February 1998	31 December 2024
Revision	2	12 December 2000	31 December 2024
Review	3	18 December 2006	31 December 2024
Review	4	24 August 2023	31 December 2024

**Consent and Moderation Requirements (CMR) reference**

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