

<b>Title</b>	<b>Demonstrate knowledge of avionic electronic theory</b>		
<b>Level</b>	<b>4</b>	<b>Credits</b>	<b>20</b>

<b>Purpose</b>	<p>This unit standard is intended for people pursuing unit standards in the avionic repair and avionic maintenance domains.</p> <p>People credited with this unit standard are able to: describe semiconductor diodes; transistor operation and applications; transistor analogue circuit applications; and transistor digital circuit applications.</p>
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<b>Classification</b>	Aeronautical Engineering > Aeronautical Engineering - Core
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<b>Available grade</b>	Achieved
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### Guidance Information

- 1 All tasks must be carried out in accordance with enterprise procedures.
- 2 Definition  
*Enterprise procedures* – procedures used by the organisation carrying out the work and applicable to the tasks being carried out. Examples are – standard operating procedures, safety procedures, equipment operating procedures, codes of practice, quality management practices and standards, procedures to comply with legislative and local body requirements.
- 3 The scope of the system that this standard relates to is described in ATA iSpec 2200, and applicable chapters.

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### Outcomes and performance criteria

#### Outcome 1

Describe semiconductor diodes.

#### Performance criteria

- 1.1 Semiconductor materials are described in terms of their properties and use in semiconductor devices.
 

Range	materials used, effects of doping, electron and hole current carriers.
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- 1.2 PN junction operation is described in terms of its application to semiconductor diodes.
- Range biasing, peak inverse voltage, maximum forward current, temperature and frequency effects, power dissipation, series and parallel connection.
- 1.3 Diodes are described in terms of identification and operating characteristics.
- Range circuit symbol, terminal identification, data sheet information, ideal and practical characteristic curves.
- 1.4 Diode functions are described in terms of applied circuit operation.
- Range clipper, clamper, full-wave, half-wave, bridge rectifier, voltage doubler, voltage multiplier.
- 1.5 Diode types are described in terms of their operating characteristics and application.
- Range Zener, silicon-controlled rectifier, tunnel, light emitting, photoconductive, varactor, varistor, Schottky barrier, diac, triac.

## Outcome 2

Describe transistor operation and applications.

### Performance criteria

- 2.1 PNP and NPN transistors are described in terms of their construction and operating characteristics.
- Range terminal identification, base, collector and emitter currents, amplification ratio, base to emitter voltage, power gain, distortion, saturation, input and output impedance, frequency response, terminal identification, circuit symbol, amplification process, temperature effects.
- 2.2 Bipolar junction transistors are described in terms of their operation in amplifier circuits.
- Range common base, emitter and collector configurations; biasing methods and stabilisation in amplifier circuits.
- 2.3 Special purpose junction transistors are described in terms of their use in avionic equipment.
- Range operating principles, characteristics and applications for unijunction, programmable unijunction, opto-isolator and photo transistors.

2.4 Field effect transistors are described in terms of their operating principles and applications.

Range junction, metal oxide, silicon, insulated gate.

### Outcome 3

Describe transistor analogue circuit applications.

#### Performance criteria

3.1 Operational amplifiers are described in terms of operating parameters and applications.

Range open loop gain, bandwidth, slew rate, input and output impedance, drift, input offset voltage and current; in integrators, differentiators, voltage followers, comparators, inverting, non-inverting, summing and differential amplifiers.

3.2 Multistage amplifiers are described in terms of configuration and operating characteristics.

3.3 Power supplies are described in terms of principles of operation.

Range transformer, rectifier, filter; zener, zener by-pass, and amplified voltage regulators; current limiting.

3.4 Transistorised circuits are described in terms of their operating principles and application.

Range push pull amplifiers; Darlington pairs; complementary symmetry configuration; astable, bistable and monostable multivibrators; resistive capacitive, inductive capacitive, and crystal oscillators.

### Outcome 4

Describe transistor digital circuit applications.

#### Performance criteria

4.1 Electronic waveforms are described in terms of their characteristics.

Range rise and fall times, mark space ratio, leading and trailing edges, pulse duration.

4.2 Electronic logic gates are described in terms of their function and characteristics.

Range AND, NAND, OR, NOR, XOR, NOT; supply voltage, fan in, fan out, propagation delays.

4.3 Electronic flip-flops are described in terms of their use in avionic equipment.

Range reset and set, clocked, JK, JK master and slave, T (toggle) and D (delay) type; set up and hold times, propagation delay, clock frequency; counters, registers, data storage devices, serial and parallel data transfer.

4.4 Number systems are manipulated in terms of base conversions.

Range decimal to binary and hexadecimal, and vice versa.

4.5 Microprocessor systems are described in terms of microprocessor architecture, memory devices, and input and output.

<b>Planned review date</b>	31 December 2024
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#### Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 May 1996	31 December 2016
Revision	2	7 August 1997	31 December 2016
Revision	3	8 May 2001	31 December 2016
Review	4	19 May 2006	31 December 2016
Revision	5	21 September 2007	31 December 2016
Review	6	19 September 2013	31 December 2021
Review	7	26 March 2020	N/A

<b>Consent and Moderation Requirements (CMR) reference</b>	0028
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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 ServiceIQ [qualifications@serviceiq.org.nz](mailto:qualifications@serviceiq.org.nz) if you wish to suggest changes to the content of this unit standard.