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## Electronics and Control (Higher) Unit

**SCQF:** level 6 (6 SCQF credit points)

**Unit code:** H23B 76

### Unit outline

The general aim of this Unit is to develop a deep understanding of electronic control systems. Learners will investigate and explore engineering problems and design, simulate, construct, test and evaluate solutions.

Learners who complete this Unit will be able to:

- 1 Develop analogue electronic control systems
- 2 Develop digital electronic control systems
- 3 Develop programmable control systems for mechatronic systems

This Unit is a mandatory Unit of the Higher Engineering Science Course and is also available as a free-standing Unit. The Unit Specification should be read in conjunction with the *Unit Support Notes* which provide advice and guidance on delivery, assessment approaches and development of skills for learning, skills for life and skills for work. Exemplification of the standards in this Unit is given in *Unit Assessment Support*.

The *Course Assessment Specification* for the Higher Engineering Science Course gives further mandatory information on Course coverage for learners taking this Unit as part of the Higher Engineering Science Course.

### Recommended entry

Entry to this Unit is at the discretion of the centre. However, learners would normally be expected to have attained the skills, knowledge and understanding required by one or more of the following or equivalent qualifications and/or experience:

- ◆ Electronics and Control (National 5)

## **Equality and inclusion**

This Unit Specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence. For further information please refer to the *Unit Support Notes*.

# Standards

## Outcomes and assessment standards

### Outcome 1

The learner will:

#### **1 Develop analogue electronic control systems by:**

- 1.1 Designing and constructing circuits using sensor inputs and BJT drivers
- 1.2 Designing and constructing circuits using sensor inputs and MOSFET drivers
- 1.3 Designing and constructing operational amplifier circuits
- 1.4 Testing and evaluating analogue electronic solutions against a specification

### Outcome 2

The learner will:

#### **2 Develop digital electronic control systems by:**

- 2.1 Designing and constructing complex combinational logic circuits
- 2.2 Describing logic functions using Boolean operators
- 2.3 Simplifying logic circuits using NAND equivalents
- 2.4 Testing and evaluating combinational logic circuits against a specification

### Outcome 3

The learner will:

#### **3 Develop programmable control systems for mechatronic systems by:**

- 3.1 Designing and simulating high-level programs to monitor inputs and initiate digital outputs
- 3.2 Designing and simulating high-level programs to make decisions using arithmetic and logic functions
- 3.3 Testing and evaluating programs against a specification

## Evidence Requirements for the Unit

Assessors should use their professional judgement, subject knowledge and experience, and understanding of their learners, to determine the most appropriate ways to generate evidence and the conditions and contexts in which they are used.

For this Unit, learners will be required to demonstrate technological skills, knowledge and understanding in the context of electronic control systems.

Evidence of Outcomes may be demonstrated by carrying out practical design and development tasks, supplemented by oral or written evidence of testing and evaluation. Evidence of Outcomes and Assessment Standards may be generated during one or more activities. Although learners are expected to develop a range of digital, analogue and programmable control systems, evidence is only required for one of each.

Exemplification of assessment is provided in *Unit Assessment Support*. Advice and guidance on possible approaches to assessment is provided in the *Unit Support Notes*.

# Development of skills for learning, skills for life and skills for work

It is expected that learners will develop broad, generic skills through this Unit. The skills that learners will be expected to improve on and develop in this Unit are based on SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work* and drawn from the main skills areas listed below. These must be built into the Unit where there are appropriate opportunities.

## **2 Numeracy**

- 2.1 Number processes
- 2.3 Information handling

## **4 Employability, enterprise and citizenship**

- 4.2 Information and communication technology (ICT)

## **5 Thinking skills**

- 5.3 Applying
- 5.4 Analysing and evaluating

Amplification of these is given in SQA's *Skills Framework: Skills for Learning, Skills for Life and Skills for Work*. The level of these skills should be at the same SCQF level of the Unit and be consistent with the SCQF level descriptor. Further information on building in skills for learning, skills for life and skills for work is given in the *Unit Support Notes*.

# Administrative information

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**Published:** August 2015 (version 2.0)

**Superclass:** XL

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## History of changes to National Unit Specification

Version	Description of change	Authorised by	Date
2.0	The word 'digital' removed from 'digital input' in Assessment Standard 3.1	Qualifications Manager	August 2015

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Note: readers are advised to check SQA's website: [www.sqa.org.uk](http://www.sqa.org.uk) to ensure they are using the most up-to-date version of the Unit Specification.

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