

## National Unit Specification: general information

<b>UNIT</b>	Programmable Control Systems (Higher)
<b>NUMBER</b>	D147 12
<b>COURSE</b>	Mechatronics (Higher)

### SUMMARY

The purpose of this unit is to develop an understanding of a range of Programmable Control Systems as applied to a mechatronic system. It will also develop an appreciation of the role that software plays in the behaviour of a mechatronic system.

### OUTCOMES

- 1 Evaluate and operate a programmable system.
- 2 Solve a control problem using a PLC.

### RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained one of the following:

- Standard Grade Technological Studies or Physics at grade 2 or above
- equivalent National units
- Intermediate 2 Electronic and Electrical Fundamentals or Technological Studies
- Scottish Group Award at Intermediate 2 in an appropriate area.

Note: It is recommended that all candidates should have attained a minimum of Standard Grade Mathematics at grade 3 or equivalent National units.

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### Administrative Information

<b>Superclass:</b>	VE
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<b>Version:</b>	03

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## **National Unit Specification: general information (cont)**

**UNIT**      Programmable Control Systems (Higher)

### **CREDIT VALUE**

0.5 credit at Higher.

### **CORE SKILLS**

There is no automatic certification of core skills or core skills components in this unit.

Additional information about core skills is published in *Automatic Certification of Core Skills in National Qualifications* (SQA, 1999).

## **National Unit Specification: statement of standards**

### **UNIT          Programmable Control Systems (Higher)**

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

#### **OUTCOME 1**

Evaluate and operate a programmable system.

##### **Performance criteria**

- (a) The key features of various programmable sub-systems used in control systems are correctly identified.
- (b) The functions of a software development environment are clearly described.
- (c) Pre-prepared PLC software is correctly used to operate a mechatronic system.
- (d) PLC software is successfully modified to perform an alternative task on a system.

##### **Note on range for the outcome**

Programmable sub-systems: microcontroller-based systems, PC-based systems, programmable logic controllers.

Key features: ease of use, ease of change, expansion, maintenance, cost, physical attributes.

PLC software: ladder logic.

Software development environment: editor, emulator, simulator.

##### **Evidence requirements**

Written and graphical evidence that the candidate can:

- evaluate the key features of various types of programmable control systems
- describe the key functions of a software development environment with specific reference to the editor, emulator and simulator.

In addition, performance evidence that the candidate can correctly operate and successfully modify the program sequence for the chosen system.

## **National Unit Specification: statement of standards**

### **UNIT Programmable Control Systems (Higher)**

#### **OUTCOME 2**

Solve a control problem using a PLC.

##### **Performance criteria**

- (a) The given task is correctly analysed.
- (b) The I/O assignments for the chosen control systems are clearly identified.
- (c) Software for the chosen PLC is used effectively.
- (d) The operation of the selected system is successfully verified.

##### **Note on range for the outcome**

Analysis tool: flowchart.

##### **Evidence requirements**

Written evidence regarding the correct analysis of the problem and identification of the input/output sub-systems. Performance evidence of the correct operation of the system.

## **National Unit Specification: support notes**

### **UNIT      Programmable Control Systems (Higher)**

This part of the unit specification is offered for guidance. The support notes are not mandatory.

It is recommended that you refer to the SQA Arrangements document for Higher Mechatronics before delivering this unit.

While the exact time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

The purpose of this unit is to develop an understanding of a range of Programmable Control Systems as applied to a mechatronic system. The candidate will appreciate the role that software plays in the behaviour of a mechatronic system.

#### **GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT**

This unit should be taught, wherever possible, in a practical context, although simulation may be used to enhance the candidate's learning experience.

#### **GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT**

A candidate-centred resource-based approach to learning should be adopted in which candidates are encouraged to work both individually and co-operatively as team members.

It is recommended that you refer to the Subject Guide for additional information. The Subject Guide is intended to support the information contained in the Arrangements document. The SQA Arrangements documents contain the standards against which candidates are assessed.

#### **GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT**

Examples of instruments of assessment which could be used are as follows:

- practical assignments
- restricted response questions
- extended response questions
- laboratory investigations
- mini-projects
- case studies.

## **National Unit Specification: support notes (cont)**

### **UNIT        Programmable Control Systems (Higher)**

#### **SPECIAL NEEDS**

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment and Certification Arrangements for Candidates with Special Needs/Candidates whose First Language is not English* (SQA, 1998).