SCQF level 5
Unit Specification

Electronics: Circuit Construction

SCQF: level 5 (6 SCQF credit points)

Unit code: JQ9P 75

Unit outline

The general aim of this Unit is to develop skills in assembling a range of electronic circuits, using permanent and non-permanent methods, to construct complete working devices. Learners will also develop skills in testing and fault-finding.

Learners who complete this Unit will be able to:

1 Plan the construction of electronic circuits
2 Construct working electronic circuits
3 Test electronic circuits

This Unit is available as a free-standing Unit. The Unit Specification should be read in conjunction with the Unit Support Notes, which provides 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 the Unit Assessment Support.

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: Circuit Construction (National 4)
- Numeracy (National 4)

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 Plan the construction of electronic circuits by:

1.1 Listing, sourcing and costing the required components
1.2 Choosing a construction method
1.3 Creating a layout diagram

Outcome 2

The learner will:

2 Construct working electronic circuits by:

2.1 Inserting components on to prototype board
2.2 Soldering components on to strip board and pre-printed PCB
2.3 Connecting relays and other electromechanical devices
2.4 Applying a range of wiring techniques
2.5 Applying safe working practices

Outcome 3

The learner will:

3 Test electronic circuits by:

3.1 Creating and following a testing checklist
3.2 Using multimeters, logic probes, oscilloscopes and continuity testers
3.3 Measuring resistance, current, voltage (peak and rms) and frequency

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 the ability to plan, construct and test electronic circuits, while applying safe working practices. Evidence may be observational, obtained while the learner is carrying out appropriate practical tasks.

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

Assessment standard thresholds

If a candidate successfully meets the requirements of the specified number of Assessment Standards they will be judged to have passed the Unit overall and no further re-assessment will be required.

The specific requirements for this Unit is as follows:

- 8 out of 11 Assessment Standards must be achieved.

It should be noted that there will still be the requirement for candidates to be given the opportunity to meet all Assessment Standards. The above threshold has been put in place to reduce the volume of re-assessment where that is required.

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 through the 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

2.3 Information handling

5 Thinking skills

5.2 Understanding
5.3 Applying

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.

Appendix: Unit support notes

Introduction

These support notes are not mandatory. They provide advice and guidance on approaches to delivering and assessing this Unit. They are intended for teachers and lecturers who are delivering this Unit. They should be read in conjunction with:

- the *Unit Assessment Support packs*
- the *Unit Specification*

Developing skills, knowledge and understanding

Teachers and lecturers are free to select the skills, knowledge, understanding and contexts which are most appropriate for delivery in their centres.

Approaches to learning, teaching and assessment

The Unit is designed to provide flexibility and choice for both the learner and the teacher.

Learning and teaching activities should be designed to stimulate learners' interest, and to develop skills and knowledge to the standard required by the Outcomes and to the level defined by the associated Assessment Standards.

Sequence of delivery

The sequence of delivery and the distribution of time is a matter of professional judgement and is entirely at the discretion of the centre. Two main approaches are suggested, but other possibilities exist.

Each learner is expected to plan, construct and test several circuits during this Unit. Each Outcome represents one of the three main stages in circuit construction. It is therefore unlikely that a simple sequential approach is appropriate, as this would involve planning several circuits, then constructing them, then testing them.

Applying Outcomes 1, 2 and 3 sequentially to a series of circuits

A more appropriate approach is to develop a series of circuits of increasing complexity, building up skills with each circuit, until each learner reaches a level where the teacher has evidence that they have achieved the appropriate standard.

Each circuit would be developed through the following phases:

Outcome 1 (planning):
- design
- simulation
- 'purchase' of components

Outcome 2 (construction):
- breadboard try-out
- solder and connect

Outcome 3 (testing):
- test and evaluate

Assessment evidence could be collected from any stage of any of the circuits.

Topic approach

In this approach (with all constructing the same circuits) the following sequence of main topics would give opportunities to develop all of the required skills:

1 Constructing circuits on breadboard
2 Soldering and safety introduction
3 Constructing circuits on stripboard
4 Ordering components
5 Soldering small commercial PCB project or kit
6 Connection technologies

Useful resources

Suitably ventilated area for soldering (this depends on school safety policy and type of soldering irons and solder used).

Safety equipment
- safety glasses (optionally, with magnification)

Tools
- soldering irons
- soldering iron stand
- wire strippers
- solder sucker
- track cutter, side cutters, end cutters
- crimp tools
- multimeters, continuity testers
- magnifying light
- bread boards
- power supplies
- oscilloscope (can be PC plug-in)
- screwdriver, pliers, etc

Consumables
- lead-free solder (ideally rosin-free)
- stripboard
- range of components
- wire, wire markers, cable ties, etc.

Books
Some useful books include:
Electronics for Dummies: UK Edition by Ross, Shamieh and McComb
Make: Electronics: Learning Through Discovery by Charles Platt

Component suppliers
Electronic components and kits can be obtained from wide range of suppliers, including RS components, Picaxe, Rapid Electronics and Velleman.

Safety considerations and good practice

- No mains voltage work should be attempted by students and students should be reminded that this Unit does not qualify them to work on any mains circuit.
- Students should not construct any kind of radio transmitter or laser.
- Students should be aware of the dangers of using large capacitors, transformers or high voltage circuits; suggested limit 12V.
- Solder should be lead-free and the care of soldering irons should be covered before soldering begins.
- Students should know the location of a cold water tap when soldering.
- Keep the soldering tip tinned.
- When soldering, students should have soldering iron and solder in hands, work positioned or held correctly, and have safety glasses on.
- Wire work: preparing wires for insertion on stripboard and breadboard should be practiced by all students. Wires should lay flat on the surface, between the correct holes, with stripped ends a reasonable length. Other wire stripping should be practised with a range of wire stripping tools.

Approaches to delivering and assessing each Outcome

The learner must demonstrate attainment of **all** of the Outcomes and their associated Assessment Standards. Assessment must be valid, reliable and fit for purpose.

SQA does not specify the methods of assessment to be used; teachers should determine the most appropriate method for their learners. In many cases, evidence (which may be oral or observational) will be gathered during normal classroom activities, rather than through formal assessment instruments.

Centres are expected to maintain a detailed record of evidence, including oral or observational evidence. Evidence in written or presentation format should be retained by the centre.

Authentication of evidence
All evidence should be gathered under supervised conditions.

In order to ensure that the learner's work is their own, the following strategies are recommended:

- personal interviews with learners where teachers can ask additional questions about the completed work
- asking learners to do an oral presentation on their work
- ensuring learners are clear about acknowledging sources
- using checklists to record the authentication activity

Assessment evidence may be produced in a variety of formats including presentations, web pages, digital photographs, digital video, podcasts and blogs, and these can be stored by the learner (or teacher) within a proprietary e-portfolio, or simply by storing them in a secure folder. It should be noted that centres should verify that this evidence

is indeed that of the learner and ensure that no credit is given for archive information without further analysis or comment by the student.

Outcome 1
The learner will:

1 Plan the construction of electronic circuits by:

1.1 Listing, sourcing and costing the required components
1.2 Choosing a construction method
1.3 Creating a layout diagram

Notes on delivery of Outcome 1
For each circuit, learners should be shown how to create a list of required components, and then could be asked to produce an online shopping basket from a supplier, or physically select components from class supplies. Peer checking could be used.

Learners can build the circuit on breadboard, stripboard or using a proprietary kit or PCB.

Students should be able to create a layout diagram and use it to decide where to put each component.

Compared to National 4, SCQF level 5 learners are expected to be able to work more independently, and to be able to create their own layout diagrams.

Notes on assessment of Outcome 1
It is expected that the learner will plan many circuits during the Unit, gradually developing confidence and independence. Learners should produce a component list for at least one circuit. Evidence of competence in Assessment Standards 1.2 and 1.3 may be by observation, supported by answers to teacher questioning.

Outcome 2
The learner will:

2 Construct working electronic circuits by:

2.1 Inserting components on to prototype board
2.2 Soldering components on to strip board and pre-printed PCB
2.3 Connecting relays and other electromechanical devices
2.4 Applying a range of wiring techniques
2.5 Applying safe working practices

Notes on delivery of Outcome 2
The delivery of this Outcome should be based on actual construction of a series of electronic circuits, carefully chosen to develop and consolidate a full range of practical construction skills. Practice at crimping, tinning and fixing wires could be done to produce an example board of techniques. Video demonstrations of soldering techniques can be used. Safe working practices should be taught as a natural part of the learning activities. A safety poster could be produced by learners in groups.

Compared to National 4, SCQF level 5 learners are expected to be able to construct more complex circuits, using a wider range of components, including relays and other electromechanical devices.

Notes on assessment of Outcome 2
It is expected that the learner will construct many circuits during the Unit, gradually developing competence. Suitable evidence for Assessment Standards 2.1, 2.2, 2.3 and 2.4 will be a range of completed and working circuits, which show the full range of skills required. It is not necessary for all of these to be retained by the centre; photographic evidence may be used to supplement actual circuits. Evidence of safe working practice will be by teacher observation.

Outcome 3
The learner will:

3 Test electronic circuits by:

3.1 Creating and following a testing checklist
3.2 Using multimeters, logic probes, oscilloscopes and continuity testers
3.3 Measuring resistance, current, voltage (peak and rms) and frequency

Notes on delivery of Outcome 3
Activities with existing circuits could be used to develop the skills required for this Outcome. These could be combined with activities for the Circuit Design Unit. It is important that the teacher explains and models the checking/fault finding/problem solving approach, rather than just fixing problems for the learner.

Compared to National 4, SCQF level 5 learners are expected to be able to create their own testing checklists, make use of logic probes and oscilloscopes, and to measure frequency.

Notes on assessment of Outcome 3
Evidence for this Outcome may be observational.

Developing skills for learning, skills for life and skills for work

Learners are expected to develop broad generic skills as an integral part of their learning experience. The Unit Specification lists the skills for learning, skills for life and skills for work that learners should develop through this Unit. These are based on SQA's Skills Framework: Skills for Learning, Skills for Life and Skills for Work and must be built into the Unit where there are appropriate opportunities. The level of these skills will be appropriate to the level of the Unit.

The table below suggests opportunities to develop these skills during this Unit.

Skill	Opportunity to develop skill
2 Numeracy 2.3 Information handling	Drawing and interpreting circuit diagrams
5 Thinking skills 5.2 Understanding	Interpreting layout diagrams Using multimeters, logic probes, oscilloscopes and continuity testers appropriately
5.3 Applying	Choosing appropriate construction methods Applying safe working practices Using and creating checklists to identify faults

The Unit may also provide opportunities to develop or consolidate other skills for life, learning and work, including:

- Reading and writing
- Number processes
- Working with others
- Enterprise and citizenship
- Evaluating

Combining assessment within Units

It may be possible to develop learning/assessment activities which provide evidence that learners have achieved the standards for more than one Outcome within the Unit, thereby reducing the assessment burden on learners. Combining assessment of Outcomes (or parts of Outcomes) in this way is perfectly acceptable, but needs to be carefully managed to ensure that all Assessment Standards and Outcomes for the Unit are covered.

Administrative information

Published: January 2026 (version 3.0)

History of changes to National Unit Specification

Version	Description of change	Date
2.0	Unit code updated.	July 2019
3.0	We have added unit support notes. We have removed 'Practical' from the unit name and changed the unit code. **What you need to do differently** There is no impact on teaching, learning or assessment, however, you must use the new code for entries.	January 2026