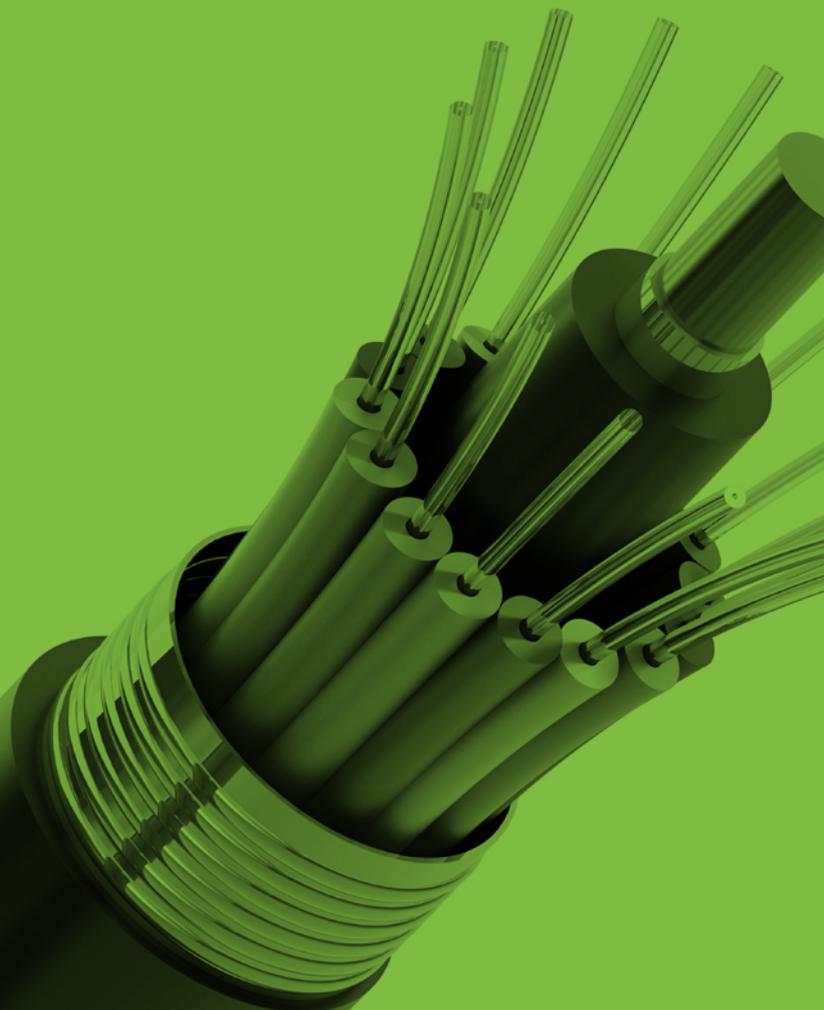GCSE (9-1)

eduqas
Part of WJEC

WJEC Eduqas GCSE (9-1) in
ELECTRONICS
ACCREDITED BY OFQUAL
DESIGNATED BY QUALIFICATIONS WALES

GUIDANCE FOR TEACHING

Teaching from 2017
For award from 2019

Version 2 December 2025

wjec
cbac

SUMMARY OF AMENDMENTS

Version	Description	Page number
2	Changes required due to submission of NEA switching to electronic upload: Section 'Component 3 – NEA' replaced, marked exemplar removed as exemplars are now available on Portal.	17-19

Contents

The WJEC Eduqas GCSE in Electronics provides a broad, coherent, satisfying and worthwhile course of study. It encourages learners to develop confidence in, and a positive attitude towards, electronics and to recognise its importance in their own lives and in today's technological society.

This WJEC Eduqas GCSE in Electronics specification sets out the knowledge, understanding and skills required to ensure progression from Key Stage 3 national curriculum science and mathematics requirements and progression to AS and A level.

The specification ensures that learners have the scientific and mathematical knowledge and understanding, and the engineering skills, to tackle problems in an electronics context. GCSE Electronics is to be studied in such a way as to develop and maintain the learner's interest in engineering subjects and the appreciation of their relevance to their everyday lives. The scope and nature of the learner's study should be coherent and practical. The practical work enables learners to see the theoretical knowledge contained in the specification in action and to gain greater understanding of the knowledge in a practical context.

Studying this GCSE in Electronics enables learners to:

- develop scientific knowledge and conceptual understanding of the behaviour of analogue and digital electrical/electronic circuits including a wide range of electronic components
- develop an understanding of the nature, processes and methods of electronics as an engineering discipline to help them answer questions about practical circuits
- be aware of new and emerging technologies
- develop and learn how to apply observational, practical, problem solving and evaluative skills in the identification of needs in the world around them and to propose and test electronic solutions
- progress to level 3 qualifications in electronics and engineering

Learners' understanding of the connections between the different aspects of the subject is a requirement of all GCSE specifications. In practice, this means that learners will be required to draw together different areas of knowledge, skills and understanding from across the full course of study.

Practical work is an intrinsic part of this specification. It is vitally important in developing a conceptual understanding of many topics and it enhances the experience and enjoyment of electronics. The practical skills developed are also fundamentally important to learners going on to further study in electronics, engineering and related subjects, and are transferable to many careers.

Additional ways that WJEC Eduqas can offer support:

- specimen assessment materials and mark schemes
- face-to-face CPD events
- examiners' reports on each question paper
- free access to past question papers and mark schemes via the secure website
- free access to question bank
- direct access to the subject officer
- free eBook resources
- free online resources
- exam results analysis
- online examination review

Aims of the Guidance for Teaching

The principal aim of the Guidance for Teaching is to offer support to teachers in delivery of the new **WJEC Eduqas GCSE in Electronics** specification and offers guidance as to the requirements of the qualification and the assessment process.

The guidance is **not intended as a comprehensive reference**, but as support for professional teachers to develop stimulating and exciting courses tailored to the needs and skills of their own students in their particular institutions.

Possible Delivery Model

The course can be taught with Component 1 in Year 10. In Year 11 learners will complete Component 2 and Component 3 (the NEA). Practical work should be taught as an integral part of the theory.

Year						
10	Component 1					
	Electronic systems and sub-systems	Circuit concepts	Resistive components in circuits	Switching circuits	Applications of diodes	Combinational logic systems
	Practical work					
11	Component 2					
	Operational amplifiers	Timing circuits		Sequential systems	Interfacing digital to analogue circuits	Control circuits
	Practical work and Component 3 NEA					

Assessment Objectives

	Objective
AO1	Demonstrate knowledge and understanding of the: (1a) ideas of electronics (1b) techniques and procedures of electronics
AO2	Apply knowledge and understanding of the: (1a) ideas of electronics (1b) techniques and procedures of electronics
AO3	Analyse problems and design: (1a) design electronic systems to address identified needs (1b) build electronic systems to address identified needs (only assessed in NEA) (1c) test electronic systems to address identified needs (only assessed in NEA) (1d) evaluate electronic systems to address identified needs.

The following questions in the sample assessment materials exemplify the WJEC interpretation of each of the assessment objectives:

AO1: demonstrate knowledge and understanding of the ideas, techniques and procedures of electronics.

Component 1 Q1(b) asks learners to draw logic gate symbols for AND and NOR gates. This question is based upon statement 1.6(b) identify and use NOT gates and 2-input AND, OR, NAND and NOR gates…' of the specification. Since the question requires learners to demonstrate their knowledge of scientific symbols in a familiar context, it is classed as AO1 strand 1a.

Component 1 Q2(c)(iii) asks learners to give the E24 colour code for a resistor in a circuit diagram. This question is based on the statement 1.3(c) select resistors for use in circuits by using the colour and E24 codes for values…of the specification. Since the question requires learners to demonstrate their knowledge of the E24 coding technique for resistors, this is classed as AO1 strand 1b.

AO2: apply knowledge and understanding of the ideas, techniques and procedures of electronics.

Component 2 Q6(a) asks learners to analyse a given system information and draw the output signal produce by the Schmitt inverter. This question is based on the statement 2.4(a) describe the action of a Schmitt inverter and its use in debouncing signals produced by mechanical switches and analogue sensors. This requires the application of ideas in unfamiliar context, it is classed as AO2 strand 1a.

Component 1 Q6(b) This question involves learners analysing a part complete truth table and using a logic system diagram to complete all the outputs on the truth table. This requires the application of logic procedures and is hence AO2 strand 1b.

AO3: analyse problems and design, build, test and evaluate electronic systems to address identified needs. Only stands 1a and 1d can be assessed on written papers.

Component 1 Q8(d)(ii) requires learners to design the process and output circuit stages for a cooling system. AO3 1a requires learners to analyse problems and design electronic systems to address identified needs. This is therefore classed as AO3 strand 1a.

Component 2 Q10 requires learners to analyse a control system flowchart design and evaluate the program against the specification. AO3 1d requires learners to analyse problems and evaluate electronic systems to address identified needs. This requires the learners to evaluate an electronic system and hence is classed as AO3 strand 1d.

Amplification of Content

This section gives amplification where needed to clarify specification content. The first column plan is taken directly from the specification. The second gives some additional elaboration of the electronics content column.

Learners will be required to draw together different areas of knowledge, skills and understanding from across the full course of study.

Synoptic questions will be set in both the Component 1 and Component 2 written exams. These questions will require learners to draw upon knowledge from *both components*. Examples of synoptic questions are included in the Sample Assessment Materials.

Component 1 – Discovering Electronics

Synoptic questions will be set in the Component 1 written exam which require learners to draw upon knowledge from Component 2.

1. ELECTRONIC SYSTEMS AND SUB-SYSTEMS

	Spec Statement	Comment
(a)	recognise that electronic systems are assembled from sensing, processing and output sub-systems, including: • sensing units: light, temperature, magnetic field, pressure, moisture, sound, rotation • signal processing: individual logic gates, latch, time delay, comparator • output devices: lamp, buzzer, solenoid, LED, actuator (servo), motor, loudspeaker	Learners need to be able recognise the input, processing and output sections of a system. Learners need to know the function of each of the units specified opposite in terms of the effect the input signal(s) has on the output. For example a pressure sensor is a digital sensor that converts pressure into an electrical signal. A high signal (logic 1) is produced at the output when someone stands on a pressure mat.
(b)	state the need for and use of transducer drivers	Learners need to understand that most electronic circuits operate on low voltage and current. In order to drive outputs a transducer driver is required to boost the current to operate output devices. Learners should be aware that high power loads (solenoids, motors and some lamps) are most likely to need a MOSFET based transducer driver. Lower power outputs like LED's / buzzers could also use a npn transistor switch as the transducer driver.
(c)	design and test electronic systems	Learners need to select appropriate input sensors, processing units and output devices to solve a variety of design scenarios and produce block diagrams for the solutions. Learners need to evaluate given system block diagrams against a given specification and (if necessary) suggest amendments to the system to bring the design closer to the design specification.

2. CIRCUIT CONCEPTS

	Spec Statement	Comment
(a)	draw, communicate and analyse circuits using standard circuit symbols using standard convention	
(b)	apply current and voltage rules in series and parallel circuits	Apply the **current at a junction** rule. Learners should be able to apply this rule to networks of resistors for example two resistors or other components, in parallel with another in series. Apply the **sum of voltages** rule. Learners should be able to apply this rule to two or more resistors or other components in series across a power supply.
(c)	use test equipment to make measurements to test electrical components and circuits including: multimeters (on voltage, current and resistance ranges), timing equipment, logic probes and oscilloscopes (or computers configured as oscilloscopes), including investigating current-voltage characteristics	Learners should be familiar with the use of a multimeter as a voltmeter, ammeter or resistance meter. Learners should be able to investigate the I-V characteristics of a resistor, filament lamp and diode, and explain the resulting characteristic graph. Learners should be familiar with signal generators producing sine, square and triangular waveforms. Learners should be familiar with a logic probe for testing digital circuits and the oscilloscope for AC circuits.
(d)	analyse circuits in terms of voltage, current, resistance, energy and power and use the equations: $V = IR$ $P = VI$ $P = I^2R$ $E = Pt$ and select and apply $P = \dfrac{V^2}{R}$	Learners should be able to apply these equations to individual components as well as in a full range of applications. For example in voltage divider circuits, sensor circuits, monostable and astable circuits, comparator circuits etc, as well as standard discrete applications. Use of E=Pt will be limited to questions calculating the energy transferred by a light, motor, led etc when used for a given period of time.

3. RESISTIVE COMPONENTS IN CIRCUITS

	Spec Statement	Comment
(a)	describe the effect of adding resistors in series and parallel	Learners should be aware that adding resistors in series **increases** resistance, whilst adding resistors in parallel **decreases** resistance.
(b)	use equations for series and parallel resistor combinations resistors in series $R = R_1 + R_2$ resistors in parallel $R = \dfrac{R_1 R_2}{R_1 + R_2}$	Learners should be able to use these equations to reduce networks of resistors to a single resistance. Networks may be series, parallel or combinations of both series and parallel components.
(c)	select resistors for use in a circuit by using the colour and E24 codes for values, tolerances and power ratings	Learners will need to apply the 4 band colour code to determine resistor values and select resistors from the E24 series. Learners will be required to determine the tolerance of resistors in order to determine the effect of this in timing calculations and current limiting applications.
(d)	use photosensitive devices, ntc thermistors, pressure, moisture and sound sensors, switches, potentiometers and pulse generators in circuits	The pulse generator has been included because the timing is controlled by a resistive element. The pulse generator can also be considered as an input sub-system.
(e)	design and test sensing circuits using these components by incorporating them into voltage dividers	The pulse generator will NOT be incorporated into a voltage divider.
(f)	design and use switches and pull-up or pull-down resistors to provide correct logic level/edge-triggered signals for logic gates and timing circuits	Learners should understand the reason for using pull-up and pull-down resistors is to provide the correct logic levels at a logic gate input.
(g)	select and apply the voltage divider equation in sensing circuits $V_{OUT} = \dfrac{R_2}{R_1 + R_2} V_{IN}$ for a voltage divider	Applications include LDR and thermistor sensors, as well as producing reference voltages for comparator circuits.
(h)	determine the value of a current-limiting resistor for LEDs in DC circuits.	In examination questions the forward voltage drop for LEDs will be given and will vary with the colour of the LED.

4. SWITCHING CIRCUITS

	Spec Statement	Comment
(a)	describe and analyse the operation and use of n-channel enhancement mode MOSFETs and npn transistors in switching circuits, including those which interface to outputs	Learners should understand that MOSFETs can be used with all output devices, whilst npn transistors are usually used for low power outputs, for example LEDs and lamps. Learners should be aware that the gate current of a MOSFET is negligible and can be assumed to be zero
(b)	select and apply the MOSFET equation $$I_D = g_M(V_{GS} - 3)$$	Understand that an enhancement mode MOSFET does not conduct until the gate threshold voltage (V_{GSth}) is reached. In calculations V_{GSth} is assumed to be 3 V.
(c)	use the following rules for an npn transistor circuit: for V_{IN} < 0.7 V, the transistor is off, $V_{BE} = V_{IN}$ and V_{CE} = the supply voltage for $V_{IN} \geq 0.7$ V, the transistor is on, V_{BE} = 0.7 V and V_{CE} = 0 V and select and apply $I_C = h_{FE} I_B$ until saturation is reached	Learners should be able to calculate either the base resistor, V_{IN} or base current from given data for the other two variables.
(d)	describe and analyse the operation and use of voltage comparator ICs	The convention of connecting the inverting input to the reference voltage and the sensing sub-system to the non-inverting input will be used.
(e)	compare the action of switching circuits based on MOSFETs, npn transistors and voltage comparator ICs	Learners should be aware that the comparator is the most sensitive to changes in the input signals, switches the fastest, but have limited output drive capablility. MOSFETs are fast and can handle high currents, but dissipate high power when carrying high currents. A npn transistor should be operated in saturation.
(f)	use data sheets to design switching circuits using MOSFETs, npn transistors and comparators	Learners should be able to select components based on their key characteristics from data sheets, e.g I_D and g_m for MOSFETs, $h_{FE,}$ and I_C for npn transistors.

5. APPLICATIONS OF DIODES

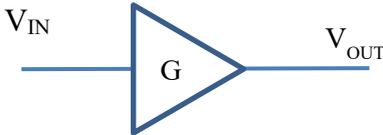|	Spec Statement	Comment
(a)	describe the I-V characteristics of a silicon diode	
(b)	describe the use of diodes for component protection in DC circuits and half-wave rectification of AC circuits	Learners should understand the use of the diode to protect devices from the reverse voltage caused by inductive loads, such as motors, relays and solenoids. Learners should be able to draw the output graph of a half wave rectifier for a sine wave input. Knowledge of smoothing and full wave rectification is not required.
(c)	describe the use of zener diodes in voltage regulation circuits	Learners should be able to describe how a fixed DC voltage output can be obtained by using a zener diode in reverse bias as part of a voltage divider.

6. COMBINATIONAL LOGIC SYSTEMS

	Spec Statement	Comment
(a)	recognise 1/0 as two-state logic levels	
(b)	identify and use NOT gates and 2-input AND, OR, NAND and NOR gates, singly and in combination	Combinations of up to 5 gates could be presented.
(c)	produce a suitable truth table from a given system specification and for a given logic circuit	Truth tables could contain up to 4 inputs.
(d)	use truth tables to analyse a system of gates	
(e)	use Boolean algebra to represent the output of truth tables or logic gates and use the basic Boolean identities $$\overline{A.B} = \overline{A} + \overline{B} \quad \text{and}$$ $$\overline{A + B} = \overline{A}.\overline{B}$$	Learners should be able to write down the Boolean expression for systems of up to 3 inputs where the output is a logic 1 for example $Q = A.B.C + A.\overline{B}.C$ No simplification is required.
(f)	design processing systems consisting of logic gates to solve problems	
(g)	simplify logic circuits using NAND gate redundancy	Show how the following logic gates can be made up from NAND gates: NOT, 2 input AND, OR and NOR gates. Implement a given logic circuit using NAND gates. Remove double inversions.
(h)	analyse and design systems from a given truth table to solve a given problem	Systems with up to 4 inputs should be expected.
(i)	use data sheets to select a logic IC for given applications and to identify pin connections	Logic ICs will be taken from the CMOS 4000 series and could include pinout diagrams of logic gates with up to 4 inputs.

Component 2 – Application of Electronics

Synoptic questions will be set in the Component 2 written exam which require learners to draw upon knowledge from Component 1.

1. OPERATIONAL AMPLIFIERS

	Spec Statement	Comment
(a)	state that amplifiers increase the power or voltage of signals and select and apply the equation $G = \dfrac{V_{OUT}}{V_{IN}}$	Learners should be able to apply this formula to a schematic diagram as shown below: The input and output signal may be provided in graph form. Learners might be required to complete graphs from information provided.
(b)	draw a gain-frequency graph for an amplifier, measure the bandwidth from the graph and describe the trade-off between gain and bandwidth	Learners will need to understand the gain-bandwidth product for a given amplifier, and that bandwidth is measured to the point of 70% of maximum gain.
(c)	produce and interpret voltage-time graphs for the input and output signals of amplifiers	Input signals could be sine waves, square waves or triangular waves.
(d)	draw and analyse circuits for non-inverting and inverting amplifiers based upon an op-amp	
(e)	show graphically and explain how clipping distortion may affect the output signal of an amplifier	Recognise clipping distortion, and describe how it can be reduced by increasing the supply voltage, reducing the gain or reducing input amplitude.
(f)	select and apply the equations $G = 1 + \dfrac{R_F}{R_1}$ and $G = -\dfrac{R_F}{R_{IN}}$ for op-amp circuits to select resistors to produce a given gain	Learners are expected to select resistors equal or greater than 1 kΩ.

(g)	draw and analyse circuits for mixers based on a summing op-amp circuit and select and apply the equation for output voltage $$V_{OUT} = -R_F \left(\frac{V_1}{R_1} + \frac{V_2}{R_2} + ... \right) \text{summing}$$ amplifier output voltage	Analysis of mixers with up to four inputs can be expected.
(h)	draw a block diagram of a typical amplifier system consisting of signal source, preamplifier, mixer, power amplifier and loudspeaker	A minimum of two input signal sources will need to be shown.

2. TIMING CIRCUITS

	Spec Statement	Comment
(a)	describe how a RC network can produce a time delay	Appreciate that a time delay circuit has to be buffered to be of practical use.
(b)	describe how the voltage across a charging or discharging capacitor in a RC circuit varies with time, including the interpretation of decay graphs for RC networks	Explain in qualitative terms how a time delay may be changed.
(c)	describe how the time delay may be changed by varying R and/or C, including interpretation of the voltage-time graph for monostable and astable timers	Learners should be able to relate the effect of changing R and C with reference to appropriate formula.
(d)	describe the action of a 555 monostable timer and then use the equation $T = 1.1RC$, where T is the pulse duration	
(e)	describe the action of a 555 astable timer in terms of period and mark-space ratio	
(f)	use an oscilloscope, (or a computer configured as an oscilloscope) to measure the amplitude and period of the output of an astable timer	Learners should be able to calculate amplitude and period from a trace shown on an oscilloscope screen when provided with the time/cm and volts/cm values.
(g)	select and apply equations for the frequency and mark-space ratio of a 555 astable timer $$f = \frac{1}{T}$$ frequency, period relationship $$f = \frac{1.44}{\left(R_1 + 2R_2\right)C}$$ frequency of an astable $$\frac{T_{ON}}{T_{OFF}} = \frac{R_1 + R_2}{R_2}$$ mark/space ratio of an astable	
(h)	draw and analyse the circuit diagrams for a monostable and/or astable timer based on a 555 IC	Learners should be able to draw the complete 555 monostable and/or astable circuit by adding components and connections to the schematic block diagram of a 555 timer.

3. SEQUENTIAL SYSTEMS

	Spec Statement	Comment
(a)	draw the circuit diagram and describe the action of rising-edge-triggered D-type flip-flops used in data transfer, latches, 1- bit and 2-bit binary up-counters	Learners should be able to draw these circuits without being given the outline of a D-type flip-flop.
(b)	complete timing diagrams for D-type flip-flops used in data transfer, latches, 1-bit and 2-bit binary up- counters	Learners may be asked to complete graphs of Q and $\overline{Q}$.
(c)	complete a truth table to show the signals needed to display a given character on a common cathode 7-segment display	Characters will include numbers and certain letters for example A, C, E, F, H, I, L, O, P, S, U, b,d,h,n.
(d)	describe the action of and draw timing diagrams for dedicated binary and BCD counters	Understand the need for BCD counters to reduce the need for additional logic circuitry to reset binary counters for use with BCD counters.
(e)	recognise and analyse the block diagram and timing diagrams for a single digit decimal counting system consisting of: 4-bit BCD counter, decoder/driver and 7-segment display	Realise that decoders are available integrated with BCD counters in a single IC or separately.
(f)	design and analyse systems using counters (which reset at a given value) and combinational logic to produce a given sequence	Use of logic gates to reset at a given count.
(g)	design a sequencer using a 4017 decade counter and draw timing diagrams	Realise that the reset pin can be used to change the sequence length. Designs could include logic gates.

4. INTERFACING DIGITAL TO ANALOGUE CIRCUITS

	Spec Statement	Comment
(a)	describe the action of a Schmitt inverter and its use in debouncing signals produced by mechanical switches and analogue sensors	Learners should understand that mechanical switches and analogue sensors can produce multiple triggers, or slow changing signals respectively that cause errors at the input to digital systems.
(b)	compare the properties of transistors, comparators and Schmitt inverters as interfaces between analogue and digital systems	
(c)	design interface circuits using npn transistors, MOSFETs and comparators to interface input sensors to outputs	Learners should consider switching speed, output current capability, and response time of input sensors before selecting the most appropriate interface device. Designs could involve circuit calculations.

5. CONTROL CIRCUITS

	Spec Statement	Comment
(a)	define a microcontroller as a programable integrated circuit into which software can be loaded to carry out a range of different tasks	Know that simple control systems consist of software, micro-controller, input sensors, interface and output devices.
(b)	interface sensing circuits and output devices with microcontrollers	Input circuits could contain both digital and/or analogue sensors. Some analogue sensors may need to be processed by a Schmitt trigger to turn the analogue signal into a digital signal. Output circuits could contain npn transistors or MOSFETs
(c)	design and analyse flowchart programs to enable microcontrollers to perform tasks	Design, modify and analyse flowcharts for a given specification. Use the following operations in flowcharts: input/output, counting, branching, testing, time delay and simple arithmetic operations.
(d)	describe applications of microcontrollers and the reasons for their adoption as standard technology in the vehicle and domestic appliance industry	Applications could include, engine management systems, climate control, ABS braking, airbag deployment in vehicles. dishwasher, washing machines, central heating in domestic appliances.

Component 3 – NEA

Extended system design and realisation task (NEA)

See sections 2.3 and 3.2 of the specification (GCSE Electronics**) and** e-Submission **for information on how to upload work for moderation.**

NEA task forms (available on GCSE Electronics **under NEA) must be completed for each learner and submitted with reports.** The task form gives the assessment criteria for the Component. It is also used to record learner details, details of the project and marks awarded. The task form includes a declaration that **must be signed by both the learner and the teacher**. Note that declarations must be signed for **all** learners – not just those selected for moderation.

Further guidance for the NEA is given below:

General Guidance
Learners must select their **own problem** on which their project will be based. This should result in a wide range of different projects being produced by each centre.

Projects should be neither under nor over ambitious. The teacher must agree and sign off the problem on learners' tasks sheets, ensuring that it is appropriate for the ability and interests of the learner.

Circuits may be constructed on prototype board, strip board or printed circuit board. The layout and mounting of components and wiring should be neat, logical and allow testing and fault finding of the system.

Learners should progress through the following 4 stages and produce reports in 4 sections corresponding to these (see later section on Project Reports).

System Planning
When a problem has been chosen, learners should produce a design specification in both qualitative and quantitative terms (typically at least 3 of each), and including 2 or more detailed realistic **measurable** parameters. These could include parameters such as temperature ranges, pressure etc. needed for their chosen application.

Specifications should contain realistic and **justified** numerical parameters, against which the performance of the final circuit can be judged. Parameters should be based on the required operation of the system. Parameters such as maximum current, supply voltage or component properties would **not** be valid, without justification.

System Development

The system should be developed as a number of sub-systems, individually tested and evaluated before being incorporated into the complete system. All test results should be recorded as tables and/or graphs, where appropriate. Photographs of test equipment showing measurement or simulations can also be included as an effective way of showing evidence of testing.

For projects that include microcontrollers programmed using flowcharts, a subroutine / procedure can be considered as **one** sub-system as long as a specification is provided for it and it can be tested and evaluated in a similar fashion to a component based sub-system.

System Realisation

The complete system should be fully tested and test results recorded. When necessary, learners should attempt to make any modifications needed for their circuit to meet the specification and produce a final set of performance parameters for the completed system.

A photograph of the finished circuit must be included in this section. No other form of evidence (e.g. videos) should be included.

Evaluation

Learners should, by referring to their test results, evaluate the final system against the design specification and suggest further developments. Further developments should relate to improving the operation of the system rather than superficial changes to circuits.

Project reports

Reports should be presented in the 4 sections described above: System planning, System Development, System Realisation and Evaluation.

Learners should aim to ensure that evidence for each of the assessment criteria (given on the task form) is presented in the appropriate section of the report.

Assessment

The NEA is internally marked by teachers using the assessment criteria given on the task form. The criteria descriptor which best matches the candidate's work should be identified and awarded. Criteria partially achieved can be taken into account when determining the mark awarded.

The **criteria achieved, partially achieved** and **not achieved** and **marks awarded** for each section **must be clearly recorded on the candidates' task form** – see exemplars with completed task forms on Portal.

Marks can only be awarded when there is supporting evidence. **Learners' reports must be annotated to show where each of the criteria have been achieved and awarded** – see exemplars on Portal. It is helpful if teachers comment on the extent to which the circuit worked and met the specification.

Marks can only be awarded for learners' own work. Any assistance that goes beyond the guidance given in the specification must be recorded on the task form and taken into account when marking. The centre is responsible for carrying out internal standardisation where two or more teachers have been involved in the marking of the work submitted.

Submission of moderation samples

Once all learners' work has been marked, the marks must be entered into the online IAMIS system and sent electronically to WJEC. The online system will then select and return the candidates identified for the moderation sample.

The moderation samples must be in electronic form (scanned if necessary) and uploaded to the IAMIS system. Each sample must be uploaded as a single pdf document with the candidate number included as part of the filename. Guidance can be found on e-Submission.

Each sample must include:

- a completed task form (signed by both the candidate and teacher, showing which criteria have been achieved, the marks awarded for each section and the total mark)

- the task report, in 4 sections (see above), clearly identified and annotated by teachers to show where the assessment criteria awarded, have been achieved

- photographic evidence of the completed physical system.