



General Certificate of Secondary Education

Electronics 3432

Practical Work & Research Assignment

Report on the Examination

2007 examination - June series

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General Comments

Most Centres managed to make the May 5th deadline for the submission of coursework. Within the whole entry, there were the usual individual problems, but overall the standard of the assessed coursework submitted continues to improve as feedback is put into practice.

The most widespread problems continue to be with the administration tasks:

- Student signatures are required on the CRF for marks to be registered by AQA.
- Supervisor signatures are required to provide verification.
- Candidate marks must be submitted on the AQA headed Candidate Record Sheets and not the amplification marking grids which are issued for guidance only.
- Centre Declaration Sheets need to be signed by both the Prime Marker and the Head of Centre.
- Some photographs in the practical reports were of a poor quality making it difficult to confirm marks.

Overall, the standard of prime marking by supervisors continues to improve with more detailed annotation being provided. Although most of the prime marking was within tolerance, over the two assignments an appreciable number of centres were at the limit of tolerance.

Centres that continue to produce PCB solutions are advised to switch to a breadboard construction as this will help candidates deal with some questions on the theory papers. It will also allow candidates more time to concentrate on addressing the marking criteria which will ultimately lead to a better grade.

Except for centres using old stationary, the new marking grids had 1(d) and 1(e) the correct way round on the research grid allowing the mark for 'current effects' to precede that for 'future developments'. It was noted with some concern that some centres were providing a template for the research piece which did not address the issues referred to either in the specification, or on the help sheets or as explained at the training sessions. This practice can only be detrimental to candidates and those who produce such sheets need to check them carefully.

Other issues noted, but not registered as common faults:

- Some centres again had work returned due to the lack of annotation by prime markers.
- Some centres relied too much on a generic format either in the practical or research assignment thus allowing a rather limited response by candidates in terms of the tasks being independent and original work.
- There was still some evidence of pupils failing to submit research assignments. Supervisors should continue to emphasise the unacceptability of this practice.

The moderating team would again urge those involved in delivering the specification to attend one of the AQA standardisation meetings that normally take place during the autumn term. These meetings allow those attending to review the assessment process and to discuss the criteria used in both marking and moderating the assignments. These training days are intended to give teachers and supervisors examples of best practice so that the criteria can be efficiently targeted. Details of the training days can be obtained from the Subject Officer or from the AQA website (www.aqa.org.uk). AQA regret the late cancellation of the London training day last year due to sudden illness of the presenter.

Practical Work (a photograph must be provided)

General: Many candidates continue to show evidence of developing a project using a systems approach (input/process/output). The plan should involve both a systems diagram and some consideration of viable alternatives that could be used to achieve a similar outcome. However, some candidates again missed out on the specification mark by overlooking some quite obvious electronic parameters. Once again, some very capable candidates were too ambitious for GCSE level and sacrificed marks in order to pursue their own agenda. Careful guidance by the supervisor is needed in these situations.

At the lower end of the ability range, a number of recipe circuits were seen with little reference made in the report to the specification, development or measurements made. Very often the 555 timer was the only system used. This put considerable constraints on the ability of the candidate to gain marks. Such projects could easily open up more of the marking scheme to candidates if the 555 were to be preceded, e.g. by a logic gate and two inputs (switch/detector/resistor chains).

Photographs: Many Centres are now producing good digital images both of the sub-systems and of the final project. In the photograph showing the final circuit, it should be possible to see some evidence of colour codes, polarity, interconnections and the overall planned layout of the circuit. Such detail will enable the moderator to confirm the award of (A8, B, B2, some of B3 & B5 and D3).

Planning Skills

- A1 Most candidates achieved this. A title with aim (context) is required at this stage. It is expected that candidates will have discussed the general area of application with their supervisor whilst still retaining control over the final decision.
- A2 Many more candidates are now correctly using the systems (block) diagram at this stage and fewer flowcharts are being produced. The System diagram approach to circuit design is embedded in the specification (section 9.5 page 18).
- A3 The research section continues to improve. It is advisable to place the reference at the point of use. Just a few candidates submitted references to material which appeared not to play a useful part in the development of the project. Surveys / photocopied extracts from catalogues appear to have been almost eradicated.
- A4 This year there was clearer written evidence in the reports or supporting comments from the supervisor that the investigation had been a real practical and not carried out on CAD. It is difficult for the moderator to verify this mark if the report only refers to a CAD diagram and there is no supporting comment from the supervisor. There should be some reference to a real circuit and the tests done.
- A5 Many candidates again managed to obtain this mark. However, a few candidates had not received guidance or a review at an early stage and had unnecessarily failed to gain the mark. In a few cases, final performance results were being imported back to the planning stage. (A5 should not be awarded for this). Less able candidates still require guidance here. Please encourage candidates to quote a specification with a tolerance. E.g. Expected to work on a supply of 9V down to 6V; Output $f = 1\text{KHz} \pm 50\text{Hz}$.

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- A6 This mark requires a little vision rather than a purely prescriptive approach. Alternatives must meet the same initial specification, but can either be changes in sub-systems or changes in the whole system. Two valid reasons for the choice must be given. Such reasons may be cost, complexity, availability, own knowledge etc. A6 should not be awarded for alternative projects. This area proved to be fertile ground for the award of the A3 mark.
- A7 The labelled circuit diagram for the whole system is still in most cases best done by hand. CAD packages are useful, but unless used with care the final circuit can lack the detailed information which is needed for a competent Electronics student to recreate the circuit. E.g. default values get left in, not all IC's are available and sometimes not all pins are shown. Candidates are asked not to forget chip and pin numbers in their diagrams, or power rail and component values.
- A8 Protoboard diagrams are used to show that some planning has been done with respect to the position of the components on the breadboard. As an alternative to such a diagram, evidence for this planning can also be gained from a suitable photograph. More centres were awarding on this basis.
- A9 This assessment point is intended as a discriminator and again proved to be so. The candidate must provide evidence within the report that component data has been considered when selecting a component and that evidence of a relevant calculation also exists. The data and calculation are tied.
E.g. To protect an LED with an I (typ) = 10mA on a 9V supply;
Show $R=V/I$ calc to give 680 ohm value.
Or show $P=IV$ calc to confirm that $1/8^{\text{th}}$ W resistor would be suitable.
A derived truth table is also acceptable for this mark.
Cost calculations are not deemed to be appropriate for this mark.

Realization Skills

General: Attention is drawn to B4 and B5. These marks help to foster the 'build and test' approach as each sub-system is considered. Moderators are unable to support the award of B4 and B5 purely on the basis of 'it all works', so an individual sub-system and the collective circuit must be shown to work.

- B1 'Neat and logical layout' relates to the ease with which wires can be traced during fault finding and the accessibility of test points, however, excess wire and poor component locations should be penalised. Photographic evidence is required to verify this mark.
- B2 Clear photographic evidence and / or supporting evidence from the supervisor are required when considering the correct orientation of polarised and active components.
- B3 A number of candidates have started to provide good quality risk assessments and this is to be encouraged. However, some photographs clearly show that the theory does not always get put into practice. Photographic evidence of shorted components and report statements indicating a 'trial and error' approach to circuit construction makes the award of this mark difficult to support.

- B4 Less able candidates working on limited systems and able candidates working on 'lifted' complex systems continue to find it difficult to gain this mark. Evidence is needed within the report which shows that a sub-system has been tested and that it works in its own right for this mark to be awarded.
- B5 Evidence that all of the sub-systems work together.
For B4 / B5, statements carrying a little more substance than 'it works' must be used as these two stages act as discriminators. It is normally expected that the result of a test is reported to substantiate the claim to the B4 / B5 marks.
- B6 This mark is to be awarded if the candidate appreciates that there is a fault and is able to locate the point of the fault. This area continues to be poorly reported and if awarded, further amplification may need to be given by the supervisor.
- B7 This mark is to be awarded if the candidate made a systematic attempt to rectify the fault. It is expected that in some cases acknowledged discussions with the supervisor may be necessary but yet again it was not well reported by candidates.

Testing and Evaluation Skills

- C1 Testing of the circuits continues to be poorly reported by candidates. All too often candidates omit to say what instrument was used and at which point in the circuit the measurement was made. Supporting evidence from the supervisor is helpful when such details have been omitted.
- C2 If A5 has not been awarded then this mark cannot be gained since a record of the testing must include the two numerical specifications given in A5. More candidates continue to access this mark since a better attempt at A5 is being made.
- C3 Presenting the initial and final specification in a tabulated format is to be encouraged as the existence of the table can be used to award D4. The successful targeting of this mark continues to improve.
- C4 If improvements are necessary, they should be aimed at meeting the initial specification more accurately and should not change the function of the system. It is acceptable to just discuss the improvements rather than carry them out. Care should be made to distinguish between this improvement (if needed) C4 and a modification as a result of finding a specific fault (B7).
- C5 This mark is at the behest of the supervisor who must make a judgement as to the level of contribution from the candidate taken across all four skill levels. There was continued evidence of honest appraisals being made by supervisors here through the detailed annotation supplied.

Communication Skills

- D1 Although many reports were adequate, again it was noted that not enough attention was given to the development of the project. Very often the first circuit diagram encountered was a full circuit diagram. Ideally, the sub-systems should be documented in sequence so that component values, calculations, tests and modifications can be dealt with as each section is built.
- D2 There is some hierarchical structure in D1- D2 since 'easy to read' refers to a technical document. If the technical content is not adequate in D1 then this may affect D2.
- D3 This mark should only be awarded if there is photographic evidence and some carefully produced diagrams. The diagrams should be neat and carry component values / IC numbers / pin numbers and power supply values.
- D4 This should be read as 'If a graph or table are thought not to be required by the assessor, a mark should be awarded if any other mark is scored'.
Note: A table is always available through the comparison of the specification before and after i.e. A5 and C2/3. Supervisors are asked to seek positive evidence for the award of this mark.

Research Assignment (Electronics in Society)

General: Centres and candidates continue to target this assignment more effectively, although less able candidates still fail to identify the role of the electronics in the system being described. There was evidence that centres were providing better guidance in this assignment.

Those candidates adopting the continuous prose essay style, made better use of paragraphs, side headings and highlighted words and phrases. This approach is to be encouraged as it made prime marking and moderation much easier.

Centres providing candidates with a centre generated pro-forma should take care to check that headings supplied actually address the marking criteria. There were one or two instances this year suggesting that candidates had been misled.

There were no malpractice issues reported this year within this component, but it is worth reminding students of the dangers of IT generated coursework.

Candidates should be warned about the dangers of sharing documents, information and formatting. Each candidate should express views in their own way to avoid contravening the malpractice rules. The copying of large chunks of information from any source should be discouraged.

More detailed comments referring to the individual assessment points are set out below and are based upon advice given at training days and evidence from the moderation process.

Content

- 1(a) Most candidates achieved this mark, although less able candidates struggled to keep the FOUR electronic systems in FOUR different areas of society and failed to identify the part played by the electronics. Some omitted to allocate an area of society to each system. Electrical / Electronic problems continue to diminish, indicating better vetting of ideas by supervisors.
- 1(b) This mark continues to be targeted more effectively as more candidates are able to find THREE electronic systems within the SAME specified area of society.
- 1(c) This mark again acted as a discriminator. Candidates had to provide an extra THREE systems from their chosen area. It is expected that the same amount of detail be supplied as for 1(b) and that 1(c) does not degenerate into a simple list.
- 1(d) Based upon the specific topic area, this mark is for discussing recent effects on society. No value judgement is needed for this mark.
- 1(e) This section required an indication of how the future development of THREE of the systems in the specified area would affect society. This again proved to be a difficult mark to gain and required quite detailed research and some credible imagination. There were less “Star Trek” answers, but there was evidence of marks still being wrongly awarded for the basic ‘bigger, better, faster’ approach.

Analysis

- 2(a) Stating that a particular system has had a good/bad effect on society is the analysis and as such this triggers the mark. This year there was less ambiguity in the statements. More candidates made use of side headings or started statements with 'One positive effect of
- 2(b) As for 2(a), but within the specified topic area. There is evidence that more candidates are appreciating this as a subtle extension of 1(d).
E.g. A mobile phone being used as a portable communication base leading to more communications traffic can be argued as having an effect on society 1(d).
E.g. A mobile phone allowing communication in a remote environment (hiking) can be argued from a safety angle as a positive effect on society. 2(b)
- 2(c) Although there were continued good signs again this year, prime markers tended to be over generous on this mark. A significant number of candidates failed to gain this mark either because they did not reach a justified conclusion from evidence gained, or their understanding of social, economic and environmental impact on society was limited.
- 2(d) As for 2(c) but within the specified topic area. Generous marking noted.
- 2(e) This again proved to be the most difficult mark to gain, even though only one of Ethical, European, Cultural and Moral issues needed to be addressed. However, there continued to be an encouraging trend in the number of candidates who were getting to grips with the issue.

Communication

Given that the report is an attempt to address the issues set out in the sections 'CONTENT' and 'ANALYSIS', the criteria for communication is not swayed by any views, judgements or technical content. Marks are awarded in this section solely on how the research has been communicated.

- 3(a) The majority of candidates presented their work clearly with most using ICT skills well. A few word processed documents again failed to be 'spell checked'. A number of candidates had a poor appreciation of page formatting which tended to detract from the clarity of the report. Those scoring well had addressed appropriate marking points in each paragraph and had introduced the points clearly. Overall, marking points continue to be more effectively targeted.
- 3(b) More candidates this year adopted a good style and ordered their report in a logical way addressing specific points in turn. Better use was made of side headings to identify the assessment point being addressed.
- 3(c) Strategies continue to be developed to maintain a concise report whilst addressing the marking points.

- 3(d) Less able candidates either ignored this mark or produced cartoon / consumer style pictures. Otherwise, there were some good pictures used effectively to break up the text and to convey technical information.
A picture of a mobile phone as an artefact was less effective than a schematic showing how the phone communicated through a cell network.
A rough guide is that there should be at least one picture / illustration for every two artefacts described (some should be of a technical nature). Colour pictures worked best and postage stamp size pictures were least effective.
- 3(e) Again, a number of candidates omitted their list of references thus forfeiting a relatively easy mark. Candidates should be encouraged to use embedded references and then to list all references in an appendix together with any other acknowledgements. Please note that a search engine or book title is not in itself acceptable as a reference. A full web page address / book, magazine or newspaper edition & page are needed.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.