RECOGNISING ACHIEVEMENT

GCSE

Design & Technology (Electronic Products)

General Certificate of Secondary Education **GCSE 1953**

General Certificate of Secondary Education (Short Course) **GCSE 1053**

Report on the Components

June 2006

1953/1053/MS/R/06

Oxford Cambridge and RSA Examinations

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

The reports on the Examinations provide information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the syllabus content, of the operation of the scheme of assessment and of the application of assessment criteria.

Mark schemes and Reports should be read in conjunction with the published question papers.

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CONTENTS

General Certificate of Secondary Education Electronic Products (1953)

General Certificate of Secondary Education (Short Course) Electronic Products (1053)

REPORTS ON THE COMPONENTS

Unit	Content	Page
*	Chief Examiner's Report	5
1953/05	Coursework	5
1053/01 1953/01	Paper 1 (Foundation)	8
1053/02 1953/02	Paper 2 (Higher)	8
1953/03	Paper 3 (Foundation)	12
1953/04	Paper 4 (Higher)	12
*	Grade Thresholds	15

Chief Examiner's Report

General Comments

Yet again improvement in quality has been noted in many areas of coursework. The trend over the past few years has been for centre marking to be increasingly objective and consequently final marks have required fewer adjustments at moderation.
On the papers the majority of candidates are attempting all of the questions and at least giving themselves a chance of gaining marks. One area that is giving concern is the lack of knowledge of how to describe processes, tools and components accurately, using technically correct terms. Questions in all papers that required general knowledge of technology and of design in society produced creditable responses. Questions dealing with basic components and the use of these within electronic circuits reflected a lack of confidence on the part of a number of candidates and marks were lost.
The move to include formulae sheets in with the papers again seems to have been successful in ensuring that all candidates have the correct sheet in front of them in the examination.
This examination was however the last one where formulae sheets will be used for the Electronic Products papers. In future any formula that is required will be included in the question.

The individual component reports that follow should be read alongside the question papers and mark schemes.

1953/05 Internal Assessment

General Comments.

It is pleasing to note that for the vast majority of centres few if any adjustments to marks were required. Over the life of the specification, standards of marking and internal moderation have gradually improved, as teachers have become more aware of the detailed requirements of each individual assessment objective.
The increasing use of ICT continues to add to the presentation of the design folders but many candidates need to consider how they annotate their work, in order to clearly show the relevance of each piece produced. Examples were seen with several pages of computer generated images with no headings or evaluative comments, making it very difficult to see the relevance of the work presented.
It is important to stress once again that electronics is the essential element in this Specification, which must not be overlooked. A number of candidates spent a lot of time designing enclosures, but failed to offer more than one basic circuit idea. The implications of this are that they score low marks in both sections three and four as there is little development work done.
The highest attaining candidates were those who had selected their own individual problems to solve and had generated a good range of valid ideas which were then carefully evaluated before a choice was made.

Specific Comments on the Assessment Objectives.

Objective 1: Identification of a need or opportunity leading to a design brief.

There are still a few centres who allow their candidates to spend too long on this section to the detriment of later work. The weakest point remains the identification of possible users of the product and candidates would benefit from consideration of; age range, gender, interests, nationality, and ability/disability of the users. The use of digital images, extracts from magazines or papers, or brief statistics to support the need, is to be encouraged. Design briefs in most cases were clear, but a number had included specification points.

Objective 2: Research into the design brief that results in a specification.

Internet based research was widely used but candidates must evaluate the material in order to gain credit. Simply printing out web pages is a non productive activity.
Survey / questionnaire techniques, in many cases remained basic, resulting in information that was not of any great benefit to the candidate. Better examples, in which the questions were carefully framed to discover what the user required from the product, did in fact lead to information that was used to form the specification. It would be beneficial if candidates presented their surveys to potential users of the product which should result in more valid comments compared to the “school based” surveys. Work on existing products in the majority of cases was based on those products found on a website. For many candidates greater benefit would come from examining in detail products or components that have *similar* functions to their intended product rather than searching for those that are *identical* in function. E.g. those including a number display could examine any item with a 7 segment display. This approach would give functional information; the website approach is only likely to give evidence of specifications and manufacturing process for the casing.
Specifications were generally well produced but the stumbling block is still the inclusion of relevant aspects for the, “System to ensure control over the production of the product in batches”. This needs to refer to a system which would allow standardised products to be produced efficiently. Several instances were found where candidates explained in detail the different levels of production e.g. job, batch and mass production. This is not required in this section although it is part of the Specification knowledge base.

Objective 3: Generation of design solutions.

This is one area where the appropriate use of ICT can make a substantial impact. In the better examples this was certainly the case. The use of CAD packages and the Internet when used effectively are a very powerful tool but candidates must still evaluate each idea against the specification to ensure that the user’s needs are catered for. A lack of realistic circuit ideas often coupled to a proliferation of case shapes illustrated the opposite end of the spectrum. We must not lose sight of the fact that this Specification is firmly based upon the Electronics element.
Several instances were seen, particularly where centres had restricted their candidates themes, of generic sheets being used as part of the design work. It would be useful if these were clearly labelled to indicate their source.
Greater use was made of ProDesktop for case designs and whilst this is encouraged care must be taken to show specific detail. How the base would be fitted for example. The use of hand drawn sketches to investigate a range of case ideas prior to ProDesktop development still has its place and should not be overlooked.
Each idea for the circuit and case should be evaluated to determine the suitability. A more objective approach to this would be beneficial, checking to ascertain whether the design fulfils the requirements of the specification.
Decisions on which circuit and case are to be taken forward for development should be clear and supported by relevant information. This still remains an area of weakness.
Communication was varied but in the best examples was excellent, with a wide range of techniques being used.

Objective 4: Product development.

Extensive use of CAD for testing and good photographs of breadboards was seen. From the number of non-working circuits that were seen it would appear that CAD testing alone is not proving to give such accurate information for some candidates, and circuit breadboarding may give more reliable results.
When developing circuits and producing the PCB artwork editing facilities offered by CAD could be used more to benefit the candidate. Centres offering PIC based projects should realise that credit is available for evidence of testing during simulation. A print of the screen image or a photograph of the test board would be suitable. A number of projects using PIC`s failed to explain how the program was developed and tested.

A wide variety of enclosures were seen, from bought in cases modified to suit the purpose to individually designed packages. Whatever approach is taken it is important that the final product represents as near a professional finish as is possible in the school environment. Some excellent cases were seen; particularly those produced using CAD/CAM facilities. PCBs should be suitably mounted as should batteries and the decisions on all of these points should be included within this section. When modifying the case top to add, for example, a row of LEDs or a pattern of holes to let out sound, the use of a jig or template would allow the candidate to consider the implications for quantity manufacture. This is the area which is often overlooked.

Objective 5: Product planning and realisation.

A large proportion of the available marks for this Objective are awarded for planning and there must be evidence for this in the folder otherwise the maximum that may be awarded is 3 marks. More action plans were seen this year including, tools and equipment used, health and safety issues, and quality control.
The most frequent cause of low marks in this section resulted from uncompleted products. It is easy to underestimate how much time the practical work can take but in a 40 hour project we must allow a minimum of 20 hours, which is in line with the total marks available.
At the higher achieving level some excellent projects were seen with little increase in the number of PIC based products. Care must be taken when deciding to adopt a PIC based solution, as instances of inappropriate use can lead to unnecessarily complex solutions, when traditional alternatives would have been more suitable.
A small number of commercial kit based projects were seen and these are to be discouraged as they do not meet the spirit of this Specification which is for the candidates to design and build a marketable electronics product.
When awarding marks for this section, it must be remembered that there must be clear evidence in the quality of the practical outcome to support the assessment made. This remains the area where most moderation adjustments are required, usually as a result of high marks being awarded for uncompleted or low quality work.

Objective 6: Evaluation and testing

The majority of candidates produced reasonable results in this section but uncompleted products proved a problem for some. Even in these cases there were many features which could have been assessed against the specification e.g. if a PCB had been manufactured the tracks could be tested for continuity. Testing remains subjective, in many cases not covering the conditions in which the device was intended to operate. Numeric data collected as a result of testing is required at the higher level. Digital images of testing the final product produced useful evidence. Few candidates had commented upon the performance of the system used to control manufacture.

Presentation

It must be remembered that this section is concerned with the logical and concise nature of the folder and not simply the aesthetics. Separators for each section are to be encouraged as they demonstrate a logical order in the production of the folder.

Papers 1 and 2
General Comments

The papers produced a spread of marks across almost the full range.
As in previous years Papers 1 and 2 included questions on CAD / CAM and product analysis as the two overlap questions, answered by both tiers of candidate. The majority of candidates had attempted all questions though legibility of responses does remain a problem in a few cases. Use of generic responses, e.g. 'cheap', 'quick' or 'easy', is still prevalent among a minority of candidates. In most cases these unqualified terms will not be enough to gain a mark. Comparison between alternatives will usually result in the mark being awarded.

Practical processes such as soldering were generally well known but there was a tendency on the part of some candidates to use colloquial terms rather then technically correct vocabulary. One area that was generally answered poorly was the identification of IC pin numbers in question 3 of the Foundation Paper. The specification requires that candidates have a chance to use and handle integrated circuits, thus gaining knowledge of the pin notation.
The technique of using a breadboard for circuit development seemed to be an area of difficulty for some candidates. Although simulation software is readily available in most centres the actual building of a test circuit is a techniques that candidates should be aware of.
The question on relay pins in the Higher Tier proved difficult for many candidates; use of relays is a feature of many coursework projects and candidates can expect to find reference to them in the written papers.
The second overlap question, which was based on the analysis of a smoke detector, was successful in providing clear differentiation at the higher end of the Foundation Paper. The device was familiar to candidates and they were able to draw on their own knowledge in addition to the information provided in the question.

Paper 1 Foundation Tier

1 (a) (i) The switch types appeared to be familiar to the majority of candidates, who gained full marks for correct identification.

(ii) Very few errors appeared in naming the switches with return actions. Candidates should be aware that if only one name is required and they give two, one of which is incorrect, the mark would not be awarded.

(b) Advantages of a soldered joint were mainly related to the security and permanence of it but a number of marks were lost through failure to recognise the ease of removal of the spade terminal. Few responses recognised the fact that no heat was involved

(c) (i) The majority of candidates picked **B** as the correct view.

(ii) Cleaning the iron and wiping on a sponge were widely recognised as part of the tinning process; the main error was the description of soldering a joint rather than tinning the iron. A few responses indicated that tin was the substance added, rather than solder.

2 (a) (i) Reference to the longer expected life of an LED gained one mark as did reference to the different colours and shapes available. No mark was awarded for reference to the space required as LED's and filament lamps are available in a range of sizes.

(ii) The need for a protective resistor was widely known but it was often described as ' preventing the LED from blowing up', rather than limiting current.

(iii) The dimmer light level resulting from too high a value of resistor was recognised by slightly less candidates.

(b) Responses to this part of the question were generally poor, breadboarding did not seem to be fully understood, The LED being reversed was spotted by most but few identified the missing connection from resistor to positive rail. Marks were awarded to those candidates who had indicated the position of the errors on the diagram.

(c) (i) Adjustment of the setting point for the op-amp output was not widely appreciated but allowance was given to those who had referred simply to adjustment of the circuit.

(ii) Recognition of the 'one way flow' nature of the diode was rewarded with a mark though very few candidates noted the protection provided against incorrect connection of the battery. Most put increase in reading for thermistor heating. There was some confusion between an LED and a diode, which led to candidates thinking that the component was a warning device.

(d) (i) Knowledge of the effect of heat on the resistance of an NTC thermistor was not common; the majority stated that the resistance increased.

(ii) There appeared to be very little knowledge of adhesives amongst candidates. Frequent errors referred to solder, glue or unsuitable adhesives that would be affected by heat. Trade names of epoxy resin were all accepted.

3 (a) (i) Storage of charge was understood.

(ii) Clear specification points relating to the function of the device were not widely recognised.

(b) The position of pins 6 and 14 highlighted the lack of experience of IC's in many candidates. The most common error was to correctly count down one side from pin 1 and then to count down the opposite side instead of following the pins round in an anti clockwise direction.

(c) (i) Interpretation of the output graphs given for alternative timing circuits was a good discriminator for more able candidates. A large number of responses correctly stated that the minimum length of output pulse was not dependent on the time that the switch was pressed.

(ii) Use of a larger capacitor was the correct response most commonly found, rather fewer candidates mentioned using a resistor in series with R1.

(d) (i) Few candidates correctly identified the NOR gate.

(ii) Few candidates knew that joining the inputs of a NOR gate will turn it into an inverter.

(iii) Surprisingly correct responses could be found to this part even though the NOR gate had not been correctly identified. Either a NOT, inverter or NAND were acceptable as alternatives.

4 (a) This part of the question was well answered; knowledge of the benefits of a CAD system for PCB design was widely recognised.

(b) (i) Few candidates realised that the increased cost of moulded lettering resulted from the expense of mould / tool manufacture or that once the mould is produced any changes to lettering are extremely difficult.

(ii) The fact that the label could be removed with the inherent danger that warnings were no longer available was widely recognised.

(c) Environmental effects resulting from manufacturing were well recognised and the majority of candidates gained marks for this part.

(d) (i) With the exception of those candidates who suggested making the board larger this was a well answered part of the question.

(ii) The height of components was frequently mentioned though rather fewer responses mentioned the effect that this would have on the casing design. The better responses also mentioned the size of other essential components such as the battery, which were not included in the diagram.

5 (a) (i) The question was centred on the reasons for choosing the stated production method but this was often misinterpreted and mention was made of visible features of the casing such as the test button, or other design aspects were considered.

(ii) The required property related to the need for the clips to flex or bend when the battery is inserted. A number of candidates related their answer to the holding of the battery as shown in the diagram; this is a function of the clip rather than a property.

(b) The majority of candidates responded well to this part of the question, gaining both marks.

(c) (i) A common fault with this part was to mention *removal* of the part rather than assembly. As these devices are not readily repairable it is not intended that they should be dismantled.
(ii) This part of the question differentiated well, better candidates realising that the screw head shown is intended to prevent removal with a standard screwdriver.
(d) Knowledge of components that require correct orientation was generally good.
(e) This final part to the question was well answered with the majority of candidates gaining at least one of the marks.

Paper 2 Higher Tier

1 (a) This part of the question was well answered; knowledge of the benefits of a CAD system for PCB design was widely recognised.
(b) (i) Responses at the Higher level were significantly better than Foundation; expense of mould / tool manufacture being recognised, there were again few responses referring to the difficulty of making changes once the mould has been produced.
(ii) The fact that the label could be removed with the inherent danger that warnings were no longer available was widely recognised.
(c) Environmental effects resulting from manufacturing were well recognised and the majority of candidates gained marks for this part.
(d) (i) This was a well-answered part of the question.
(ii) The height of components was frequently mentioned. The better responses also mentioned the size of other essential components such as the battery, which were not included in the diagram.

2 (a) (i) The question was centred on the reasons for choosing the stated production method but this was often misinterpreted and mention was made of visible features of the casing such as the test button, or other design aspects were considered.
(ii) The required property related to the need for the clips to flex or bend when the battery is inserted; generally well answered.
(b) The majority of candidates responded well to this part of the question, gaining both marks.
(c) (i) A common fault with this part was to mention removal of the part rather than assembly. As these devices are not readily repairable it is not intended that they should be dismantled.
(ii) The majority of candidates realised that the screw head shown is intended to provide a tamperproof fixing.
(d) Knowledge of components that require correct orientation was generally good.
(e) This final part to the question was well answered with the majority of candidates gaining both of the marks.

3 (a) (i) The question asked for functional points to be identified; The majority of candidates made this distinction; some however used economic points or mentioned the relative size of the devices.
(ii) Very few responses recognised the need for steady light and many candidates were unaware of the need for the LDR to be kept clean in order to give an accurate reading.
(iii) This part was generally well answered.
(b) (i) The majority of candidates could describe the purpose of a relay sufficiently to gain the mark.
(ii) The fact that the relay would be constantly switching on and off was recognised though descriptions of the result were at times vague.
(c) (i) The calculation was well answered by most candidates, with very few failing to include the working and the majority gaining at least one mark.

(ii) This part of the question was badly answered by the majority of candidates. Knowledge of how a relay operates along with correct names for the pins was rarely found.

4 (a) (i) A number of candidates knew how to draw a square wave but failed to gain marks because frequency and the number of pulses were incorrect. A number of sine waves were also encountered.

(ii) A range of responses was accepted for interpretation of the graph and the majority of candidates gained a mark.

(iii) A high proportion of correct answers to this part, mainly from those who had also gained marks in the previous part.

(b) As with the Foundation Paper a high proportion of candidates appeared unfamiliar with the use of a breadboard. Those who had used one invariably gained both marks.

(c) (i) This question involved a procedure that many candidates will have used in coursework. Very few gained both marks but a good proportion realised that for accurate calibration the desired temperature had to be reached.

(ii) Those who had encountered the PIC microcontroller generally gave good responses; there were a number who relied on the generic terms such as 'cheap' and 'small'.

5 (a) (i) A good response in general, showing familiarity with commonly used sensing devices.

(ii) Many candidates seemed unaware of contact bounce or the need for a clean signal with a voltage level matching the input requirement of the IC.

(iii) Use of debouncing circuits such as an RS bistable or a Schmitt device with a capacitor was not commonly found in the responses. Use of a Schmitt device alone was rewarded with one mark.

(b) (i) A significant number of candidates successfully converted the binary number to denary.

(ii) The majority of candidates who had gained a mark in the previous part were able to give a reason for not using binary as the final display.

(c) A number of errors were noted in responses to this final part of the question. The main cause of lost marks was misinterpretation of the schematic diagram with a few candidates attempting to jump tracks over an existing track without using a link wire.

Papers 3 and 4
General comments

Tier entries suggest that too many low performing candidates are being entered for the Higher Paper. The number of candidates who had difficulty answering questions on the higher paper and registering single figure scores reflects this. To perform to their ability candidates should sit an accessible paper in which they can gain some success. Facing a difficult paper will soon demoralise a candidate making them 'give up' early into the examination paper.
Most schools teaching Electronics now have PIC technology available for students, it is disappointing in view of this that candidates still seem unfamiliar with the nature and application of a PIC microcontroller.
On a more positive note it was evident that some centres had made good use of the pre-release material relating to Alarms. Many candidates had obviously prepared well for the Product Design question using the pre-release material to good effect.

Paper 3 Foundation Tier

1 Large numbers of candidates seemed to be unfamiliar with the outlines of some basic components when presented with them. This could suggest that practical activities involving handling of such components may be on the decline in favour of computer-simulated activities in schools.

(a) Nearly all candidates were able to correctly identify the outline of a 555 IC, but surprisingly few seemed familiar with the shapes of the other components shown.

(b) Most candidates were able to gain the two marks available by describing the tools as 'wire cutters' and 'pliers of some sort'. There were a few incorrect responses describing the side cutters as 'wire strippers' and the long nose pliers as 'heat sinks'.

(c) (i) A significant proportion of the candidates could not relate thermal conductivity as the property required by the bit of a soldering iron.

(ii) Only a small number of candidates were able to correctly identify copper as the suitable material for the bit of the soldering iron. Most responses gave 'iron' as an answer, presumably because of the name of the tool.

(iii) Most answers correctly alluded to thermal insulation in some way, with others describing 'grip' as an important property required by the handle of a soldering iron.

(iv) Correct responses from nearly all candidates suggesting 'rubber' 'plastic' or 'wood' as suitable materials for use as a soldering iron handle.

2 The disappointing responses in this question suggest that most candidates do not have much 'hands on' experience of using multimeters.

(a) (i) This question was not well answered. Candidates did not seem familiar with multimeter digital displays, and even less so with the analogue types. Few candidates drew anything resembling a digital readout for 5V. Drawings of the analogue display included 360° scales and 12V fsd scales even though the range required was clearly shown set to 10V fsd.

(ii) Clear display or ease of reading were the better responses. A few candidates understood that digital multimeters are more robust than their analogue counterparts. Some candidates incorrectly thought digital multimeters to be more accurate.

(iii) Only a few correct responses identified the lack of rapidly fluctuating readings as the correct advantage.

(vi) A common mistake made by a few candidates was to set the dial between the 1k and 100k in order to read. However the majority of candidates did gain full marks by correctly setting the dial to the 100k range.

(b) (i) Most candidates correctly identified current as being measured by the meter M1, though some used the term 'amps' in this context.

(ii) Very few correct answers were evident. It seemed that the overwhelming majority of candidates were not familiar with the difference between voltmeters and ammeters, and they were unable to realise that the meter was reading 5V across the circuit.

3 This question exposed a disappointing lack of knowledge in most candidates about all aspects of transistors, which could be assumed to be a fundamental requirement for any electronics course.

(a) Very few candidates were able to identify the transistor symbols correctly, NPN and PNP seemed unfamiliar terms, and even fewer responses recognised the FET.

(b) Perhaps less than half candidates were able to correctly substitute the figures using the formula given, and many of those that managed to do so were unable to convert units to correctly arrive at the gain of the transistor, sadly reflecting upon mathematical ability in general.

(c) (i) Candidates seemed not to have known about motor noise suppression and most thought that the function of the capacitor had something to do with ‘storage of electricity’.

(ii) Some responses stated that the ‘motor would stop working’ to gain a mark, a few predicted that the diode might’ blow’; however very few responses showed enough understanding to gain the full two marks available.

(d) Unfortunately few candidates seemed familiar with the Darlington Pair arrangement, and some of these, even though they realised two transistors were needed, had problems correctly connecting the emitter of one to the base of the second.

4 Most candidates were able to access this question at some level and gain marks.

(a) (i) Some candidates realised that SMT circuits can be made smaller than their through hole circuit counterparts.

(ii) Most candidates gained a mark by realising that drilling of holes to allow for component leads was unnecessary; others identified not needing to crop component leads as the advantage.

(b) (i) Plated through holes appeared to be largely a mystery to candidates, with only a minority able to identify their true purpose as providing electrical connection between top and bottom surfaces of the circuit board. Incorrect responses alluded to ‘providing better contact for component legs’ or ‘for providing a screw location for mounting the boards.

(ii) Many candidates were able to correctly reason that SMT boards would be too small to handle and manipulate for prototype assembly.

(c) (i) A few candidates failed to realise that they needed to choose an answer from the list of bulleted points at the beginning of the question. However most were able to correctly identify the process involving hot air jets.

(ii) Well answered by the majority of candidates.

(iii) About half of the candidates correctly explained that the glue spots were needed to prevent components falling off when the boards were inverted for soldering.

(iv) Although many candidates correctly identified a reason for adding flux to make a solder paste as ‘to make the mixture sticky’, ‘to clean the metal surfaces for soldering’ or ‘to help solder flow’, significant numbers were of the opinion that the addition of flux somehow reduced the melting point of solder.

(d) Well answered with the majority of candidates gaining marks, answers identified a good range of reasons including, built in obsolescence, difficulty in identifying the faults, problems of physically dismantling the phones, and the low cost of replacement phones.

5 There was good reason to suppose that some centres and candidates had used the pre-release material to good effect to research this product evaluation question. These candidates scored higher than on some of the earlier questions.

(a) Nearly all candidates gained a mark for identifying a domestic hazard other than burglary, which could be detected using an alarm, the overwhelming majority giving fire as the hazard.

(b) (i) Many candidates correctly identified ease/speed of installation as an advantage. Some other reasons referred to included, the installation aesthetics and being able to place sensors in difficult to reach locations. Incorrect responses often referred to 'no wires to cut' as if alarms could be simply disabled in such a way.
(ii) The anti scan facility was not understood by the majority of candidates and this part of the question caused the most difficulty.
(iii) Zone settings were familiar to most candidates, although some had difficulty clearly explaining the feature, but appeared to understand the concept.
(c) The table involving the choice of suitable devices was generally well done though a few candidates wrote more than one device in each box. The devices which most candidates got correct were the ionisation chamber and PIR.

Paper 2 Higher Tier

1 & 2 These questions were generally answered a little better than on the foundation paper, but generally the previous comments are still applicable.

3 This question exposed some weaknesses in candidates, and there was little to suggest that there has been any improvement in the ability to carry out the basic calculations fundamental to electronics.
(a) (i) Most candidates managed to successfully complete this simple calculation.
(ii) Although the majority of candidates successfully carried out the substitution to get one mark, many of these then failed to correctly execute the calculation.
(iii) The calculation for the voltage drop was not well completed. Some candidates got as far as calculating the voltage across the resistor as 4.125V but then failed to subtract this from the supply voltage.
(b) Variable mark / space was very poorly understood; some candidates did realise that it something to do with energy efficiency, and expressed this in a number of ways e.g. 'use less electricity'. The realisation that the transistor would run cooler failed to register.
(c) Clearly candidates have little experience of heat sinks, with some candidates attempting to answer this question by designing elaborate water baths and attachments made of black plastic. Others seemed rather keen to offer fans as the solution. Perhaps half of candidates gained some marks, which included some well-drawn solutions; a few let themselves down through not being able to choose suitable conductive materials, or attachment methods.

4 Candidates experienced some difficulties with this question, which leads to the conclusion that many had never experienced building a counter circuit.
(a) The segment combinations were very well done, with nearly all candidates gaining the full marks.
(b) The advantage of the CMOS counter IC over the corresponding TTL equivalent was rarely understood. Either the operation over a wide range of voltages or the consumption of less power would have gained the mark.
(c) (i) About half the responses correctly showed a connection from pin 15 to the negative rail.
(ii) Most candidates failed to connect a PTM switch in the correct location.
(iii) Saving power or to control the brightness or to blank the zero display were rarely given as the correct answers allowed.
(d) (i) It is amazing to think that presented with a choice of two displays, most candidates incorrectly chose the common anode display.
(ii) Few of those candidates attempting this question were able to relate the display type to the +V pin output condition when illumination was required.
(e) The square wave was correctly drawn in most cases, and the rising edge was usually clearly identified.

5 For most candidates this question exposed a lack of knowledge about the working of operational amplifiers and the nature of PIC's.

(a) (i) Few candidates managed to correctly place the feedback resistor between the output of the op-amp, and its inverting input.

(ii) The resistance was correctly calculated as 100k by a few candidates, with many arriving at incorrect answers of 100, 100R and 10k

(iii) The sine wave was often drawn correctly but rarely to the right amplitude and even more infrequently was it inverted.

(b) Very poorly attempted though some did give an inverted square wave but then failed to draw it at the correct full amplitude.

(c) (i) Candidates appeared to know little about the differences between a PIC microcontroller and a microprocessor with few gaining any marks in this question..

(ii) Another area where candidates seemed to lack knowledge was about the need for and operation of a resonator to provide the clock pulses necessary for a PIC to step through its operation. Very few candidates scored any marks on this question.

General Certificate of Secondary Education (D & T) (1053)
June 2006 Assessment Series

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
01	50	-	-	28	24	20	17	14
02	50	29	24	19	14	-	-	-
03	105	81	69	58	47	36	25	14

Syllabus Options

Foundation Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	-	-	-	88	75	62	49	36
Percentage in Grade		-	-	-	28.1	18.8	25.0	15.6	12.5
Cumulative Percentage in Grade		-	-	-	28.1	46.9	71.9	87.5	100

The total entry for the examination was 59

Higher Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	135	118	101	85	67	58	-	-
Percentage in Grade		12.2	22.5	38.8	14.3	12.2	0.0	-	-
Cumulative Percentage in Grade		12.2	34.7	73.5	87.8	100	100		

The total entry for the examination was 54

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	7.4	13.6	23.4	19.8	14.8	9.9	6.2	4.9
Cumulative Percentage in Grade	7.4	21.0	44.4	64.2	79.0	88.9	95.1	100

The total entry for the examination was 113

General Certificate of Secondary Education (D & T) (1953)
June 2006 Assessment Series

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
01	50	-	-	28	24	20	17	14
02	50	29	24	19	14	-	-	-
03	50	-	-	22	19	16	14	12
04	50	25	20	15	10	-	-	-
05	105	81	69	58	47	36	25	14

Syllabus Options

Foundation Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	-	-	-	91	76	61	47	33
Percentage in Grade		-	-	-	27.6	23.2	20.8	15.3	9.0
Cumulative Percentage in Grade		-	-	-	27.7	50.8	71.6	86.9	95.9

The total entry for the examination was 2363

Higher Tier

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	132	115	98	82	64	55	-	-
Percentage in Grade		11.2	22.7	32.2	21.9	9.1	1.5	-	-
Cumulative Percentage in Grade		11.2	33.9	66.2	88.1	97.2	98.7		

The total entry for the examination was 2610

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	6.2	12.4	17.7	24.5	15.5	10.2	6.9	4.0
Cumulative Percentage in Grade	6.2	18.6	36.3	60.8	76.3	86.5	93.4	97.4

The total entry for the examination was 4973

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