



General Certificate of Education
Summer 2003
Advanced Subsidiary Examination

**DESIGN AND TECHNOLOGY:
SYSTEMS AND CONTROL TECHNOLOGY
Unit 1 Materials and Components**

SCT1

Friday 6 June 2003 Morning Session

In addition to this paper you will require:

- an unlined answer book (7024);
- Insert sheet for use with Question 4(b) (enclosed);
- normal writing and drawing instruments.

Time allowed: 1 hour 30 minutes

Instructions

- Use blue or black ink or ball-point pen. Pencil and coloured pencils should be used only for drawing.
- Write the information required on the front of your answer book. The *Examining Body* for this paper is AQA. *The Paper Reference* is SCT1.
- Answer Question 1 and any **two** of Questions 2 to 4.

Information

- The maximum mark for this paper is 100.
- 40 marks are allocated to Question 1, 28 marks to each of Questions 2 to 4, and 4 marks overall for quality of written communication.
- This paper carries 30 per cent of the total marks for Advanced Subsidiary awards and 15 per cent for Advanced awards.
- You are reminded of the need for good English and clear presentation. The quality of your written communication will be assessed across all questions.

Advice

- Your answers should be illustrated with sketches and/or diagrams wherever you feel it is appropriate.

Answer Question 1 and any **two** of Questions 2 to 4.

- 1 (a) A set of traffic lights is needed for a narrow bridge to allow alternating one way traffic flow. The light sequence is RED, RED and AMBER; GREEN, AMBER and then back to RED. With the aid of a flowchart describe the control of the traffic lights. Your answer should make reference to the lights at both ends of the bridge. *(12 marks)*
- (b) Describe in detail a suitable system that could be used to control the sequence of lights at **one end** of the bridge. Your answer should clearly show how the system is capable of switching lamps on and off which operate from a 230V a.c. supply. *(12 marks)*
- (c) Describe in detail the advantages of using a programmable control system for the operation of traffic lights that are part of an integrated traffic control system. *(8 marks)*
- (d) List with reasons **four** criteria that need to be considered when selecting suitable materials for the manufacture of a case to hold the traffic light control circuitry. The case will be mounted next to the traffic lights. *(4 x 2 marks)*
- 2 (a) Breadboards, stripboards and PCBs are all methods of producing electronic circuits. Describe how and why these different systems may be used at the various stages in the development of a product. *(3 x 8 marks)*
- (b) Identify **two** possible risks involved in the production of PCB's by etching, in each case suggest a way of minimising the risk. *(2 x 2 marks)*
- 3 With the aid of annotated sketches describe systems that will amplify the following by a factor of 3
- (a) Linear movement
- (b) Linear force
- (c) Angular velocity
- (d) Turning force (Torque). *(4 x 7 marks)*

- 4 (a) (i) With the aid of diagrams describe **three** ways of displaying a numerical value as an analogue or digital signal from an electronic system. (3 x 2 marks)
- (ii) Describe an appropriate use for *each* of the display systems in Part (a)(i). (3 x 2 marks)
- (iii) Outline the relative advantages of analogue and digital display systems. (4 marks)

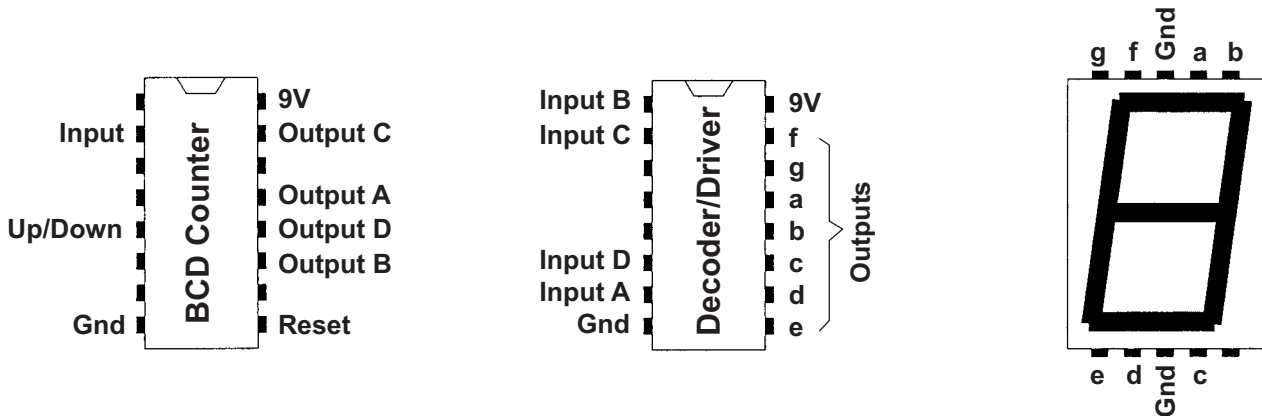
(b) The diagrams below show the following components,

BCD counter.

Decoder Driver.

7 Segment display.

- (i) On the insert sheet provided, complete the circuit diagram that will count up by one for each input pulse. (6 marks)
- (ii) Then using only AND gates, show how the circuit can be made to reset to ZERO after 7 input pulses. (6 marks)



END OF QUESTIONS

Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

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The diagram on this sheet is to be used for answering:
SCT1, Question 4(b)

