

**GCSE**  
**D&T ELECTRONIC PRODUCTS**  
**D&T ELECTRONIC PRODUCTS (Short Course)**

Paper 1 (Foundation Tier)

**D&T SYSTEMS & CONTROL TECHNOLOGY**  
**(ELECTRONICS OPTION)**

Paper 3 (Foundation Tier)

**TUESDAY 5 JUNE 2007**

Candidates answer on the question paper  
Additional materials:  
No additional materials are required.

**F**

**1953/01**

**1053/01**

**1957/03**

Afternoon

Time: 1 hour



Candidate  
Name

Centre  
Number

--	--	--	--	--

Candidate  
Number

--	--	--	--

**INSTRUCTIONS TO CANDIDATES**

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Show all working for calculations.
- Do **not** write on the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- Marks will be awarded for the use of correct conventions.
- Dimensions are in mm unless stated otherwise.

**FOR EXAMINER'S USE**

<b>Q1</b>	
<b>Q2</b>	
<b>Q3</b>	
<b>Q4</b>	
<b>Q5</b>	
<b>TOTAL</b>	

This document consists of **12** printed pages.

- 1 Many of the items used in modern life make use of electronic circuits. Three examples are shown in Fig. 1.

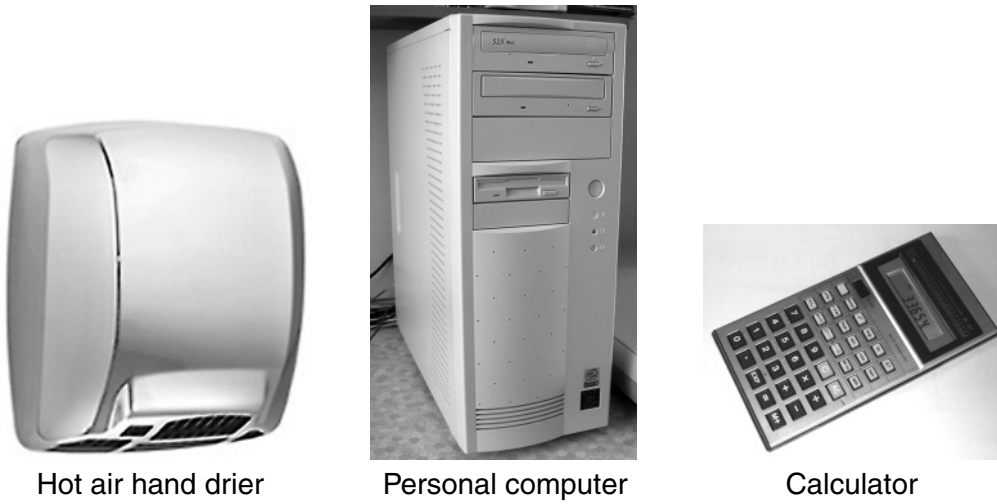
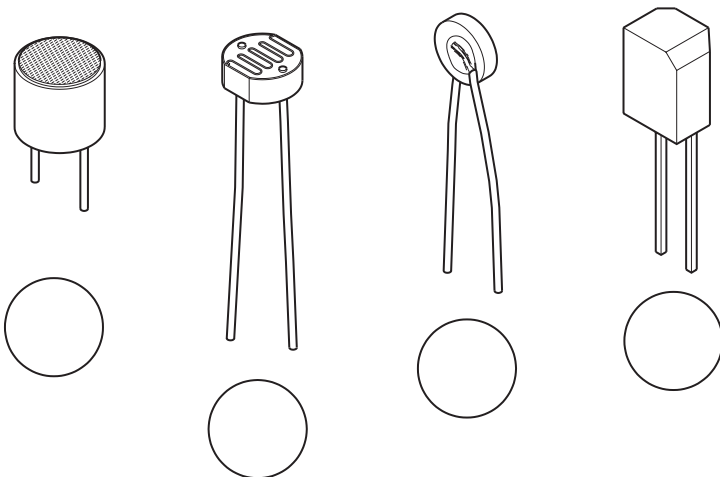


Fig. 1

- (a) (i) Components that sense heat, light or sound are often found in electronic circuits. Insert the correct letter under each drawing to identify the component.



A	NTC thermistor
B	Photodiode
C	LDR
D	microphone insert

Fig. 2

[4]

- (ii) State the name of the component in Fig. 2 that senses heat.

.....[1]

- (iii) Describe how the negative leg (cathode) of the photodiode can be identified when both legs are the same length.

.....  
 .....[1]

- (b) (i) It is often necessary to solder wires to the legs of an LDR before fitting it into a casing. Three types of wire are shown in Fig. 3. State the most suitable wire for this type of connection.

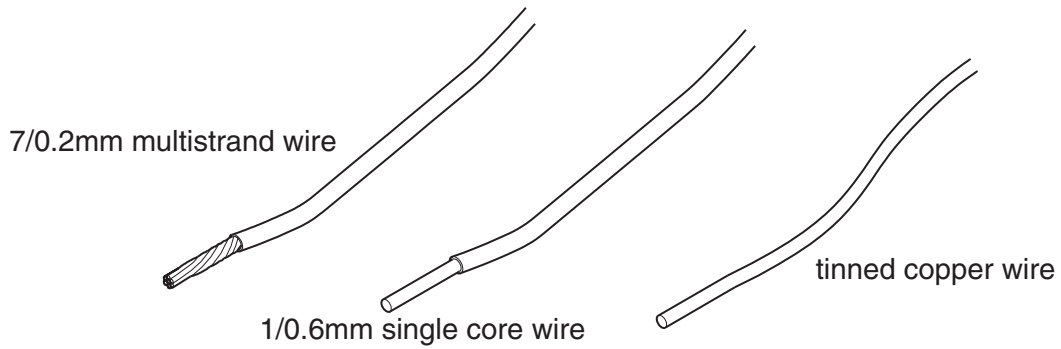


Fig. 3

.....[1]

- (ii) Give **one** reason for your choice of wire.

.....[1]

- (iii) Heat shrink sleeving reduces in diameter when it is heated. It is used to cover a soldered joint from a component leg to a wire as shown in Fig. 4.

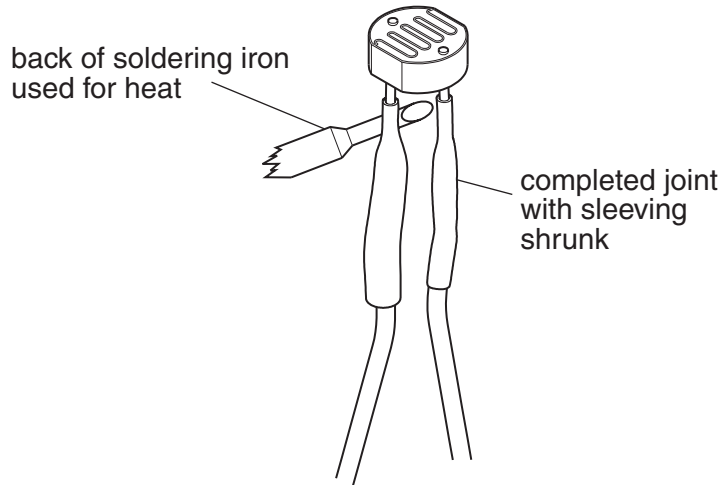


Fig. 4

Give **two** reasons for using heat shrink sleeving.

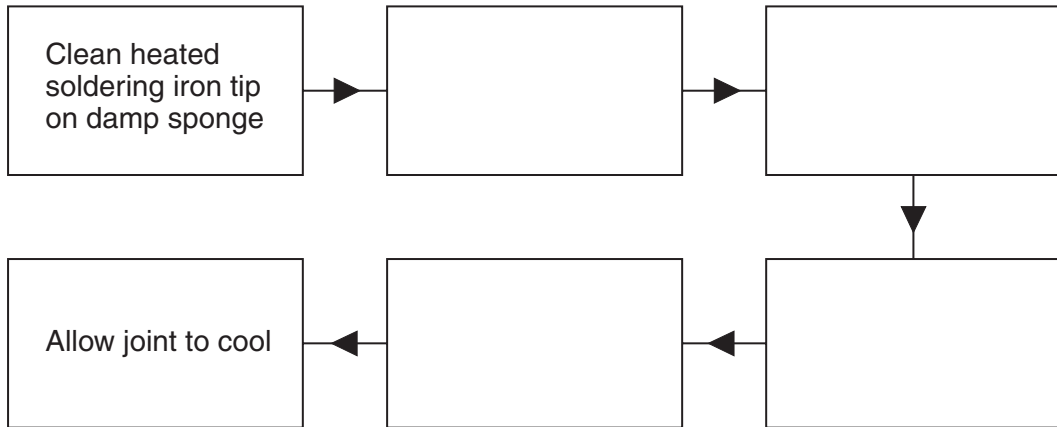
1 .....[1]

2 .....[1]

[Total: 10]

- 2 (a) (i) Good soldering technique is an important part of electronics work. Use the terms below to complete a block diagram of the soldering process.

**Wait for heat to conduct.**  
**Place soldering iron tip onto joint**  
**Tin the soldering iron**  
**Feed solder into joint**



[2]

- (ii) From July 2006 manufacturers of electronic circuits have not been able to use solder containing lead. State the reason for this regulation.

.....[1]

- (b) (i) 'Dry' joints, which look correct but do not make a good connection, can prevent a circuit from working.

Fig. 5 shows a multimeter in position for testing a series of joints.

Draw an arrow on the dial to show the correct setting for the multimeter.

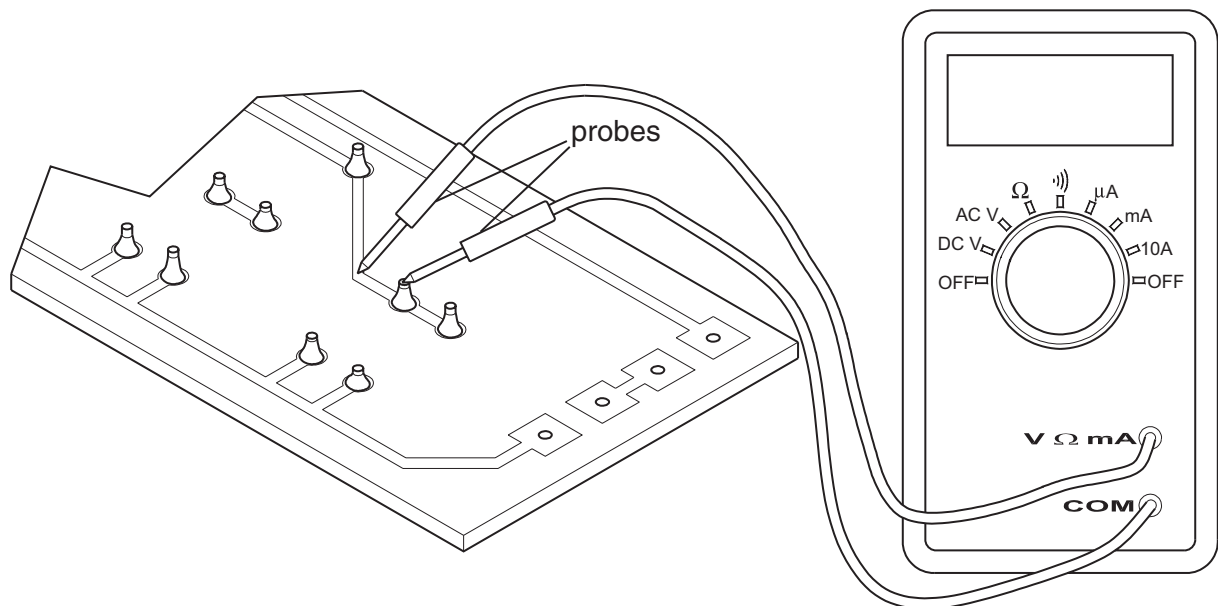


Fig. 5

[1]

- (ii) An alternative method of checking for dry joints would be to use an LED to make a simple test tool.  
Using the component symbols shown in Fig. 6 complete the circuit diagram for a test tool.

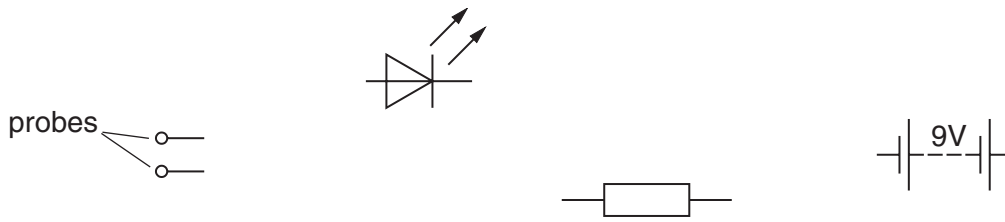


Fig. 6

[2]

- (c) Component legs should be trimmed close to a PCB after soldering.  
State the number of the tool shown in Fig. 7 that is the most suitable for this task.

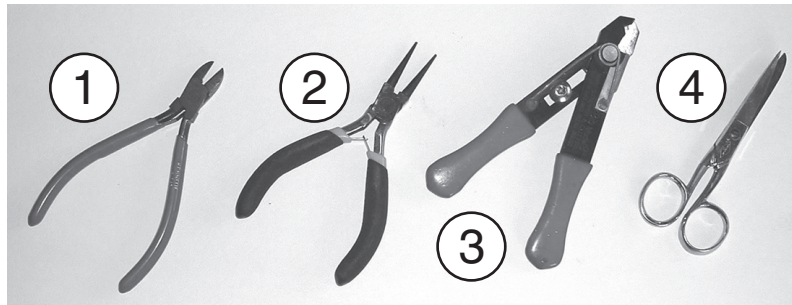


Fig. 7

tool number.....[1]

- (d) A circuit board requires eight external wires to be connected.  
Three possible methods are shown in Fig. 8.  
Give **one** reason for choosing each of the methods.

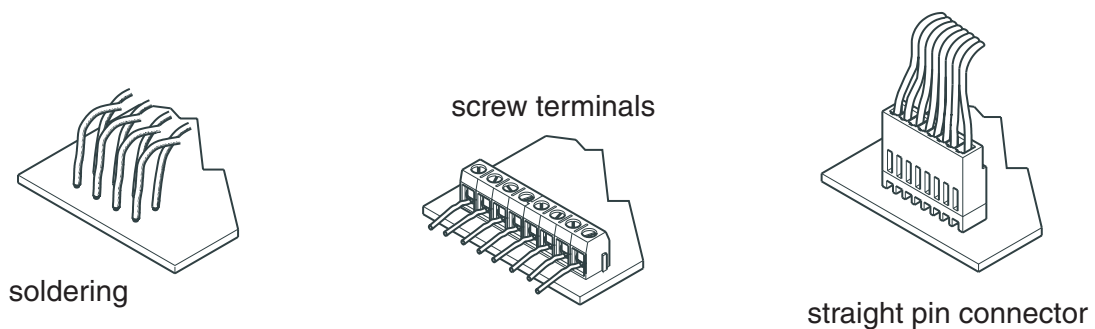


Fig. 8

soldering.....[1]

screw terminals.....[1]

straight pin connector.....[1]

[Total: 10]

[Turn over

- 3 (a) Fig. 9 shows a hot air hand drier with the sensor circuit that controls it. The drier starts when the sensor is shaded by a hand being placed under the base of the drier.

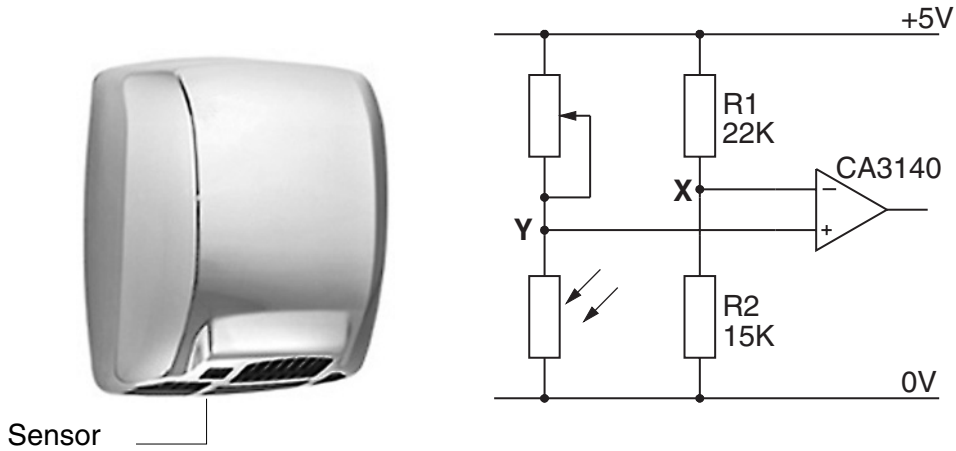


Fig. 9

- (i) R1 and R2 form a potential divider to give a reference voltage for the IC. Calculate the reference voltage at point X in the circuit. Use the formula Voltage out =  $\frac{R_2}{R_1 + R_2} \times \text{Supply voltage}$ .

.....  
 .....[2]

- (ii) Describe the effect on the voltage at point Y when a hand shades the sensor.

.....  
 .....[1]

- (b) Before manufacture circuits of this type are often tested using a breadboard. Fig. 10 shows a breadboard layout of the circuit and the IC pinout diagram.

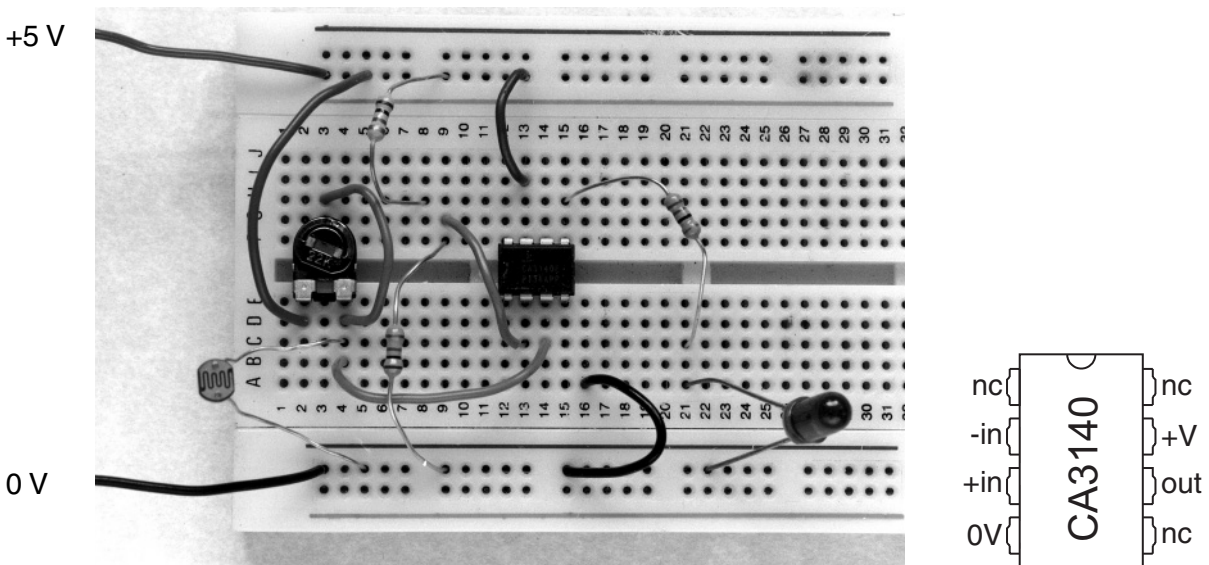


Fig. 10

(i) Describe **three** changes that are needed before the breadboard circuit will work.

1 .....[1]

2 .....[1]

3 .....[1]

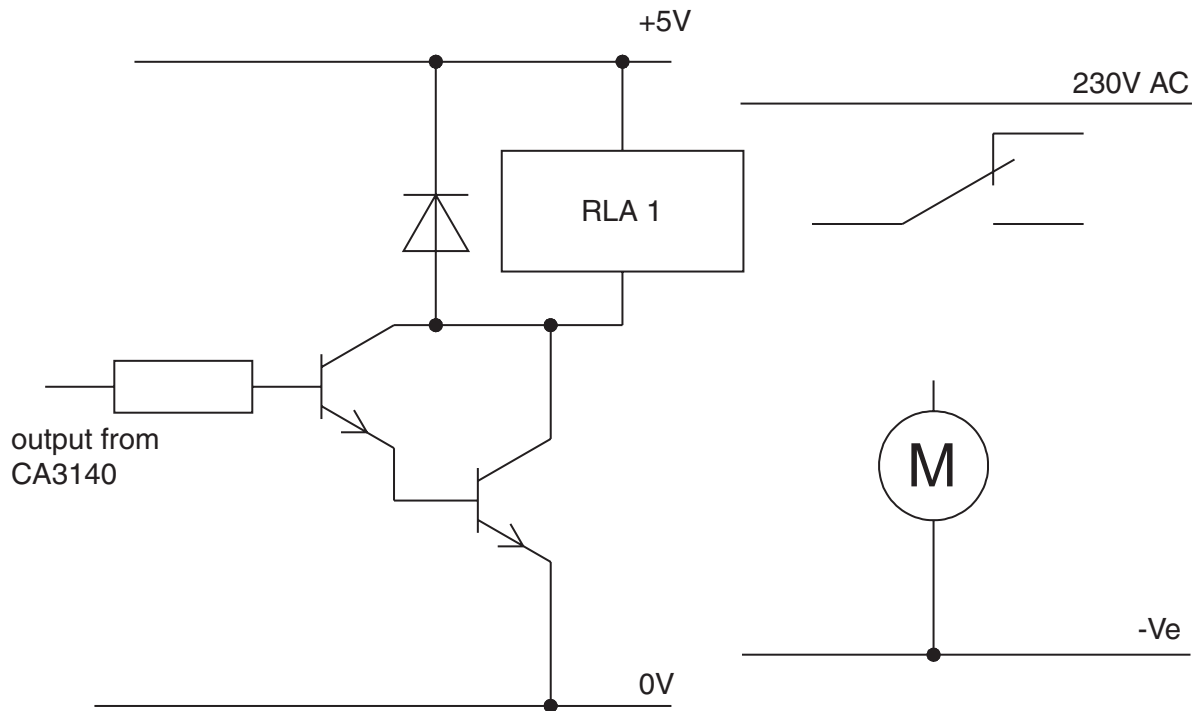
(ii) The IC used in the breadboard circuit is contained in an 8 pin dil package. Complete the name of the package.

d ..... i ..... l ..... [1]

(c) Fig. 11 shows the output part of the drier circuit using a relay to power the fan for the hot air.

(i) Complete the following connections from the relay output.

- 1 From 230V AC to relay Common terminal.
- 2 From relay Normally Open to fan motor.



**Fig. 11** [2]

(ii) The output from the IC goes through a Darlington transistor to drive the relay RLA1. State the purpose of the Darlington transistor.

.....[1]

[Total: 10]

4 (a) Different styles of drawing can be produced using CAD as shown in Fig. 12.

(i) For each style state the likely end user of that drawing.

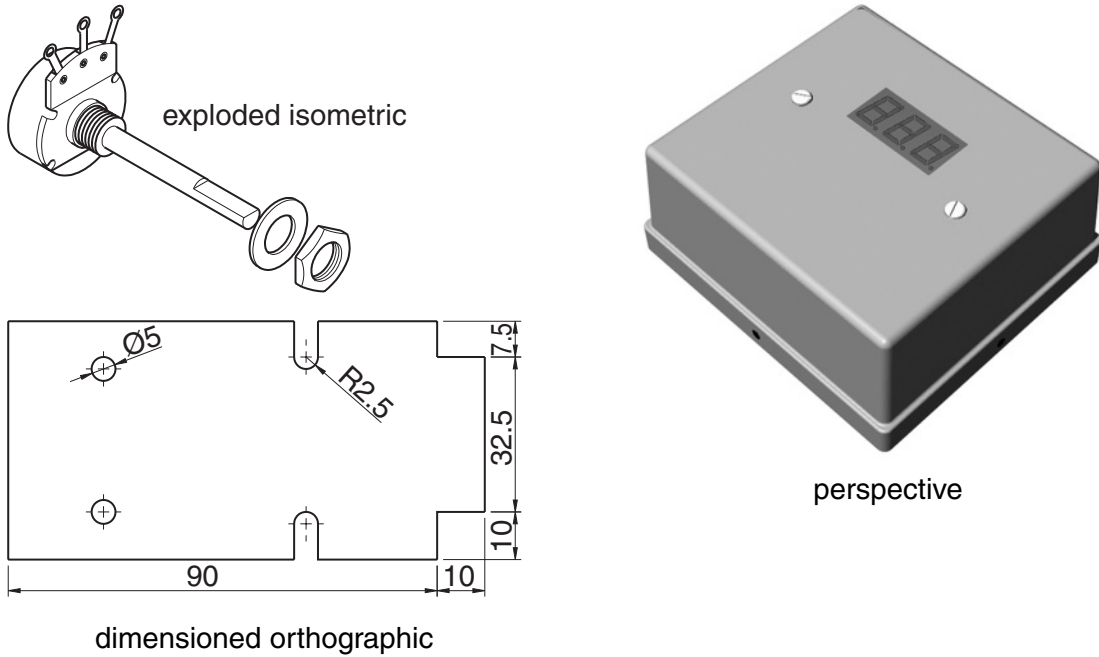


Fig. 12

- exploded isometric .....[1]
- dimensioned orthographic.....[1]
- perspective .....[1]

(ii) A drawing of a mounting hole in the corner of a circuit board is shown in Fig. 13. The tolerance of the hole diameter is shown as  $+0.2$

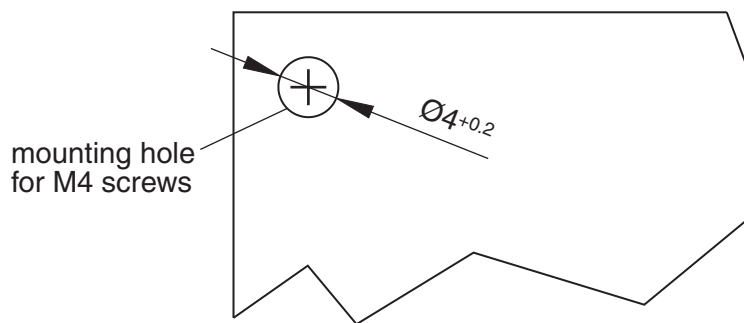


Fig. 13

State the largest drill size that can be used to produce the hole to the dimension shown.  
 .....[1]

(iii) Give the reason for **not** using a minus tolerance in this case.  
 .....[1]



- (b) Circuit drawings produced on a CAD system can normally be used to generate parts lists. Describe how that information can help the manufacturer to operate a 'Just in Time' system.

.....  
.....  
.....[2]

- (c) Electronic systems are often produced using small 'plug together' boards as shown in Fig. 14.

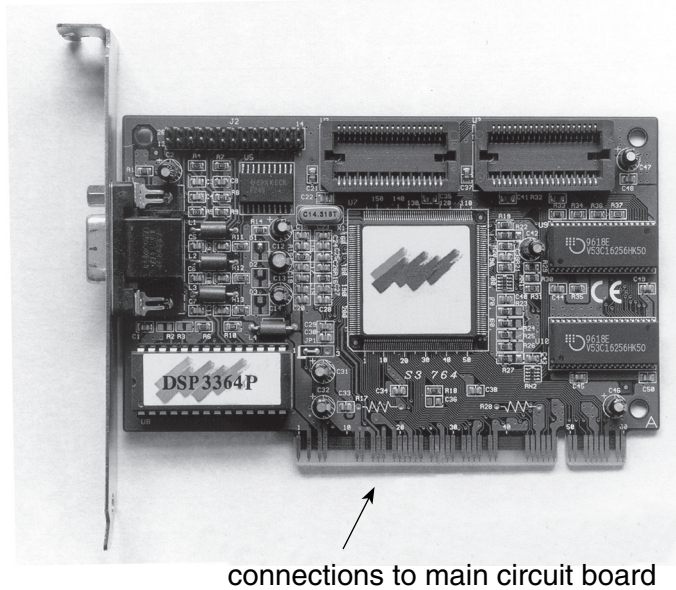


Fig. 14

- (i) Use of 'plug together' boards can help with quality control. Give **two** quality control advantages of using 'plug together' boards.

1 .....  
.....[1]

2 .....  
.....[1]

- (ii) Plug together boards are not normally repaired if they develop a fault. Give **one** reason for this.

.....  
.....[1]

[Total: 10]

5 Electronic calculators have been readily available for over 30 years. Three examples are shown in Fig. 15.

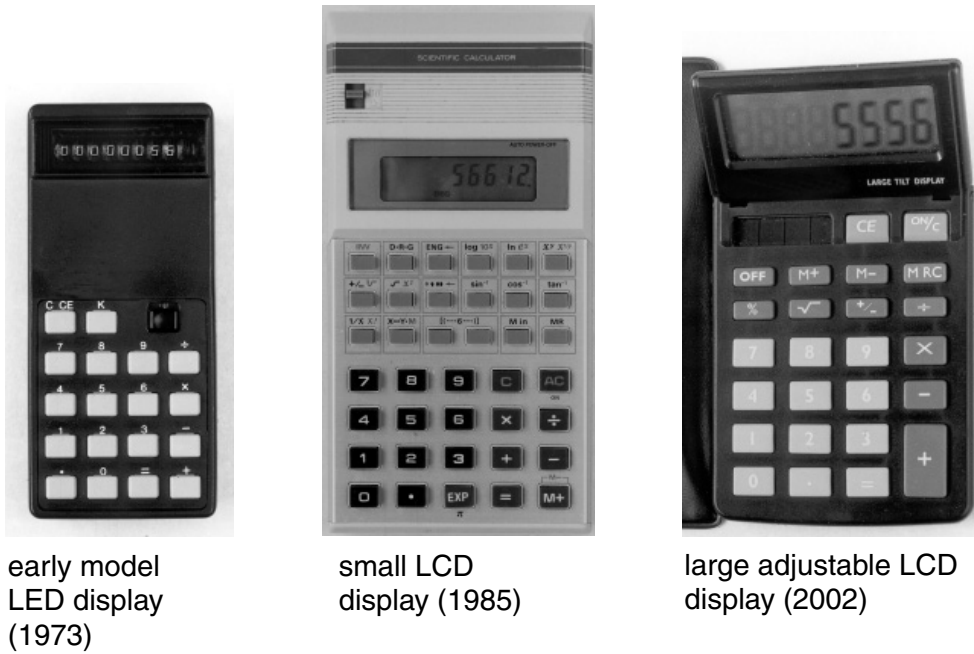


Fig. 15

(a) (i) Give **one** benefit of using an LED display.

.....  
 .....[1]

(ii) Give **one** benefit of using an LCD display.

.....  
 .....[1]

(b) (i) Calculator cases are injection moulded. Give **two** reasons for this process being used.

Reason 1 .....

.....

Reason 2 .....

.....[2]

- (ii) Fig. 16 shows the battery cover on the 1985 calculator held in place by a clip that is part of the moulding. Give **one** property that is required from the plastic used in the battery cover.

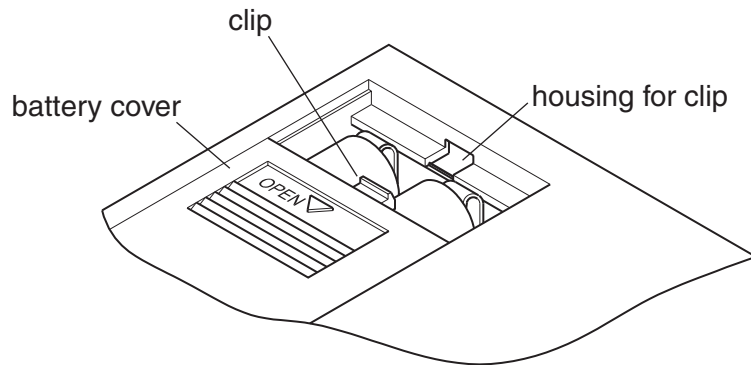


Fig. 16

.....[1]

- (c) Fig. 17 shows a key removed from the 1985 calculator keypad.

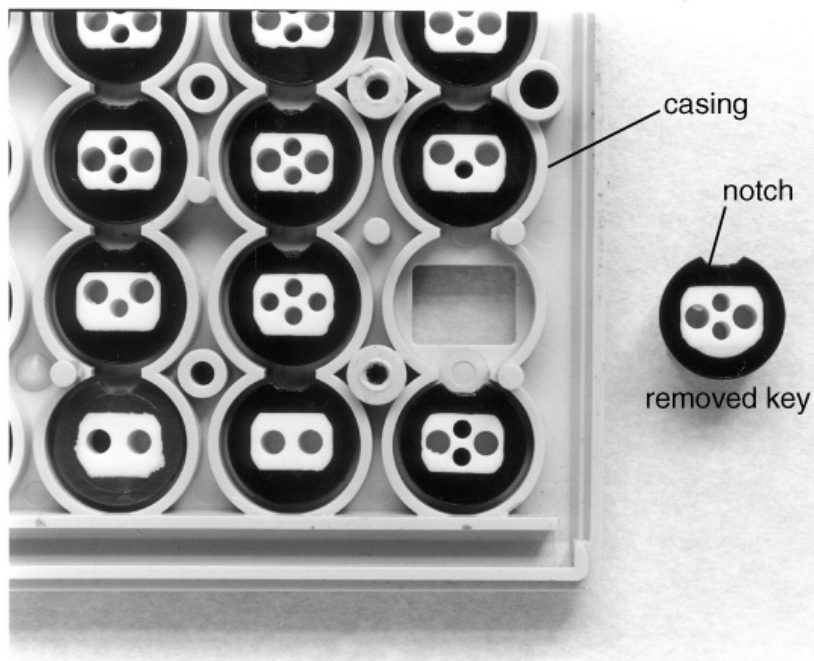


Fig. 17

- (i) State the reason for the notch in the key.

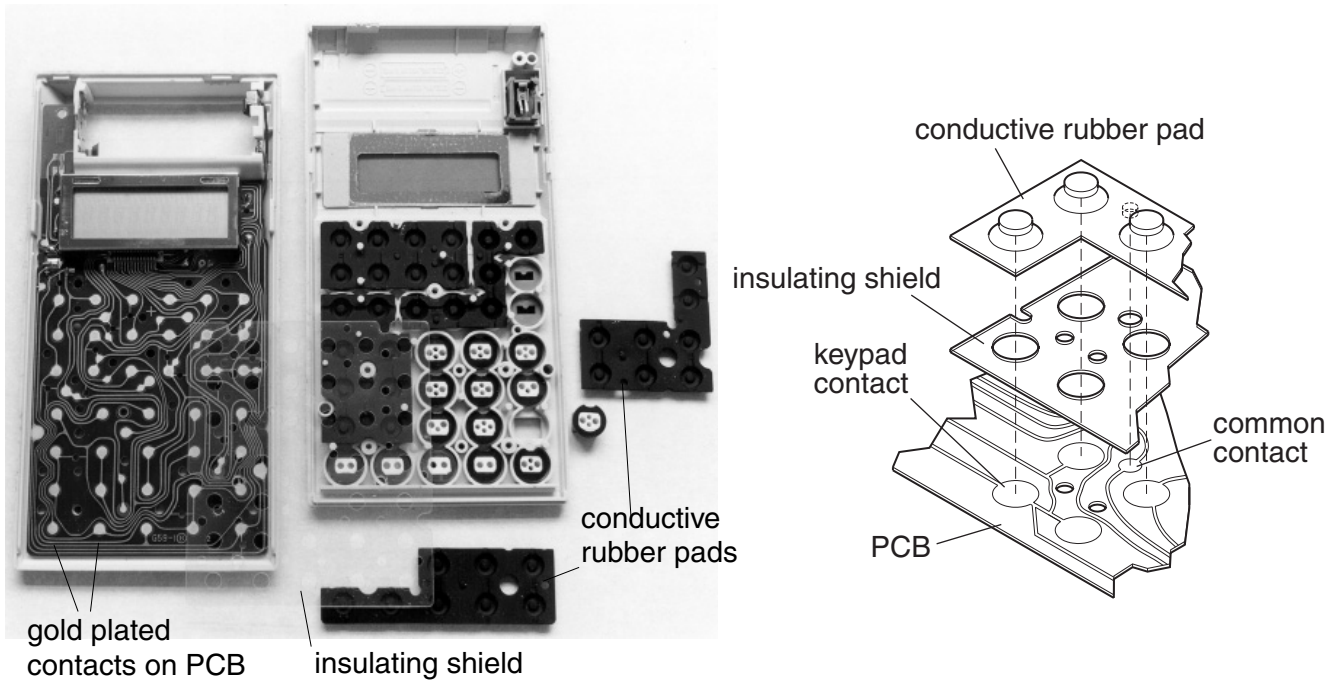
.....[1]

(ii) The 1985 calculator has approximately 60 parts used in the final assembly.  
Give **two** reasons for manufacturers trying to reduce the number of parts in a product.

1 .....  
.....[1]

2 .....  
.....[1]

(d) A view of a keypad is shown in Fig. 18.  
A signal is sent when the conductive rubber pad is pressed, making an electrical connection between two points on the circuit board.



**Fig. 18**

Explain why this system is preferred to using conventional switches with metal contacts.

.....  
.....  
.....[2]

[Total: 10]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

OCR is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.