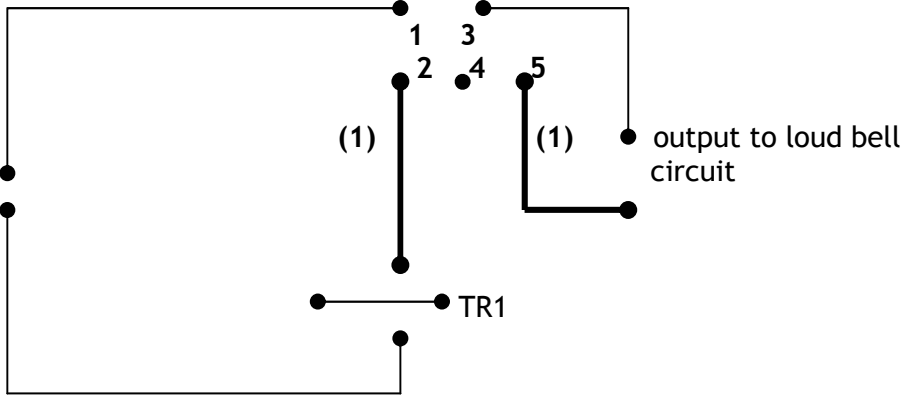


Mark Scheme (Results) Summer 2008

GCSE

GCSE Design & Technology: Systems & Control Technology (1974) Paper 2F

1974 2F Mark Scheme

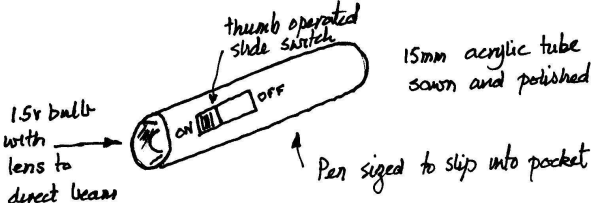
Question Number	Answer	Mark
1 (a)	<p>Name: Resistor Use: Resist current/potential divider/protects components</p> <p>Name: Pliers/long nose/snipe nose Use: Holds components/wire/cuts wire</p> <p>Name: Capacitor Use: Stores voltage/charge/timer circuit/decouples/DC block/AC pass</p> <p>Name: Meter / multi-meter / voltmeter / Ammeter Use: Reads ohms/amps/volts/voltage/continuity/resistance/current/DC/AC</p> <p>Name: Robot Arm / CNC arm / CAM arm /Hydraulic arm / Pneumatic Use: Pick and place/solders /moves components</p> <p style="text-align: right;">(10 x 1)</p>	(10)
1 (b)	<p>One action given:</p> <p>They close/make/change over / switch over / connect the circuit /pin 3 & 4 open / pin 3 & 5 closed</p> <p style="text-align: right;">(1 x 1)</p>	(1)
1 (c)(i)	<p>Two other reasons given:</p> <ul style="list-style-type: none"> • The transistor is not powerful enough to run the bell / The loud output device needs more current (1) • No feedback to the input signal (1) • Output device needs to be distant from the electronic circuit (1) • Allows a low current / voltage circuit to run a high current / high voltage output (1) <p style="text-align: right;">(2 x 1)</p>	(2)
1 (c)(ii)	 <p style="text-align: center;">(1) (1)</p> <p style="text-align: center;">TR1</p> <p style="text-align: center;">(only acceptable answers)</p> <p style="text-align: right;">(2 x 1)</p>	(2)

1 (d)	<p>Three pieces of information given:</p> <ul style="list-style-type: none"> • Selling price (1) • Product description (1) • Stock control number (1) <p style="text-align: right;">(3 x 1)</p> <p><i>(only acceptable answers)</i></p>	(3)
1 (e)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • See if it works / Correct errors before production (1) • See if it looks good (1) • Test physical dimensions (1) • Test reliability (1) • Quantify costs (1) • Safe to use (1) <p style="text-align: right;">(2 x 1)</p>	(2)
1 (f)	<p>One task described:</p> <ul style="list-style-type: none"> • A scanner looks at the product for quality control / computers automatically test each product • A computer controls a CNC machine / robotic arms • An automatic counter is used for stock control / reordering for a customer • CNC machines work together to built a product • Automatic machines pack the products in customer batches / to order • CNC machines can be allocated as they are needed <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark
2 (a)(i)	<p>Four components named:</p> <ul style="list-style-type: none"> • PTM (1) • Diode (1) • Buzzer (1) • Battery/cells (<i>not cell on its own</i>)/ power supply (1) <p><i>(only acceptable answers)</i></p> <p style="text-align: right;">(4 x 1)</p>	(4)
2 (a)(ii)	<p>One action stated:</p> <ul style="list-style-type: none"> • It operates/fires/latches/triggers/turn(s) on /conducts/switch(es)/switch(es) on (1) <p style="text-align: right;">(1 x 1)</p>	(1)
2 (a)(iii)	<p>One action stated:</p> <ul style="list-style-type: none"> • Stays operated/latched/ stays on /keeps the circuit working / the buzzer stays on (1) <p style="text-align: right;">(1 x 1)</p>	(1)
2 (a)(iv)	<p>One reason given:</p> <ul style="list-style-type: none"> • Switches circuit Off / breaks the latch / switches the buzzer off / resets the circuit (1) • Shorts out TH1 (1) <p style="text-align: right;">(1 x 1)</p>	(1)
2 (a)(v)	<p>One reason given:</p> <ul style="list-style-type: none"> • Protects the thyristor (1) • Removes back voltage / EMF from wound buzzer (1) <p style="text-align: right;">(1 x 1)</p>	(1)
2 (b)(i)	<p>One mark only for either of these answers</p> <ul style="list-style-type: none"> • 682 • 68... (<i>to any decimal</i>) <p>Two marks for</p> <ul style="list-style-type: none"> • 6K8 • 6.8K • 6800 <p><i>(only acceptable answers)</i></p>	(2)
2 (b)(ii)	<p>One meaning given:</p> <ul style="list-style-type: none"> • The maximum percentage range that the value/size may vary (1) <p><i>(only acceptable answer but likely to be in candidate speak)</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)

2 (c)(i)	<p>One reason given:</p> <ul style="list-style-type: none"> • Sounds strange/funny at the wrong speed (1) • Can be disorientating if speed changes (1) • The quality of the sound / music (1) <p style="text-align: right;">(1 x 1)</p>	(1)
2 (c)(ii)	<p>One function and one reason given:</p> <p>Function: Volume control Reason: Cause deafness/headphone damage</p> <p>Function: Track selection/fast forward Reason: Saves time</p> <p>Function: Random play Reason: Stops boredom</p> <p>Function: Battery indicator Reason: Buy new batteries / change batteries</p> <p style="text-align: right;">(2 x 1)</p>	(2)
2 (d)(i)	<p>One sentence completed:</p> <ul style="list-style-type: none"> • Planned product obsolescence (1) <p><i>(only acceptable answer)</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
2 (d)(ii)	<p>One sentence completed:</p> <ul style="list-style-type: none"> • Changing fashion (1) <p><i>(only acceptable answer)</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
2 (e)(i)	<p>One disadvantage given:</p> <ul style="list-style-type: none"> • Replacements use valuable resources (1) • Batteries could pollute the ground/contamination (1) • Plastic takes a long time to degrade(1) <p style="text-align: right;">(1 x 1)</p>	(1)
2 (e)(ii)	<p>One way described:</p> <ul style="list-style-type: none"> • Plastic cases/components may be collected and used in new cases/circuits • Cases may be ground down and mixed with new granules <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark
3 (a)	<p>DESIGN IDEA 1 Each point of specification has two marking points.</p> <p>1 mark should be awarded for evidence of each point of specification resolved in the design. For each specification point with both elements viably satisfied 2 marks For each specification point with only one element viably satisfied 1 mark Where the answer does not viably answer a specification point 0 marks</p> <p>Candidates may answer any specification point in either graphical form or by annotation.</p> <p>No marks are awarded for quality of communication.</p> <p>Specification point 1 Fit easily into the given pocket size</p> <ul style="list-style-type: none"> evidence to indicate that it will fit into the pocket (1) eg. proportion/ size / scale evidence to indicate that it fits easily (1) eg. shape / full dimensions <p>Specification point 2 Able to switch on and stay on</p> <ul style="list-style-type: none"> evidence to indicate that it will switch on (1) eg. any electronic switch evidence to indicate that it will stay on eg. any latching switch <p>Specification point 3 Have a powerful beam of light</p> <ul style="list-style-type: none"> evidence to indicate that it has an electronic light eg. Bulb/halogen /led/ultra bright LED evidence to indicate that the light is bright eg. Shape of case/ultra bright LED/led cluster <p>Specification point 4 Be made from materials and processes suitable for one-off production</p> <ul style="list-style-type: none"> evidence to indicate that the material is suitable for one-off production (1) evidence to indicate that the process is suitable for one-off production (1) <p>Possible graphical solutions: Design Idea 1</p> <p>The diagram shows a 3D perspective of a rectangular device. The length is labeled as 80mm and the width as 15mm. On the front face, there is a cluster of five small circles labeled 'ULTRA-BRIGHT LED CLUSTER'. On the side face, there is a small rectangular protrusion labeled 'Push toggle switch'. Handwritten annotations include: 'Fits into pocket' with an arrow pointing to the top edge; 'thin so no bumps' with an arrow pointing to the top surface; 'grip makes it easy to switch on' with an arrow pointing to the side face; and 'Vacuum formed in two halves. polystyrene.' at the bottom right.</p>	(8)

	<p>Design Idea 2</p> <p>To score a mark for Design Idea 2, each specification point must be resolved again in the second design idea but the second design idea must be technically / conceptually different in design and construction from the first and not a simple variation on a theme to score the mark.</p> <p>Use exactly the same criteria as design idea 1 to mark design idea 2.</p> <ul style="list-style-type: none"> • A different method of fitting into the pocket (1) • A different method of fitting easily (1) • A different method of switching on (1) • A different method of staying on (1) • A different electronic light (1) • A different method of showing powerful beam (1) • A different material (1) • A different process (1) 	(8)
3 (b)	<p>Each point clearly evaluated.</p> <p>If a candidate has indicated design idea 1 and then evaluates design idea 2 for all or part of (i), (ii) & (iii) then the idea in greater evidence should be marked.</p> <p>The evaluation of the design must contain reference to either positive or negative aspects not just simply a description of the design.</p> <p>Award 1 mark for a correct evaluation / justification relating to each design feature and how it succeeds or fails.</p> <p>Repetition of original spec scores 0.</p>	
3(b)(i)	<p>Evaluation of: The small pocket torch needs to fit easily into the given pocket size</p> <p>Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> • Fitting in the pocket • How easy it is it is <p style="text-align: right;">(2 x 1)</p> <p>E.g. <i>The torch is very small and although it will fit into most side pockets it would be lumpy</i></p>	(2)

3(b)(ii)	<p>(ii) Evaluation of: The small pocket torch must switch on and stay on. Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> • Method of switching on • Method of staying on <p style="text-align: right;">(2 x 1)</p> <p><i>eg. The tilt switch is easy to use but will not stay on when tilted back.</i></p>	(2)
3(b)(iii)	<p>(iii) Evaluation of: The small pocket torch must be made from materials and processes suitable for one-off production Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> • The material used • The process used <p style="text-align: right;">(2 x 1)</p> <p><i>eg. Acrylic is easy to shape and clean but the bend will be difficult to achieve on a line bender.</i></p>	(2)
Total for question		22

Question Number	Answer	Mark
4 (a)	<p>Three each of the following, one under each heading:</p> <p>Specification points Reasons</p> <p>(i) Market</p> <ul style="list-style-type: none"> • Point: It must be cost effective/cheap • Reason: So that more people buy them • Point: It must have a LED indicator • Reason: To give confidence that it is working • Point: It must be easy to test • Reason: Safety/make sure it is working • Point: It must have a quick release screw • Reason: Easy to change the batteries <p style="text-align: right;">(2 x 1)</p> <p>(ii) Quality</p> <ul style="list-style-type: none"> • Point: The battery must last a long time • Reason: To keep the alarm working • Point: Must keep going during a fire/fireproof • Reason: To alert if fire is close to the alarm • Point: It must be easy to change the batteries • Reason: Fitted to the ceiling/hands above head • Point: It must have a smoke vent • Reason: So it can detect smoke quickly <p style="text-align: right;">(2 x 1)</p> <p>(iii) Environment</p> <ul style="list-style-type: none"> • Point: It must be made from recyclable materials • Reason: To conserve the earth's resources • Point: It must be discrete in the home • Reason: So it fits the surroundings • Point: It must be made from white plastic • Reason: White goes with any colour scheme <p style="text-align: right;">(2 x 1)</p> <p><i>Some flexibility should be given as some points may cross over descriptions.</i></p>	<p style="text-align: center;">(2)</p> <p style="text-align: center;">(2)</p> <p style="text-align: center;">(2)</p>

4 (b)(i)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Light (1) • Rigid (1) • Does not rust (1) • Non-magnetic (1) • Easily shaped/die cast (1) • Easy to recycle (1) <p style="text-align: right;">(2 x 1)</p>	(2)
4 (b) ii	<p>Two reasons given:</p> <ul style="list-style-type: none"> • The bracket can be the same colour as the case (1) • It is a low temperature process (1) • Plastic layer protects - sharp edges - scraping ceiling (1) • It is a self finishing process (1) <p style="text-align: right;">(2 x 1)</p>	(2)
4 (c)	<p>Two properties given with two reasons:</p> <p>Property: Good conductor of electricity Reason: small power loss</p> <p>Property: is malleable Reason: easy to produce/ can bend without breaking</p> <p>Property: not magnetic Reason: will not be affected by electro-magnetic devices</p> <p>Property: does not corrode easily Reason: long component life</p> <p>Property: ductile Reason: can be drawn into a wire</p> <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
4 (d)	<p>Two electronic quality control checks named:</p> <ul style="list-style-type: none"> • Detection to activation time/working check (1) • Test button function ease (1) • PCB continuity check (1) • Battery to PCB check (1) • LED function check (1) <p style="text-align: right;">(2 x 1)</p>	(2)
4 (e)	<p>One way described:</p> <ul style="list-style-type: none"> • The tracks are close together making it the only viable method • Complicated PCB needs to fit into small space • Tracks may be laid at 45 degrees to save space <p style="text-align: right;">(2 x 1)</p>	(2)

4 (f)(i) & (ii)	<p>(i) The alarm sound must be clearly heard.</p> <ul style="list-style-type: none"> • A loud buzzer/siren sounds which is loud enough to be heard all over the house. • When smoke is detected an electronic timing circuit drives a high frequency buzzer • The vent in the case allows a loud sound to be emitted <p style="text-align: right;">(2 x 1)</p> <p>(ii) Have a means of fixing to a ceiling.</p> <ul style="list-style-type: none"> • An aluminium ceiling bracket has two slots which screws go through to fix to the ceiling • The case slots onto the ceiling bracket and is held in place by the quick release screw <p style="text-align: right;">(2 x 1)</p>	<p style="text-align: right;">(2)</p> <p style="text-align: right;">(2)</p>
	Total for question	22
	Total for paper	88