

Design & Technology (Systems & Control)

General Certificate of Secondary Education **GCSE 1957**

Mark Schemes for the Components

June 2007

1957/MS/R/07

OCR (Oxford, Cambridge and RSA Examinations) is a unitary awarding body, established by the University of Cambridge Local Examinations Syndicate and the RSA Examinations Board in January 1998. OCR provides a full range of GCSE, A-level, GNVQ, Key Skills and other qualifications for schools and colleges in the United Kingdom, including those previously provided by MEG and OCEAC. It is also responsible for developing new syllabuses to meet national requirements and the needs of students and teachers.

The mark schemes are published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme or report.

© OCR 2007

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 870 6622
Facsimile: 0870 870 6621
E-mail: publications@ocr.org.uk

CONTENTS

General Certificate of Secondary Education Systems & Control (1957)

MARK SCHEMES FOR THE UNITS

Unit	Content	Page
1957/01	Paper 1 (Foundation)	1
1957/02	Paper 2 (Higher)	9
1957/03	Paper 3 (Foundation)	17
1957/04	Paper 4 (Higher)	25
1957/05	Paper 1 (Foundation)	35
1957/06	Paper 2 (Higher)	41
1957/07	Paper 3 (Foundation)	49
1957/08	Paper 4 (Higher)	57
*	Grade Thresholds	65

Mark Scheme 1957/01
June 2007

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 6*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.
- c) **Annotation of scripts**

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 8*)

e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 6*)

There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 26*)

1	(a)	Metal/steel/aluminium/other appropriate metal Plastic/PVC other appropriate plastic	1 1
	(b)	Nut and bolt	1 1
	(c)	Foot width Leg length Length of arms Width of hand Any two	 2
	(d)	Pedals to crank Axle to forks Handlebar stem to frame Wheels to frame	 1
	(e)	Faster/saves time/reference to increased safety [eg heat] More accurate/less wasted parts	1 1
	(f)	The seat has different thickness across the part (ref to seat design) Fast process/(repeatability all the same)/accurate (ref to process) (ref to costs) Cheaper/low cost Any one	 1

2	(a)	REFERENCE TO BALANCE eg <i>'When load is attached the crane is balanced'</i> .	1
		REFERENCE TO FALLING OVER eg <i>'To prevent the crane tipping over'</i> .	1
	(b)	Anticlockwise (pulley)	1
		Anticlockwise (crank handle)	1
	(c)	LUBRICATION oil/grease/greater gap TOLERANCE not as tight/more loose/needs bearing/smooth finish MATERIAL material is smoother/ use low friction material Any two	2
	(d)	Dowel/dowelled	1
	(e)	jib	1
		tower	1
		string	1

3	(a)	Input	1	
		Processing/process/control	1	
		Screen VDU/speakers	1	
	(b)	Electrical	1	
		Light/sound	1	
	(c)	(i) Transistor	1	
		(ii)	Reduces the current/reduces the electricity [no mark for referring to voltage changes]	1
			Protects the LED/stops LED blowing	1
	(d)	$\frac{9 - 2}{0.02}$	1	
		= 350	1	

- 4 (a)** Any point relating to safety **1**
- (b)** – turn the direction of motion (through 90 degrees)
– reduce the speed of rotation
– increase the torque
- Any two **2**
- (c)** Axle bent
Gears do not mesh
Holes in housing not aligned
Diameter of axle too large
Position of motor incorrect
Axle not tightly fitted to the gear
Too much friction/ needs lubrication
- Any two **2**
- (d)** Fits the hand comfortably
Not too heavy to hold for a time
Trigger easy to operate/sufficient sensitivity
Well balanced
- Any two **2**
- (e)** Use of robots/greater automation
Mass/Batch production [allow 'use jigs']
Set up a JIT system
Move to a country with lower labour costs
[do not allow reference to lower cost materials or components]
- Any one **1**
- (f)** Problem of separating the parts
Toxic fumes from the electronic parts when separating
Some plastic parts are too low grade to be useful
Reference to some plastics do not bio degrade
Not all parts can be recycled
- Any two **2**

- 5 (a) Materials used are not 'thrown away' often/less toxic waste 1
- (b) Larger driver
Smaller driven
Reference to reducing slipping eg tightening belt/v belt
- Any two** 2
- [Pulleys same size = 1 mark max]
[Swoping pulleys round = 1 mark max]
- (c) Milling/router 1
- (d) Alter the speed of the cutter [rpm]
Alter the feed of the material [mm/sec]
Use lubricant
More passes
[do **not allow** reference to altering the tool eg stronger tool/ diamond tipped tool]
- Any two 2
- (e) (i) Visually check the surface for imperfections
Check the size of the **blank**/aluminium is to size/within tolerance
Check aluminium is correct thickness/within tolerance
Check cutter is correct diameter
- Any one 1
- (ii) Correct length/within tolerance
Correct width/within tolerance
- Correct radius corners
Slot for pulley in correct position
Check the size of the holes are correct/correct diameter holes
Check the holes are in the right place
Check the cuts go through
- Check there are no sharp edges
- Any one 1
- (f) (i) Reusable/slight changes can be made without starting again 1
- (ii) Development costs are high/basic material costs are high 1

Mark Scheme 1957/02
June 2007

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 6*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.
- d) **Annotation of scripts**

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 8*)

e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 6*)

There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 26*)

- | | | |
|----------|---|----------|
| 1 | <p>(a) Any point relating to safety</p> | 1 |
| | <p>(b) – turn the direction of motion (through 90 degrees)
 – reduce the speed of rotation
 – increase the torque</p> <p>Any two</p> | 2 |
| | <p>(c) Axle bent
 Gears do not mesh
 Holes in housing not aligned
 Diameter of axle too large
 Position of motor incorrect
 Axle not tightly fitted to the gear
 Too much friction/ needs lubrication</p> <p>Any two</p> | 2 |
| | <p>(d) Fits the hand comfortably
 Not too heavy to hold for a time
 Trigger easy to operate/sufficient sensitivity
 Well balanced</p> <p>Any two</p> | 2 |
| | <p>(e) Use of robots/greater automation
 Mass/Batch production
 Set up a JIT system
 Move to a country with lower labour costs
 [do not allow reference to materials or components]</p> <p>Any one</p> | 1 |
| | <p>(f) Problem of separating the parts
 Toxic fumes from the electronic parts when separating
 Some plastic parts are too low grade to be useful
 Not all parts can be recycled</p> <p>Any two</p> | 2 |

- 2 (a) Materials used are not 'thrown away' often//less toxic waste 1
- (b) Larger driver 1
Smaller driven 1
- Reference to reducing slipping eg tightening belt/v belt
[Pulleys same size = 1 mark max]
[Swapping pulleys round = 1 mark max]
- Any two
- (c) Milling/router 1
- (d) Alter the speed of the cutter [rpm]
Alter the feed of the material [mm/sec]
Use lubricant
More passes
[do not allow reference to the tool]
- Any two 2
- (e) (i) Visually check the surface for imperfections
Check the size of the **blank**/aluminium is to size/within tolerance
Check aluminium is correct thickness/within tolerance
Check cutter is correct diameter
- Any one 1
- (ii) Correct length/within tolerance
Correct width/within tolerance
- Correct radius corners
Slot for pulley in correct position
Check the size of the holes are correct/correct diameter holes
Check the cuts go through
Check there are no sharp edges
- Any one 1
- (f) (i) Reusable/slight changes can be made without starting again 1
- (ii) Development costs are high/basic material costs are high 1

- 3 (a) (i) Smooth surface/lightweight/light/good strength to weight
look attractive/waterproof/very lightweight (any one) 1
- (ii) Smooth/no undercuts/sloping sides/draught angle
resists heat/does not melt/withstands the air pressure/
does not collapse
can be used more than once (any two) 2
- (b) Additional solar cell in series/parallel 1
or/additional capacitor in **series** [not parallel] with existing capacitor
- explanation** of what effect the change makes 1
eg greater charge stored
- (c) Structure allowing tilting (**sketch**) 1
[eg simple frame, simple support, shell, wedge]
- Method of locking (**sketch**) 1
[eg nuts and bolts, screws, double sided tape]
- Quality of sketches 1
- TWO specification points justified**
eg 'm5 nuts and bolts hold panel securely in place'
eg 'wedge is vacuum formed plastic and so is lightweight'
eg '.plated screws are used to prevent corrosion' 2

4	(a)	PVC/HDPE/polypropelene/ABS/nylon Injection Moulding	1 1
	(b)	Wheels not wide enough apart Centre of gravity too high Distance between axles too small Seat too far back/angled back too much Seat (stem) too high Any two	2
	(c)	Cost of setup is high	1
	(d)	Method of securing to frame (sketch/note) eg welded bracket Easy removal without tools (sketch/note) eg ball/button and spring Horizontal and vertical movement (sketch/note) eg U-joint Method of adjustment of length (sketch + note explaining) eg sleeving	1 1 1 2

- 5 (a) **Sketch** showing the inclusion of an electric motor with a simple mechanical control system to move the load at a suitable speed eg pulleys/gears 1

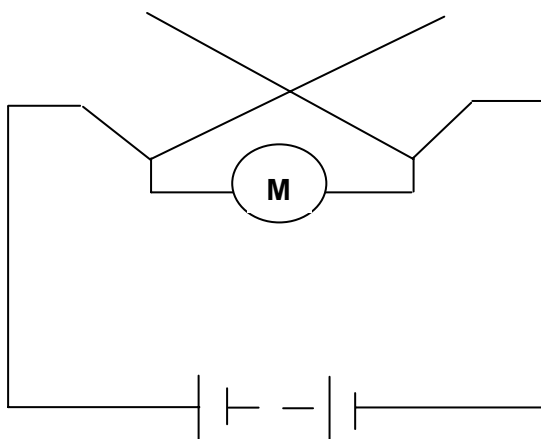
Note explaining the inclusion of an electric motor with a simple mechanical control system to move the load at a suitable speed eg pulley/gears 1

- (b) Circuit with battery+motor+switch [correct symbols not required here] 1

Double pole switch [note or attempted drawing] 1

Double pole switch drawn correctly 1

Any two circuit symbols correctly drawn 1



- (c) **Sketch** showing a system for guiding the string which keeps friction as small as possible eg steel eyes/plastic loops/washers/pulleys 1

Note explaining a system for guiding the string which keeps friction as small as possible eg steel eyes/plastic loops 1

Mark Scheme 1957/03
June 2007

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 6*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.
- e) **Annotation of scripts**

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 8*)

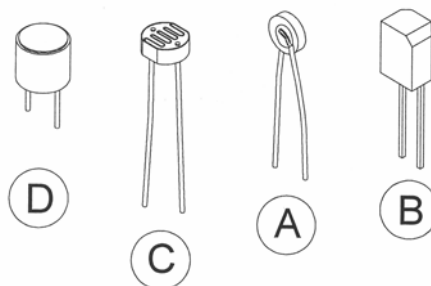
e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 6*)

There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 26*)

1 (a) (i) 1 mark for each correct.



[4]

(ii) Component that senses heat is the thermistor (A), 1 mark.
Accept any indication of the correct component.

[1]

(iii) Cathode identified by one of the following:

- diode tester/multimeter
- test in breadboard
- pin diagram
- slope/bevel on top of casing
- trial and error.

1 mark for suitable method.

[1]

(b) (i) 7/0.2mm wire multistrand – accept any indication of the correct wire.

[1]

(ii) Reason should refer to **flexibility**, allowing movement without breaking.
Accept insulation – or other good reason for wrong wire.

[1]

(iii) Reasons could include:

- insulation of joint
- strengthen joint
- colour coding
- neatness of joint.

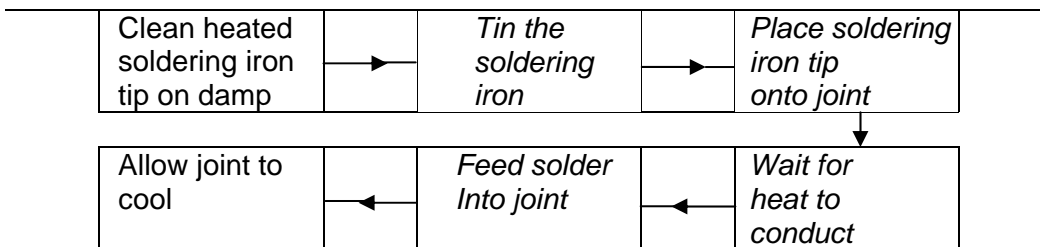
1 mark each for two suitable reasons 2 x 1.

[2]

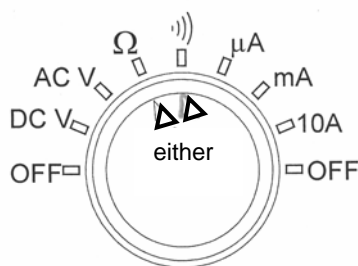
Total Marks

[10]

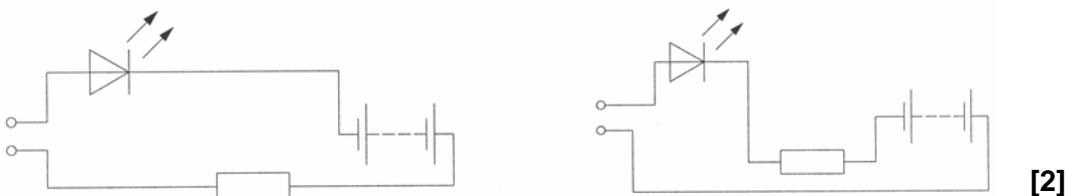
- 2 (a) (i) Two parts of process in correct order 1 mark, all parts in correct order 2 marks. [2]



- (ii) Reference to the toxic nature of lead, 1 mark.
Allow general reference to health and safety or legal requirement. [1]
- (b) (i) Arrow next to resistance symbol or continuity test symbol))) , 1 mark.
Allow other methods of indicating eg circle around resistance symbol.



- (ii) Connections to form a circuit, 1 mark,
diode cathode to battery negative, 1 mark,
(other layouts are possible).



- (c) Tool 1, 1 mark, accept side cutters or indication on Fig. 7. [1]

- (d) **Soldering** – low cost (accept ‘cheap’) – good/permanent connection – no extra components. [1]

Screw terminals – easy to connect/disconnect – positions of wires changed easily, [1]

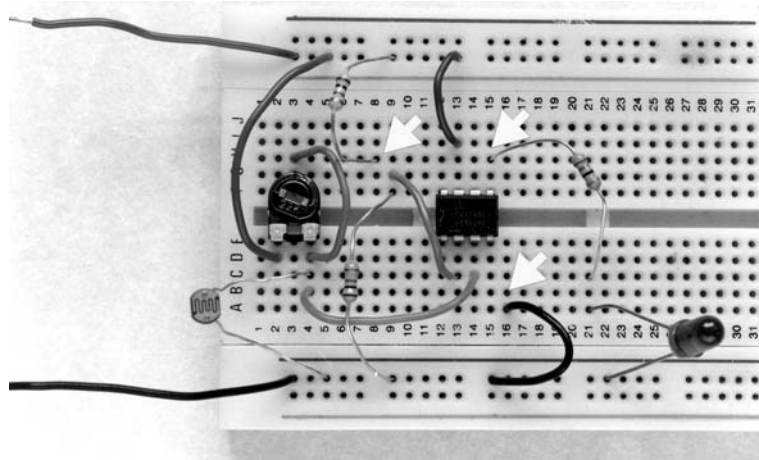
Straight pin connector – easy/fast connection of multiple wires – only fits one way – strain relief – removable without any tools. [1]

Total Marks [10]

3	(a)	(i)	Substitution into formula $V = 15000/(22000 + 15000) \times 5$, 1 mark Correct answer 2.03V (allow range 2.0V – 2.03V), 1 mark. Correct answer and substitution into formula with no working, 2 marks.	[2]
		(ii)	Voltage at Y increases when sensor is shaded, 1 mark.	[1]

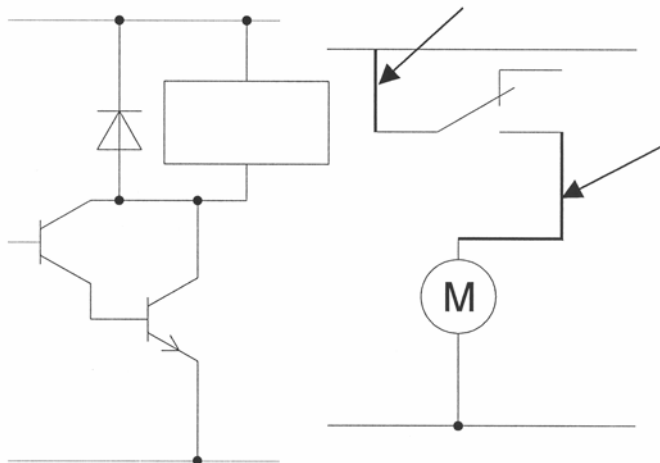
- (b) (i) Changes needed to breadboard:
- 0V connection needs moving to pin 4 [1]
 - two fixed resistors not joined in centre, top one needs moving over 1 hole [1]
 - resistor from output is in pin 5 hole needs moving to pin 6. [1]

Allow answers drawn onto Fig 10 or reference to breadboard grid.



- (ii) dual in line, 1 mark [1]

- (c) (i) 1 mark for each connection correct, 2 x 1. [2]



- (ii) The Darlington driver will amplify the current from the 3140 to operate the relay.
Allow mark for understanding of the process. [1]

Total Marks [10]

- 4 (a) (i) Responses could include:
- Exploded isometric** – assembly worker, accept reference to understanding how parts fit together. Accept reference to assembly instructions. [1]
- Dimensioned orthographic** – manufacturer or installer of the part - the user needs accurate detail. [1]
- Perspective** – client, customer, advertising producer - no technical knowledge assumed. [1]
Allow mark where understanding is shown.
- (ii) Largest drill size is $\varnothing 4.2\text{mm}$. Accept 4.2. [1]
- (iii) If a minus tolerance were used the M4 screw could bind on the hole. Allow mark for understanding. [1]
- (b) Reference to control of stock levels, 1 mark.
Reference to ordering/reordering components, 1 mark. [2]
- (c) (i) Advantages for quality control could include:
- testing of individual boards
 - accuracy during assembly
 - less expense if board is found to be faulty
 - ease of replacement
 - individual parts of the circuit can be developed/improved further, 2 x 1 marks. [2]
- (ii) Reasons could include:
- time/expense of reworking
 - small components do not allow reworking
 - repaired board may not be reliable
 - board has been superseded.
 - difficult to trace fault [1]
- 1 mark for suitable reason.
- Total Marks** [10]

- 5 (a) (i) Benefit of LED display:
- bright
 - easy to see
 - can be seen at night.
 - more robust
- [1]
- 1 mark for suitable benefit.
- (ii) Benefit of LCD display:
- longer battery life
 - greater range of characters
 - ability to make use of solar cells for power
 - uses less power.
- [1]
- 1 mark for suitable benefit.
- (b) (i) Reasons for using injection moulding could include:
- numbers being produced
 - low cost of each moulding
 - accuracy – each case identical
 - level of detail required
 - ability to change colour of moulding easily.
- [2]
- 1 mark each for two points made in explanation.
- (ii) Property required is **flexibility**, 1 mark.
Allow mark for clear description or reasons for property being required. [1]
- (c) (i) The notch in the key is for orientation to ensure that key is correct way up when assembled, 1 mark. [1]
- (ii) Reasons for reduced parts count could include:
- less time spent in assembly
 - lower cost of assembly
 - less stock to be stored
 - less to go wrong with product
 - ease of recycling parts of the product.
- 1 mark for each valid reason.
Do not accept 'cheap', 'easy' or other unjustified single word answers, 2 x 1 mark. [2]
- (d) Explanation should include reference to:
- reliability of conductive pads
 - ease of assembly
 - no metal on metal contact
 - gold plating lasts longer
 - less corrosion to cause poor contact
 - not affected as badly by atmospheric conditions.
- 1 mark for each of 2 relevant points in explanation.
Do not accept 'cheap', 'easy' or other unjustified single word answers. [2]
Allow 2 marks for clear explanation of one point.
- Total Marks** [10]

Mark Scheme 1957/04
June 2007

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 6*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.

f) Annotation of scripts

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 8*)

e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 6*)

There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 26*)

- 1 (a) (i) Responses could include:
- Exploded isometric** – assembly worker, accept reference to understanding how parts fit together. Accept reference to assembly instructions. [1]
- Dimensioned orthographic** – manufacturer or installer of the part - the user needs accurate detail. [1]
- Perspective** – client, customer, advertising producer - no technical knowledge assumed. [1]
Allow mark where understanding is shown.
- (ii) Largest drill size is $\varnothing 4.2\text{mm}$. Accept 4.2. [1]
- (iii) If a minus tolerance were used the M4 screw could bind on the hole. Allow mark for understanding. [1]
- (b) Reference to control of stock levels, 1 mark.
Reference to ordering/reordering components, 1 mark. [2]
- (c) (i) Advantages for quality control could include:
- testing of individual boards
 - accuracy during assembly
 - less expense if board is found to be faulty
 - ease of replacement
 - individual parts of the circuit can be developed/improved further, [2]
- 2 x 1 marks.
- (ii) Reasons could include:
- time/expense of reworking
 - small components do not allow reworking
 - repaired board may not be reliable
 - board has been superseded.
 - difficult to trace fault [1]
- 1 mark for suitable reason.

Total Marks [10]

- 2 (a) (i) Benefit of LED display:
- bright
 - easy to see
 - can be seen at night.
 - more robust
- [1]
- 1 mark for suitable benefit.
- (ii) Benefit of LCD display:
- longer battery life
 - greater range of characters
 - ability to make use of solar cells for power
 - uses less power.
- [1]
- 1 mark for suitable benefit.
- (b) (i) Reasons for using injection moulding could include:
- number being produced
 - low cost of each moulding
 - accuracy – each case identical
 - level of detail required
 - ability to change colour of moulding easily.
- [2]
- 1 mark each for two points made in explanation.
- (ii) Property required is **flexibility**, 1 mark.
Allow mark for clear description or reasons for property being required. [1]
- (c) (i) The notch in the key is for orientation to ensure that key is correct way up when assembled. 1 mark. [1]
- (ii) Reasons for reduced parts count could include:
- less time spent in assembly
 - lower cost of assembly
 - less stock to be stored
 - less to go wrong with product
 - ease of recycling parts of the product.
- 1 mark for each valid reason, do not accept 'cheap', 'easy' or other unjustified single word answers, 2 x 1 mark. [2]
- (d) Explanation should include reference to:
- reliability of conductive pads
 - ease of assembly
 - no metal on metal contact
 - gold plating lasts longer
 - less corrosion to cause poor contact
 - not affected as badly by atmospheric conditions.
- 1 mark for each of 2 relevant points in explanation. [2]
Do not accept 'cheap', 'easy' or other unjustified single word answers.
Allow 2 marks for clear explanation of one point.

Total Marks [10]

- 3 (a) (i) Two stages in providing accurate time can include the following:
- calculation of resistor/capacitor combination to use
 - use of on screen simulation to test values
 - use of breadboard testing
 - checking delay against known time source, ie stopwatch.

[2]

1 mark each for valid stages. 2 x 1.

- (ii) Functional advantages of microprocessor:

- accurate timing
- ease of changing delay
- accurate repeat of time delay
- reduced need for logic gates.

[1]

1 mark for **functional** reason.

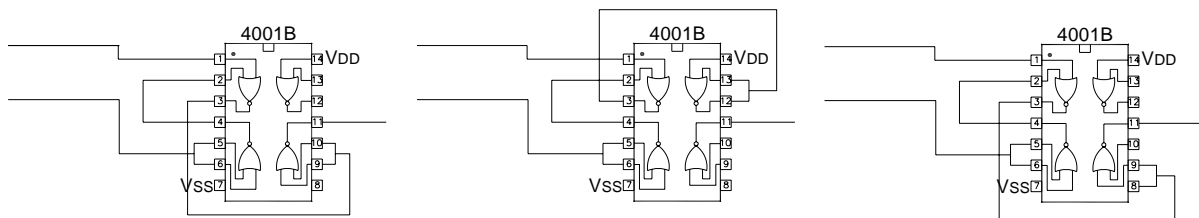
- (b) (i) 1 mark for X column correct, 1 mark for Y column correct in relation to X column.

[2]

monostable	sensor	X	Y
0	0	0	1
0	1	1	0
1	0	0	1
1	1	0	1

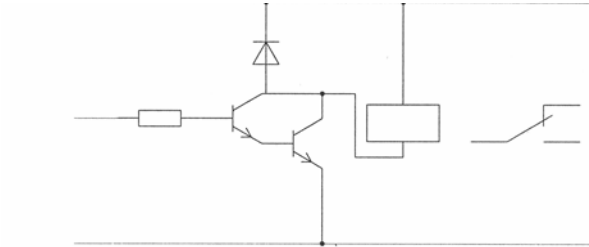
- (ii) 1 mark for left hand gate connections, 1 mark for final NOT gate inputs. eg allow use of alternative gates.

[2]



- (c) 1 mark for use of transistor(s) for amplification, 1 mark for functional circuit. eg [2]

Allow use of Darlington array.

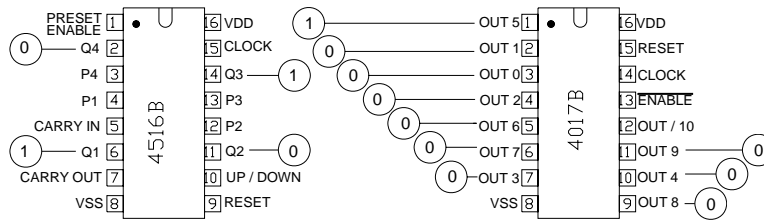


- (d) Precaution could include use of earthing, RCD device, double insulation, transformer, no physical contact.
Allow reference to protection of circuit from water. [1]

1 mark for suitable safety precaution.

Total Marks [10]

4 (a) (i) 1 mark for 4516 outputs, 1 mark for 4017 outputs. [2]

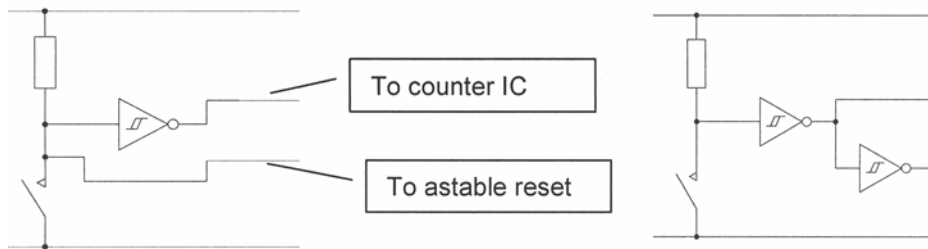


(ii)	Advantage of 4516: Counts to 16 Allows longer total count Can give up/down count	Advantage of 4017: Doesn't need understanding of binary Clear linear outputs Doesn't need logic or decoding
	1 mark each for suitable advantage, 2 x 1	

[2]

(b) 1 mark for correct connection to counter IC reset.
1 mark for correct connection to astable reset.

[2]



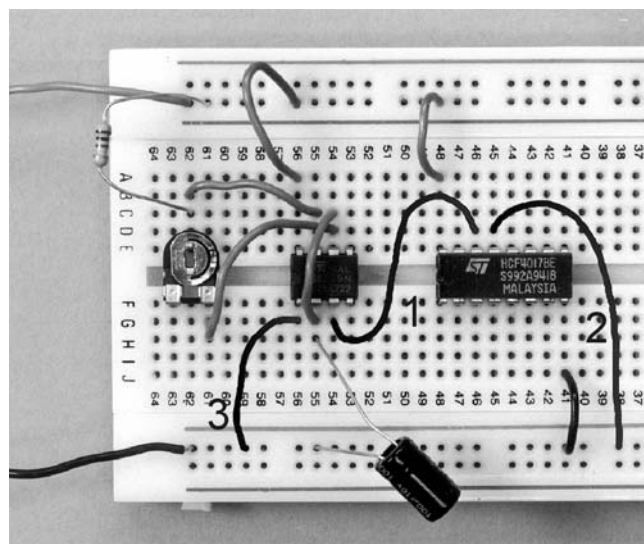
(c) Output 0 is not used because it will light when no time has elapsed and could be confusing to the user. Output 1 will light after the first astable cycle. No mark for repeating 'Q0 is high' without further explanation.

[1]

1 mark for understanding shown.

(d) 1 mark for each correct connection. 3 x 1.

[3]

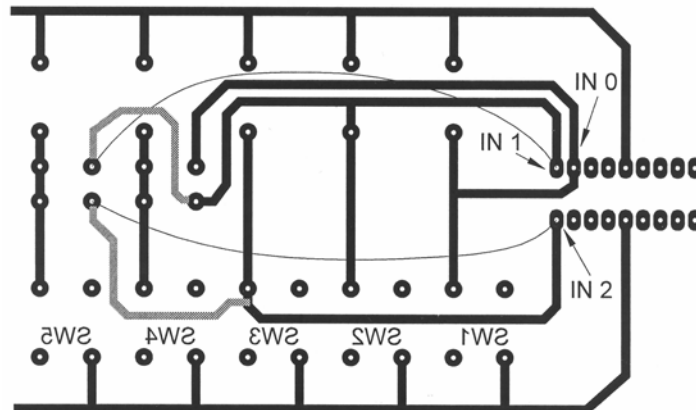


- 5 (a) (i) The diodes block the signal from switches 3, 4 and 5 from activating unwanted signals. [2]

1 mark for mention of 'blocking' effect.
1 mark for consequences of signal being blocked.

- (ii) 8 combinations are available using 3 inputs. [1]

- (b) (i) 1 mark for each track correctly routed. There are a number of possible solutions the one shown is the simplest. 2 x 1. [2]



- (ii) Features that can be controlled could include:

- track width
- shape, type and size of board
- track direction
- pad shape and dimension
- copper fill
- hole size in pad.

[1]

Allow 1 mark for any suitable feature.

- (c) Benefits could include:

- uses in a counting circuit
- uses in a dimmer circuit
- uses in combustible/flammable conditions
- uses that require tactile feedback to operator.

[2]

2 x 1 allow marks for realistic uses.

- (d) Problems will include:

- small workshops using existing stocks
- solder used in repairs
- imported goods
- cost of new soldering equipment
- not easy to check visually
- cost of inspection and testing.

[2]

2 x 1 marks for clear descriptions of likely problems.

Total Marks [10]

Mark Scheme 1957/05
June 2007

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 4*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.
- g) **Annotation of scripts**

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 6*)

e) Handling of unexpected answers

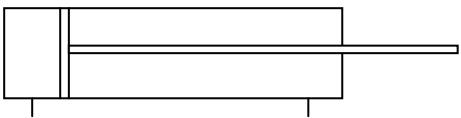
The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 4*)


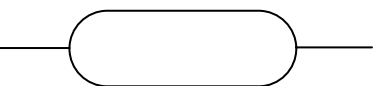
There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 25*)

1(a) A = Exhaust [1]

B=  [1]

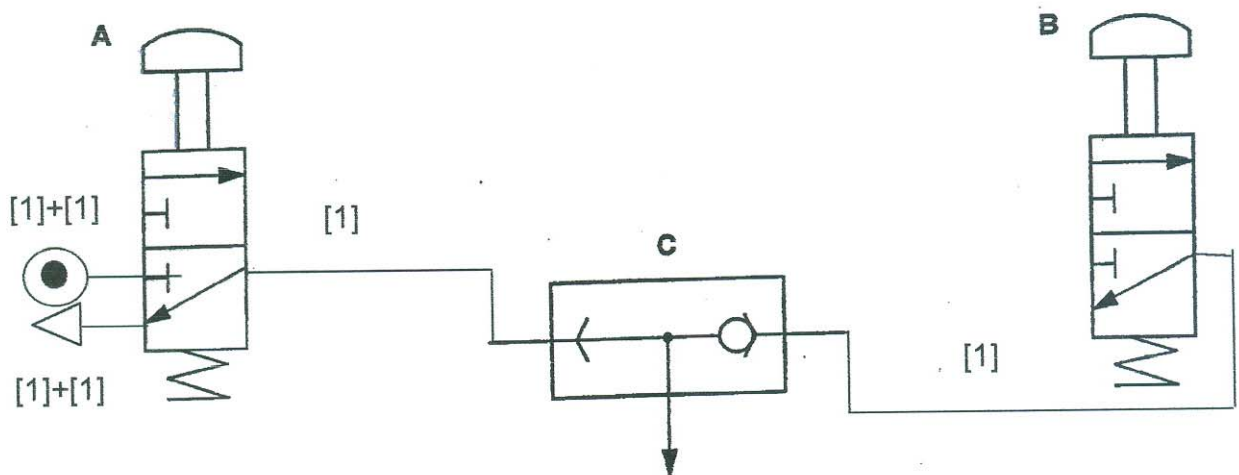
C =  [2]

D = 3 port (1) push button (1) spring return valve (1). [3]

E=  or  [1]

1(b) Time delay / Store air / Smooth supply. [2]

2(a)(i) & (ii)



2(a)(iii) A Shuttle Valve. [1]

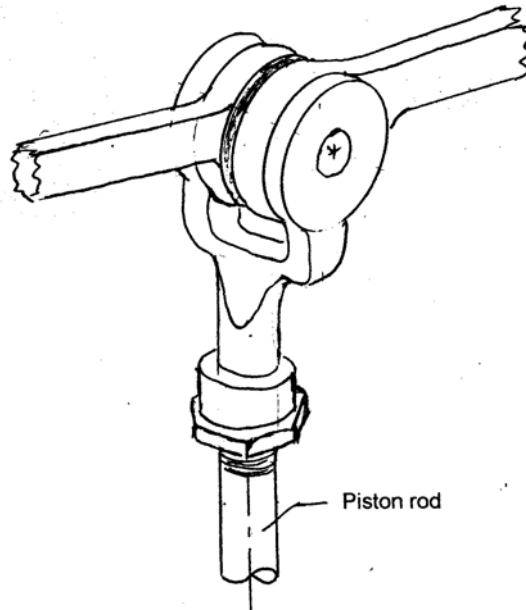
2(b)(i) A Single Acting Cylinder. [1]

2(b)(ii) A uni-directional flow restrictor /flow control valve. [1]

2(b)(iii) The arrow shows that the air flow can be adjusted in one direction. [1]

- 3(a)(i) Main air passes through valve A (1) and into B blowing the ball onto the seat (1) and through the restriction of valve B (1) to the single acting cylinder which will outstroke (1). [4]
- 3(a)(ii) The ball in component B is released from the seat allowing air to pass quickly through the open route of valve B (1) reducing air pressure in C and allowing the spring to instroke the cylinder (1). [2]
- 3(b) Main air passes momentarily through to the single acting cylinder which outstrokes slightly (1) but returns quickly through the open route of valve B. (1) [2]
- 3(c) If component B is removed from the circuit there will be no adjustment to the speed (1) of the cylinder outstroking. (1) [2]
- 4(a) Accuracy of drawing. Able to copy and paste components. Quicker to draw complex designs. Easy to save and store images. Make changes to existing drawings more easily. Import images. (1 mark for each suitable answer up to maximum of 4) [4]
- 4(b) To help evaluate the integrity of the circuit. To test the flow. To evaluate the viability of different components. To find problems and solve them through simulation before a physical circuit is constructed. Cheaper than buying components. (1 mark for each suitable answer up to maximum of 2) [2]
- 4(c) Time programmed gates or doors. Robots used to manufacture other components working to a set programme. Fairground rides, film sets, special effects. Any other suitable application. Any two [2]
- 4(d) Cost of equipment, training of staff and retraining, redundancy, life of software, cleaner work environment, safer working environment, potentially higher pay, more skilled workforce etc. Any two [2]

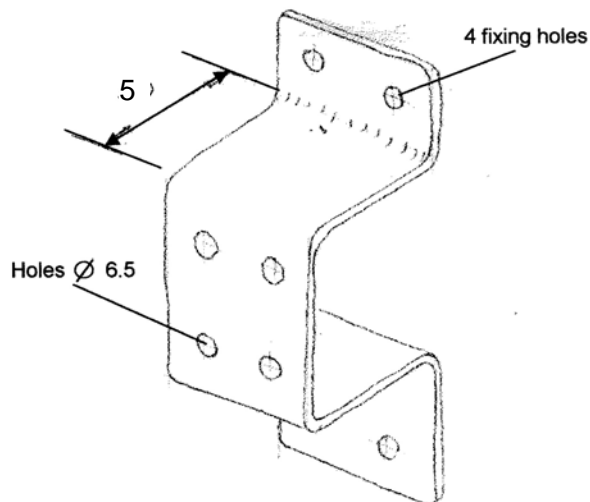
5(a)



- Thread on piston rod (connector) (1)
- Piston rod to link (1)
- Both sides of Link (1)
- Central pin (1)
- Locknut (1)

[5]

5(b)



- 50mm stand off (1)
- 4X mountings (1)
- Fixings to wall (1)
- Spare for airline (1)
- Spare for hand operation

[5]

Mark Scheme 1957/06
June 2007

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 4*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.
- h) **Annotation of scripts**

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 6*)

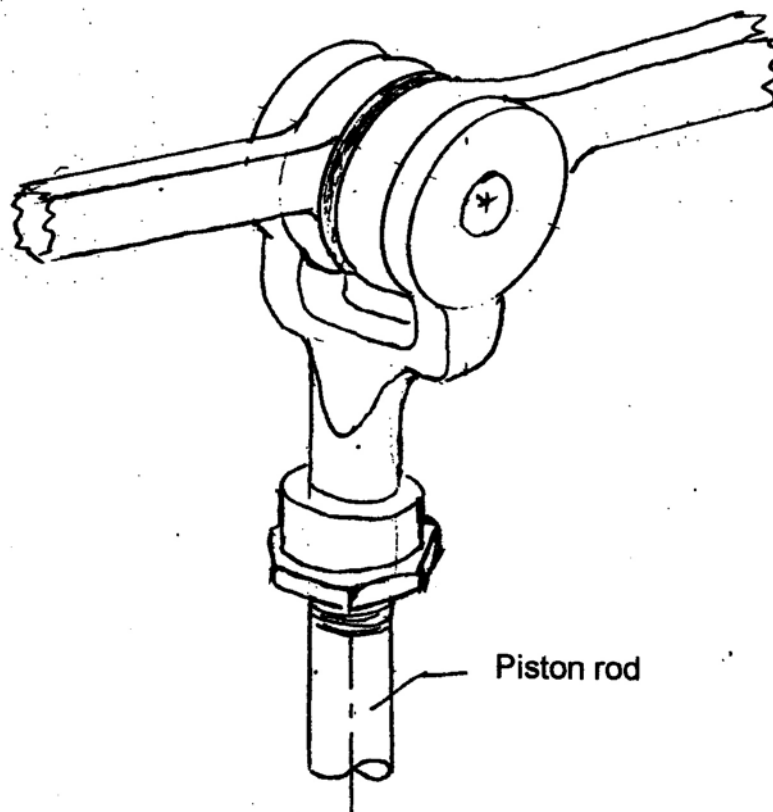
e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 4*)

There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 25*)

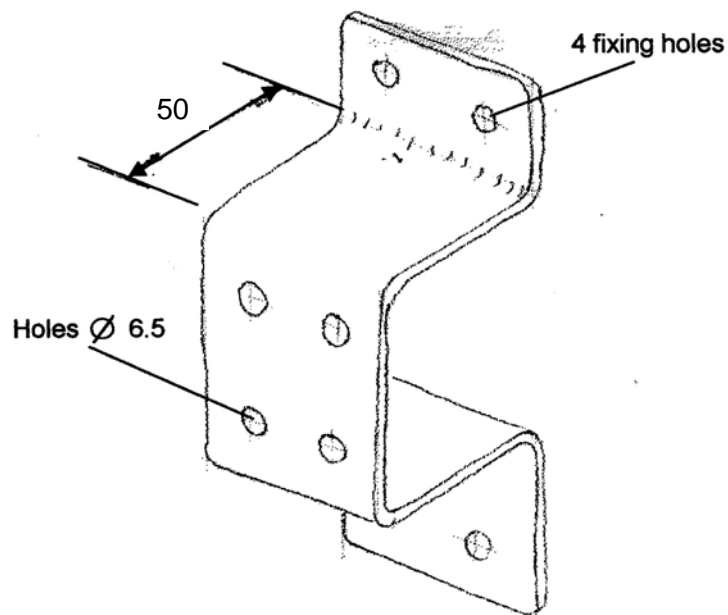
- 1(a) Accuracy of drawing. Able to copy and paste components. Quicker to draw complex designs. Easy to save and store images. Make changes to existing drawings more easily, import images.
(1 mark for each suitable answer up to maximum of 4) [4]
- 1(b) To help evaluate the integrity of the circuit. To test the flow. To evaluate the viability of different components. To find problems and solve them through simulation before a physical circuit is constructed. Cheaper than buying components.
(1 mark for each suitable answer up to maximum of 2) [2]
- 1(c) Time programmed gates or doors. Robots used to manufacture other components working to a set programme. Fairground rides, film sets, special effects. Any other suitable application. Any two, 1 mark each. [2]
- 1(d) Training of staff and retraining, redundancy, cleaner work environment, safer work environment, potentially higher pay, more skilled workforce, life of software, etc. Any two, 1 mark each. [2]
- 2(a)



- Thread on piston rod (connector) (1)
 Piston rod to link (1)
 Both sides of Link (1)
 Central pin (1)
 Locknut (1)

[5]

2(b)



50mm stand off (1)
4X mountings (1)
Fixings to wall (1)
Spare for airline (1)
Spare for hand operation

[5]

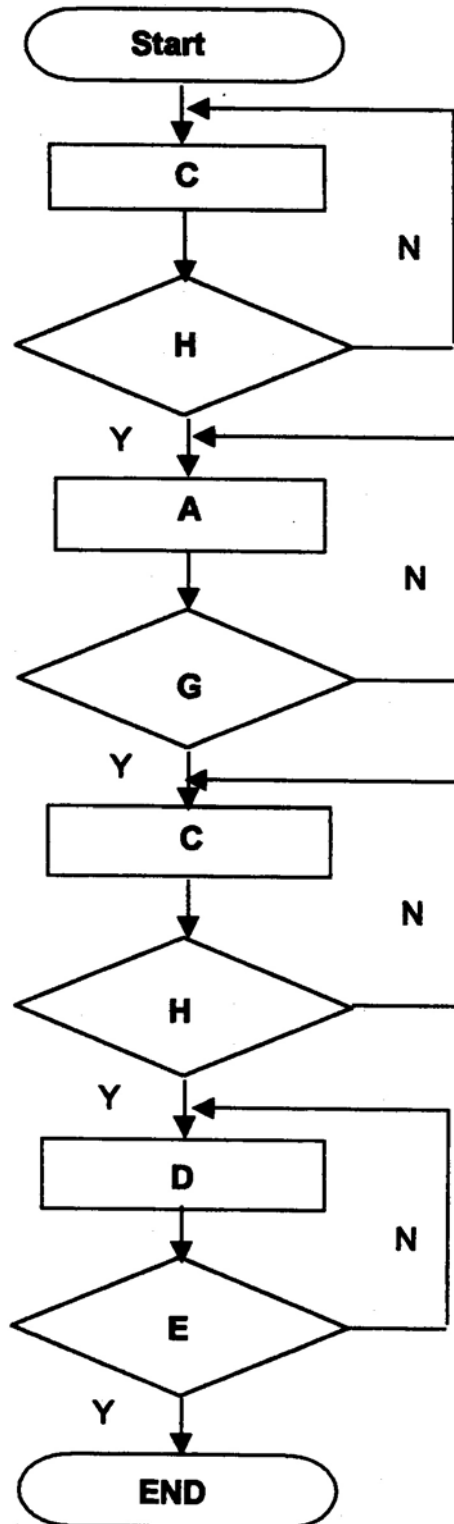
3(a) The linkages must be identical otherwise when the bridge is rolled up it will not form a circle and may not be stable.

[2]

3(b) Put the letters into the flow chart symbols to complete the flow chart.

- A Outstroke cylinder A
- E Is cylinder A fully instroked ?
- C Outstroke then instroke cylinder B.
- D Instroke cylinder A.
- G Is cylinder A fully outstroked ?
- H Is cylinder B fully instroked ?

Could Start here



[8]

- 4(a) Double acting cushioned cylinder. [1]
- 4(b) This cylinder has a chamber at each end, which traps a cushion of air (1) towards the end of the stroke (1) and releases it gradually (1). This causes the piston rod to slow up and gently finish the stroke(1), the cushion can be adjusted (1). A cushioned cylinder can prevent any slamming or vibration etc (1). [6]
- 4(c) This type of cylinder should be used because otherwise the bridge will slam on the other bank(1) and could cause damage(1), also when rolling, will slam and could cause it to distort or lock together(1). [3]
- 5(a)(i) $F = P \times A$
 $90 = 0.3 \times A$
 $A = \frac{90}{0.3} \quad (1)$
 $A = 300 \text{ sq mm} \quad (1)$
 $r = \sqrt{\frac{300}{\pi}} \quad (1)$
 $r = 9.8 \text{ mm} \quad (1)$
 $d = 19.6 \text{ mm} \quad (1)$ [4]
- 5(a)(ii) Cylinder D [1]
- 5(b) When the bridge is resting on the spring with no people on the bridge, air escapes (1) and the valve is resting and allowing the air to pass through the rest of the circuit (1).
 When there is a person on the bridge their weight lowers the bridge slightly and blocks the air (1) causing the valve to change state (1), and air is cut from the rest of the circuit (1). [5]

Mark Scheme 1957/07
June 2007

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 6*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.

i) Annotation of scripts

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 8*)

e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

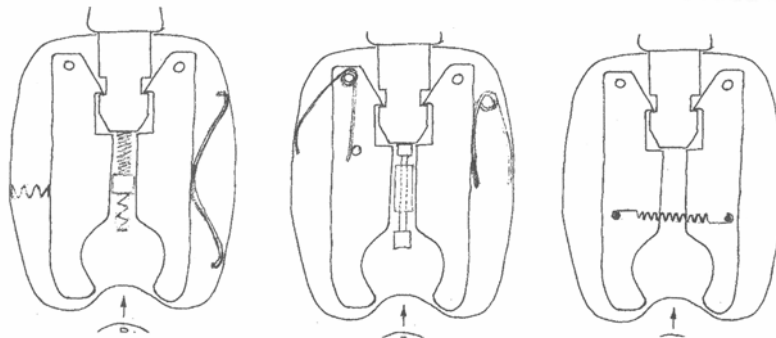
- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 6*)

There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 26*)

- | | | | | |
|---|-----|------|--|-----------------|
| 1 | (a) | (i) | <p>Turning: Drawing of: crank, wheel, or component that will increase diameter of shaft.</p> | [1] |
| | | | <p>Fixing: Grub screw, bolt, pin, adhesive if appropriate for metal (epoxy), weld, solder
Appropriate component.
Correct use of fixing.</p> | [1]
[1] |
| | | | <p>One mark only for splines or flats without fixing.</p> | |
| | | (ii) | <p>Correct name of component drawn.
Accept: handle, knob</p> | [1] |
| | (b) | (i) | <p>Component C</p> | [1] |
| | | (ii) | <p>Additional piece above strip. Prevent upward movement
Additional piece below strip. Prevent downward movement
Overhang maintained</p> | 1
1
1 [3] |
| | (c) | | <p>Rotary motion, accept circular motion
Bevel, mitre gear</p> | 1
1 [2] |

- 2 (a) Reduce friction, prevent corrosion, prevent wear, quieter operation if it seizes up it will blow over. [2]
Not: to make it turn
- (b) Grease, silicone, oil, WD40. [1]
- (c) Roller, ball, thrust [1]
- (d) Chain – non slip. 1
 Explanation to relate to the need to ensure that each element remains correctly orientated. 1 [2]
- (e) (i) Take up space between driver and driven, allow adjustment, keep direction of rotation the same for both gears. [1]
- (ii) $VR = 150/10 = 15$ [1]
 Accept 15:1 or 1:15
- (iii) Speed = $60 / 15$ 1
 = 4 rpm 1 [2]
 Accept application of incorrect VR from (ii)

- 3 (a) (i) Class 2, class B, 2nd order. [1]
- (ii) Class 3, class C, 3rd order. [1]
- (b) Component to eject bolt. B 1
 Component to eject coin. C 1
 Additional component to make these function as intended. F 1
 Component to close jaws. J 1



- (c) (i) Shape of covers, size of coin slot, length of chain, shape of jaws, shape of slot' rounded edges. [2]
- (ii) Clearly explained reason for importance of stated ergonomic feature. [2]
 Accept good explanation of ergonomic feature not given in (i) for 2 marks.

4	(a)	Lift doors, fire door, litter picks, sprinkler systems, shutter systems, parking barriers.		[2]
	(b)	Worm and worm wheel.		[1]
	(c)	Compact resulting from ability to use smaller wormwheel, high VR achieved giving very fine control of movement, high torque means that weight of camera when tilted will not cause camera to tilt further when mechanism is not powered.		[2]
	(d)	The need to prevent RSI in operators, for comfort and safety, for ease and precise control.		
		Award only one mark if candidate does not relate answer to anthropometric data.		[2]
	(e)	Stock control, quality control, machine control, CAM, CNC, deployment of workers, logistics in movement of components, not CAD.		[3]
5	(a)	Steel, aluminium, brass.		[1]
	(b)	(i) Use of design software to VR model, produce accurate drawings, calculate precise measurements, easily modify designs.		[1]
		(ii) Use CNC equipment to produce consistent accuracy when making a batch, allow other parts to be made at same time reducing workforce and time.		[1]
	(c)	Bending edge. Accurate location. Secure hold.	B 1 L 1 H 1	[3]
	(d)	Fix housing to bracket. Any angle between horizontal and 45. Note: if a selection of set angles one mark only. Fix at selected angle.	1 2 1	[4]
		Total Marks		[50]

Mark Scheme 1957/08
June 2007

INSTRUCTIONS ON MARKING SCRIPTS

All page references relate to the Instructions to Examiner booklet (revised June 2006)

For many question papers there will also be subject or paper specific instructions which supplement these general instructions. The paper specific instructions follow these generic ones.

1 Before the Standardisation Meeting

Before the Standardisation Meeting you must mark a selection of at least 10 scripts. The selection should be drawn from several Centres. The preliminary marking should be carried out **in pencil** in strict accordance with the mark scheme. In order to help identify any marking issues which might subsequently be encountered in carrying out your duties, **the marked scripts must be brought to the meeting.** (*Section 5c, page 6*)

2 After the Standardisation Meeting

- a) Scripts must be marked in **red**, including those initially marked in pencil for the Standardisation Meeting.
- b) All scripts must be marked in accordance with the version of the mark scheme agreed at the Standardisation Meeting.

j) Annotation of scripts

The purpose of annotation is to enable examiners to indicate clearly where a mark is earned or why it has not been awarded. Annotation can, therefore, help examiners, checkers, and those remarking scripts to understand how the script has been marked.

Annotation consists of:

- the use of ticks and crosses against responses to show where marks have been earned or not earned;
- the use of specific words or phrases as agreed at standardisation and as contained in the final mark scheme either to confirm why a mark has been earned or indicate why a mark has not been earned (eg indicate an omission);
- the use of standard abbreviations eg for follow through, special case etc.

Scripts may be returned to Centres. Therefore, any comments should be kept to a minimum and should always be specifically related to the award of a mark or marks and be taken (if appropriate) from statements in the mark scheme. General comments on a candidate's work must be avoided.

Where annotations are put onto the candidates' script evidence, it should normally be recorded in the body of the answer or in the margin immediately adjacent to the point where the decision is made to award or not award the mark.

d) Recording of marking: the scripts

- i) Marked scripts must give a clear indication of how marks have been awarded, as instructed in the mark scheme.
- ii) All numerical marks for responses to part questions should be recorded unringed in the right-hand margin. The total for each question (or, in specified cases, for each page) should be shown as a single ringed mark in the right-hand margin at the end of each question.
- iii) The ringed totals should be transferred to the front page of the script, where they should be totalled.
- iv) Every page of a script on which the candidate has made a response should show evidence that the work has been seen.
- v) Every blank page should be crossed through to indicate that it has been seen. (*Section 8a – d, page 8*)

e) Handling of unexpected answers

The Standardisation Meeting will include a discussion of marking issues, including:

- a full consideration of the mark scheme in the context of achieving a clear and common understanding of the range of acceptable responses and the marks appropriate to them, and comparable marking standards for optional questions;
- the handling of unexpected, yet acceptable answers. (*Section 6a, bullet point 5, page 6*)

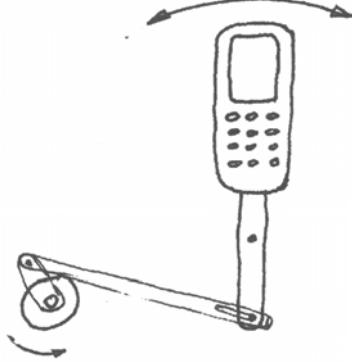
There will be times when you may not be clear how the mark scheme should be applied to a particular response. In these circumstances, a telephone call to the Team Leader should produce a speedy resolution to the problem. (*Appendix 5, para 17, page 26*)

- 1 (a) Lift doors, fire door, litter picks, sprinkler systems, shutter systems, parking barriers. [2]
- (b) Worm and worm wheel. [1]
- (c) Compact resulting from ability to use smaller wormwheel.
High VR achieved giving very fine control of movement.
High torque means that weight of camera when tilted will not cause camera to tilt further when mechanism is not powered. [2]
- (d) The need to prevent RSI in operators.
For comfort and safety.
For ease and precise control.
Award only **one** mark if candidate does not relate answer to anthropometric data. [2]
- (e) Stock control, quality control, machine control, CAM, CNC, deployment of workers, logistics improvement of components, **Not** CAD [3]

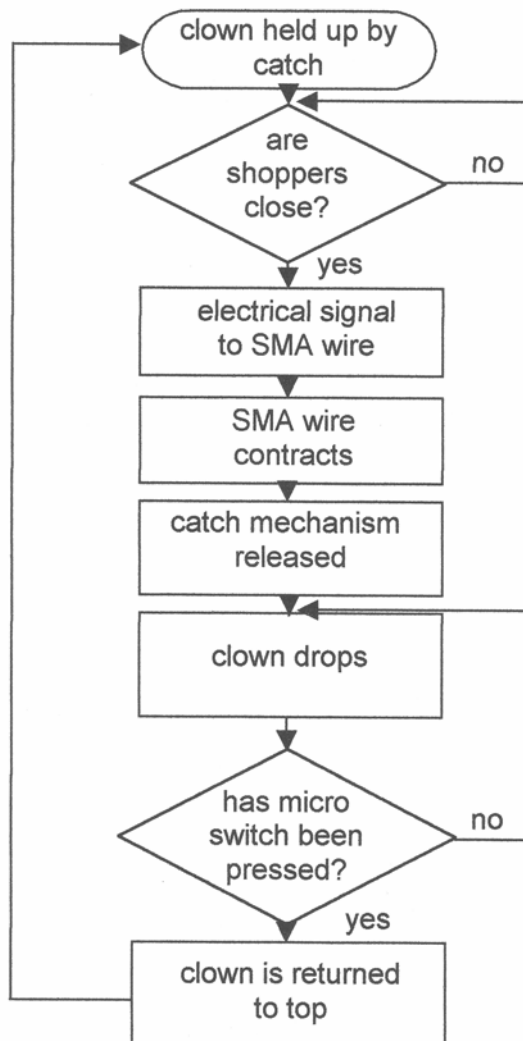
- | | | | | |
|---|-----|--|--|-----|
| 2 | (a) | Steel, aluminium, brass. | | [1] |
| | (b) | (i) | Use of design software to VR model, produce accurate drawings, calculate precise measurements, easily modify designs. | [1] |
| | | (ii) | Use CNC equipment to produce consistent accuracy when making a batch, allow other parts to be made at same time reducing workforce and time. | [1] |
| | (c) | Bending edge.
Accurate location.
Secure hold. | B 1
L 1
H 1 | [3] |
| | (d) | Fix housing to bracket.
Any angle between horizontal and 45°.
Note: if a selection of set angles one mark only.
fix at selected angle. | 1
2

1 | [4] |

- 3 (a) Pivot. 1
 Crank. Cam 1
 Connecting rod. Pulley and belt 1
 Slot in connecting rod. Dwell 1 [4]



- (b) Correct use of shapes of boxes. B 1 + 1 + 1
 2 feedback loops. F 1 + 1
 Complete Logical sequence L 1 [6]



- 4 (a) Allows slip if sign movement is temporarily restricted.
Easier maintenance, cheaper to replace worn parts.
Quieter operation. [1]
- (b) $VR = 32/8 = 4:1$. [2]
One mark only if 4
- (c) Bevel gear. Mitre gear [1]
- (d) Output $VR = 24/8 = 3:1$. 1
Combined pulley $VR = 4:1 \times 3:1 = 12:1$. 1
Speed reduction = $300/5 = 60$. 1
Gearbox $VR = 60/12 = 5:1$ 1 [4]
- (e) (i) $76/80 \times 100\% = 95\%$. [1]
- (ii) Friction, belt slip. [1]

5	(a)	(i)	Bearing A.	[1]
		(ii)	Ball bearing. If bearings B or C ticked in (i) allow mark for correct name. Bearing B: thrust. Bearing C: needle, roller.	[1]
		(iii)	Prevention of wear caused by moisture and grit in this environment, ease of use when loaded with shopping.	[2]
	(b)		Retaining bolt held.	1
			Secure hold.	1
			Release bolt.	1
			Retain coin.	1
			Release coin.	1
			Bolt shape.	1
				[6]
			Total Marks	[50]

General Certificate of Secondary Education

D&T Systems and Control (1957)

June 2007 Assessment Series

Component Threshold Marks

Component	Max Mark	A	B	C	D	E	F	G
1	50			31	26	22	18	14
2	50	28	23	18	13			
3	50			23	19	15	12	9
4	50	25	19	14	8			
5	50			32	27	23	19	15
6	50	36	31	27	22			
7	50			27	22	18	14	10
8	50	32	27	23	18			
9	100	85	74	63	51	39	27	15

Specification Options

Foundation Tier Electronics

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175				98	81	64	48	32
Percentage in Grade					20.51	29.14	22.61	13.29	7.69
Cumulative Percentage in Grade					20.51	49.65	72.26	85.55	93.24

The total entry for the examination was 429

Higher Tier Electronics

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	135	118	101	85	66	56		
Percentage in Grade		7.76	22.55	30.55	22.32	11.46	2.39		
Cumulative Percentage in Grade		7.76	30.31	60.86	83.17	94.63	97.02		

The total entry for the examination was 838

Foundation Tier Mechanisms

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175				98	81	65	49	33
Percentage in Grade					17.88	23.38	23.58	19.45	8.45
Cumulative Percentage in Grade					17.88	41.26	64.83	84.28	92.73

The total entry for the examination was 552

Higher Tier Mechanisms

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	140	124	108	92	73	63		
Percentage in Grade		10.03	20.05	25.00	24.22	16.93	2.47		
Cumulative Percentage in Grade		10.03	30.08	55.08	79.30	96.22	98.70		

The total entry for the examination was 768

Foundation Tier Pneumatics

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175				107	89	71	53	35
Percentage in Grade					26.67	16.67	30.00	23.33	3.33
Cumulative Percentage in Grade					26.67	43.33	73.33	96.67	100.00

The total entry for the examination was 33

Higher Tier Pneumatics

	Max Mark	A*	A	B	C	D	E	F	G
Overall Threshold Marks	175	134	121	108	95	76	66		
Percentage in Grade		12.12	9.09	34.85	30.30	10.61	1.52		
Cumulative Percentage in Grade		12.12	21.21	56.06	86.36	96.97	98.49		

The total entry for the examination was 66

Overall

	A*	A	B	C	D	E	F	G
Percentage in Grade	5.68	13.22	17.84	21.97	18.26	10.08	6.17	2.92
Cumulative Percentage in Grade	5.68	18.90	36.74	58.71	76.97	87.05	93.22	96.14

The total entry for the examination was 2799

Statistics are correct at the time of publication.

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

(General Qualifications)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

Oxford Cambridge and RSA Examinations
is a Company Limited by Guarantee
Registered in England
Registered Office; 1 Hills Road, Cambridge, CB1 2EU
Registered Company Number: 3484466
OCR is an exempt Charity



OCR (Oxford Cambridge and RSA Examinations)
Head office
Telephone: 01223 552552
Facsimile: 01223 552553

© OCR 2007