

Design and Technology

General Certificate of Secondary Education **1957/05**

Systems and Control Technology: Paper 5 Pneumatics

Mark Scheme for June 2010

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of pupils of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support which keep pace with the changing needs of today's society.

This mark scheme is 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.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.


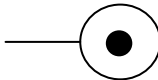
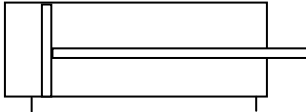
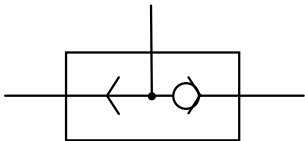
OCR will not enter into any discussion or correspondence in connection with this mark scheme.

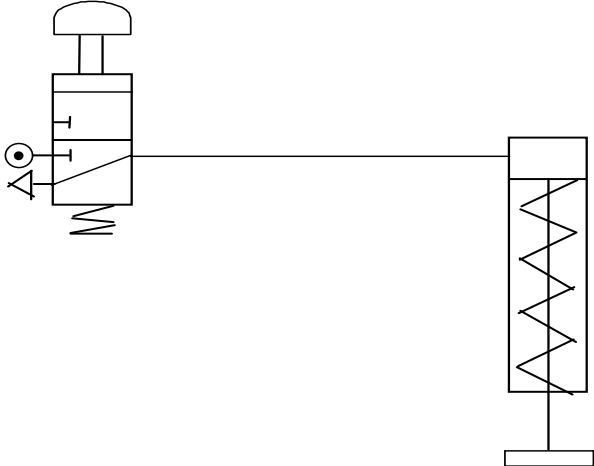
© OCR 2010

Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

Question		Expected Answers	Rationale	Marks
1	(a)	A 	<p>If spring shown(1) Cylinder with piston & no ports(1)</p> <p>Any two from 3 parts</p> <p>Input in middle (1) Two sockets & ball (1)</p>	[1]
		B 		[1]
		C 		[2]
		D Push Button spring return 3/2 valve		[2]
		E 		[2]
	(b)	The Push Button spring return 3/2 valve has a spring which returns the valve to the resting position when the button is released		[2]

Question		Expected Answers	Rationale	Marks
2	(a)	Single acting spring return cylinder.		[2]
	(b) (i)	When component A is pressed air passes through the 3/2 valve to the single acting cylinder which then outstroke's.		[1]
	(ii)	When component A is released the valve changes to exhaust and the spring in the single acting cylinder takes over allowing the cylinder to in stroke.		[1]
	(c) (i)		Restrictor on line with arrow (1) Return valve shown (1) Ball and seat correct to slow exhaust (1)	[3]
	(ii)	The unidirectional flow restrictor will allow the air to flow freely to outstroke the cylinder when the ball is blown off the seat.[1] On the return the ball blocks the seat [1] forcing the exhausting air through the restrictor. [1]		[3]

Question			Expected Answers	Rationale	Marks
3	(a)	(i)	The air receiver stores the air and maintains sufficient air pressure to the circuit even when the compressor is off.	Stores air(1) Maintains pressure (1)	[2]
		(ii)	The safety valve is an essential part of the compressed air system because if the compressor fails to shut off, and the pressure rises too high, it will release the pressure and prevent the receiver exploding.	Stops pressure getting too high (1) Releases extra pressure to protect system (1)	[2]
		(iii)	The drain valve is the method that can drain the water that has built up in the receiver/reservoir due to the water created in the pressurised air	Drain water(1) System produces water (1)	[2]
		(iv)	The pressure regulator with gauge allows the pressure to be regulated and displayed on a gauge.	Regulates pressure (1) Displayed on guage (1)	[2]
	(b)		It is important to check that there are no unconnected pipes because they will flay around and could hit somebody. (1) If pressurised air is allowed to blow on the skin it could cause air bubbles to get in the blood stream, possibly causing death. (1)		[2]

Question			Expected Answers	Rationale	Marks
4	(a)		Accuracy of drawing, Able to copy and paste components. Quicker to draw complex designs. Easy to save and draw images. Make changes to existing drawings more easily, symbol library.	Any three – no repeats	[1] + [1] + [1]
	(b)		To help evaluate the integrity of the circuit. To test the flow. To test the viability of different components. To find problems and solve them through simulation. Actual components not needed (therefore cheaper)	Any two – no repeats	[1] + [1]
	(c)		Loss of workforce, and the need to retrain for the new technology.		[1] + [1]
	(d)	(i)	A magnetic ring attached to the piston.		[1]
		(ii)	Feedback is provided to the computer when the magnetic piston ring closes the reed switch which is sensed by the computer input		[2]

Question		Expected Answers	Rationale	Marks
5	(a)	Fixed to piston rod [1] Locked on piston rod [1] Connects to leg [1] Free movement on leg [1] Communication [1]	Clear illustration for (1)	[5]
	(b)	Fixed to end of cylinder [1] Connects mounting lug [1] Free movement of cylinder [1] Retained in position on lug [1] Communication [1]	Clear illustration for (1)	[5]

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

OCR Customer Contact Centre

14 – 19 Qualifications (General)

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