

YEAR: 9	SUBJECT: ELECTRONICS	TITLE: THE 555 INTEGRATED TIMER		
OBJECTIVE: To introduce the pupils to an understanding of the 555 Integrated Circuit as used as a timer.				
STAGE	ADDITIONAL SKILLS	EXTENSION WORK	RESOURCES	H&S
<p>STAGE ONE: Aim. Introduction to timers electronics and project. Where and why they are used situations. Kinds from sand, digital electronic, water clock, clockwork, stopwatch, sun dials etc Difference between timer and clock. Rich picture to be produced using drawing equipment. T-Squares and set squares demonstrated and reference made to title blocks and border lines.</p>	<p>C. Understanding of the way technology, especially electronics can play in the lives of people. L. Key words discussed and displayed as part of a rich picture. N. Some reference may be made to units (*electrical and electronic). ICT. Potential use of internet for research regarding electronic timers. HWK. Pupils to complete rich picture.</p>	<p>Pupils to research a range of timers, as used in the home. Presentation of research as an A4 document including text and pictures.</p>	<p>ICT. Computer network and associated software. Drawing and writing equipment</p>	<p>CONTROL MEASURE CLEAPPS REF. RESIDUAL RISK</p>
<p>STAGE TWO: <u>Design brief</u> Discuss situation where timer is needed. These include egg/cooking timer, game timer e.g. chess or how long on PS2, tooth brushing/how long in bathroom, sun bed etc. Write design problem of your own picking the problem situation. Brief "I will design and make an electronic timer based on the 555 integrated circuit with audible and visual indications."</p>	<p>C. The valuable use of time and how the use of time needs careful thought and planning, in the home and in business and industry. L. Pupils write a design brief using keywords and phrases. N. Pupils consider the time settings for their chosen timer. ICT. Use of word processor / DTP for presentation of Design Brief. HWK. Pupils complete the presentation of Brief, including graphics.</p>	<p>Pupils to consider an alternative design brief / situation for their timer. Present the alterative brief as text only.</p>	<p>ICT. Computer network and associated software. Drawing and writing equipment</p>	<p>CONTROL MEASURE CLEAPPS REF. RESIDUAL RISK</p>
<p>STAGE THREE: <u>Introduce circuit and components</u> Component worksheet explained and discussed. Pupils copy circuit diagram, transfer to Crocodile Technology. Pupils simulate the circuit and make any necessary changes / alterations. Changes to resistors and capacitors to show their relationship in the circuit. Demonstration to show how capacitors store electrical charge. Homework. Revise for test on circuit symbols</p>	<p>N. Values / units of resistors and capacitors discussed and demonstrated. ICT. Use of Crocodile Technology to construct circuits and simulate their use. L. Pupils follow and copy the circuit diagram from the information sheet to the simulation software. HWK. Revise for test on circuit symbols.</p>	<p>Pupils draw a 555 timer circuit and explain the relationship between resistors and capacitors.</p>	<p>ICT. Computer network and associated software. Drawing and writing equipment</p>	<p>CONTROL MEASURE CLEAPPS REF. RESIDUAL RISK</p>

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<p>STAGE FOUR: <u>Start practical</u> Quick test on circuit symbols. Practical start with circuit board drilling and cleaning. Sequence drawing of making a circuit board handout to recreate.</p>	<p>L. Test regarding component symbols, correct spellings emphasised. N. Values and units part of test. ICT. Potential to produce sequence drawings through use of animation package such as Serif. Alternatively, a straight drawing / graphics package can be used. HWK. Complete sequence drawing. With annotation</p>	<p>Collect a sequence drawing from a piece of flat pack furniture or similar. Evaluate the instructions e.g. are they easy to follow? How can they be improved? Does the English used for the instructions need improving / changing? Evaluation to be presented as a short essay.</p>	<p>ICT. Computer network and associated software, including animation software. Drawing and writing equipment</p>	<p>CONTROL MEASURE Teacher Instruction Use of low voltage equipment</p> <p>CLEAPPS REF. 1.012 General Electronics 1.031 Drilling</p> <p>RESIDUAL RISK Low</p>
<p>STAGE FIVE: <u>Soldering</u> Soldering recap from y7 and y8, safety reminder start with battery connector, i.e. holder and resistors. Demonstration of soldering, safety emphasised and reinforced. Quality control discussed with specific reference to soldering. Pupils attempt the resistor work sheet and questions.</p>	<p>L. Listening skills - pupils to listen carefully to and to follow safety instructions. Question and answer session regarding safe operation of equipment.. Complete resistor worksheet and questions. C. Health and safety and its importance emphasised to pupils. ICT. Watch animation of soldering electronic components. HWK. Design a soldering safety poster.</p>	<p>List the stages involved in soldering and explain the need for safety and quality control at all stages .</p>	<p>ICT. Computer network and associated software. Drawing and writing equipment. Soldering equipment and components.</p>	<p>CONTROL MEASURE Teacher Instruction Use of low voltage equipment</p> <p>CLEAPPS REF. 1.019 Soldering 1.012 General Electronics</p> <p>RESIDUAL RISK</p>
<p>STAGE SIX: Polarity concept. Positive and negative on battery connector dictates +ve and -ve on buzzer, capacitor and led. How to identify them. Solder them on. Homework. Draw soldering sequence.</p>	<p>N. Polarity discussed (+ and -). Battery used to demonstrate meaning of polarity. L. Pupils attempt sequence drawing with precise annotation. ICT. Crocodile technology used to demonstrate polarity and effects of reverse polarity on a circuit and its components. (exploding components etc...) HWK. Sequence drawing of soldering. Safety and quality control emphasised.</p>	<p>Collect drawings / pictures of a range of batteries. Explain the use of each (the type of devices they power). Presentation through DTP preferred.</p>	<p>ICT. Computer network and associated software. Drawing and writing equipment.</p>	<p>CONTROL MEASURE Teacher Instruction Use of low voltage equipment</p> <p>CLEAPPS REF. 1.019 Soldering 1.012 General Electronics</p> <p>RESIDUAL RISK Low</p>

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<p>STAGE SEVEN: Finish circuit insert 555 timer, test and calibrate circuit. Correct any mistakes. Concept of Quality Control and Assurance reinforced through a product self evaluation exercise. Industrial practice. Pupils list the functions of the circuit and evaluate against each one. Pupils mark their own circuit based on list of functions.</p> <p>Pupils start designing backgrounds for their designs.</p>	<p>N. Each pupil to use meter to measure voltage and resistance. Correct values and units discussed. L. Pupils annotate ideas for backgrounds. C. Concept of quality control and its transference to general living. ICT. Pupils research possible backgrounds for their designs. HWK. Draw four ideas for background plastic.</p>	<p>Pupils to collect example 555 circuit diagrams and include notes regarding the practical application of each.</p>	<p>Internet connection. General drawing and writing equipment.</p>	<p>CONTROL MEASURE Teacher Instruction Use of low voltage equipment</p> <p>CLEAPPS REF. 1.012 General Electronics 1.031 Drilling</p> <p>RESIDUAL RISK Low</p>
<p>STAGE EIGHT: Demonstration regarding the safe use of the drilling machine. After demonstration, pupil selected to set up the drilling machine for safe use. Drill 7mm and 5mm holes in background plastic. Bend Plastic on line bender. Use plastic chooser chart to answer test questions.</p>	<p>N. Pupils accurately mark out holes for drilling. L. Pupils following demonstration on drilling, followed by question and answer session. C. Safe working practice emphasised and the need for a safe, productive working environment ourselves and others. ICT. Potential use of clips relating to properties of plastics, thermosetting and thermoplastics. HWK. Finalise background design.</p>	<p>Pupils to sketch and three electronic devices (I.e. an iPod) and add dimensions/measurements.</p>	<p>Internet connection. General drawing and writing equipment..</p>	<p>CONTROL MEASURE Teacher Instruction of Drilling Machine</p> <p>CLEAPPS REF. 1.031 Drilling</p> <p>RESIDUAL RISK</p>
<p>STAGE NINE: Pupils discuss the need for care over the environment. In pairs pupils list five materials that can be recycled. Demonstration on use for the fretsaw for cutting and shaping of perspex. And other plastic materials. Use fretsaw to cut acrylic shapes from scrap material box. (recycling and environmental concerns discussed). Pupils stick to background with Tensol. Worksheet on different adhesives.</p>	<p>C. Need for safe use of machinery emphasised. L. Pupils attempt worksheet on different adhesives. ICT. Pupils research variety of adhesives available and need for safety in their use / handling. N. pupils measure and mark out plastic materials for cutting. Templates explained. HWK. Pupils complete worksheet on adhesives.</p>	<p>Describe how safety can be ensured whilst using adhesives. Include notes and sketches.</p>	<p>Internet connection. General drawing and writing equipment.</p>	<p>CONTROL MEASURE Teacher Instruction</p> <p>CLEAPPS REF. 1.067 Fretsaw 1.001 Tensol Cement</p> <p>RESIDUAL RISK Low</p>

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<p>STAGE TEN: Apply circuit to background and glue circuit to base. Pupils to evaluate each others practical work. Marks given for aesthetics and quality of manufacture. Mark collected rough paper and presented on a A4 sheet. Table of results and pictogram included. Evaluate by class rank ordering outcomes based on quality and functionality. Write up evaluation.</p>	<p>ICT. Potential use of DTP / Graphics as part of evaluation. C. Evaluation of products and how we all evaluate as a natural part of life and as consumers. L. Presentation of evaluation and use of pictograms as a visual aspect. N. Pupils to calculate the average class mark. Mean, mode and medium average explained. HWK. Complete evaluation presentation.</p>	<p>Pupils to evaluate an electronic product of their choice. Method of presentation decided by pupil.</p>	<p>Internet connection. General drawing and writing equipment.</p>	<p>CONTROL MEASURE Teacher Instruction CLEAPPS REF. 1.003 Hot Glue Gun RESIDUAL RISK Low</p>