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ENGINEERING
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SCIENCE
EDITION 2020

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Locktronics is used in around 2,000 schools and colleges for teaching the fundamental principles of electricity. In this section we list our solutions for science. These kits are designed for students studying electrical principles from a very early age through to age 16 + and in particular, A-level physics. You will also find a range of new solutions on these pages, focused on optics, fibre optics and thermodynamics.



Our learning solutions:

- Meet RoHS compliancy stipulations and are rugged and designed to withstand the rigours of the lab or classroom
- Clearly display circuits to learners to develop their understanding of the topic being studied
- Allow for the building of solid foundational knowledge with the ability to build on this knowledge with advanced topics
- Include curriculum which guides students through the experiments and saves teachers' preparation time

“The Locktronics kits and Matrix as a company were recommended to us by one of our partners, STEMWorks, and from discussions with teachers, the Energy & Environment kits were identified as the ones most suitable to support the new Physics GCSE syllabus in Wales.

The kits will mainly be used to teach KS4 Physics students within the schools, but the teachers were also interested in the opportunity that the kits will give them to use with lower ages groups, as well as with post-16 students. Horizon Nuclear Power is currently working with two KS4 Physics teachers from Anglesey to map the kits to the new Physics syllabus, with the mapping provision then being made available to the other 3 schools on the Island, as well as feature on the Horizon website, for schools across Wales and England to access the provision.”

Claire Burgess,

Education Programme Coordinator
at Horizon Nuclear Power

CONTENTS

Electricity, magnetism and materials	page 4
Fundamentals of electricity	page 5
Energy and the environment	page 5
Electrical and electronic principles	page 6
Class pool kit	page 6
Source - DC PSU, AC PSU and signal generator	page 7
Thermodynamics kit	page 8
Ripple tank MkIII	page 8
Cloud Chamber	page 9
Advanced physical optics kit	page 10
Principles of optical waveguiding kit	page 11
Advanced fibre optic communications kit	page 11
Bit error rate & eye diagrams kit	page 12
Optical network analysis & OTDR kit	page 12
Erbium doped fibre amplifiers kit	page 13
Principles of lasers kit	page 13
WDM components & systems and Bragg gratings kit	page 14
Components listing	page 15

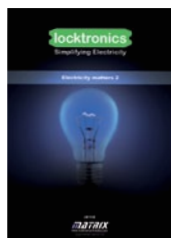
Electricity, magnetism and materials



This kit provides a comprehensive range of practical assignments in electricity and magnetism and is ideal for those who are studying science and electricity within a wide variety of academic or vocational courses. The kit is supplied with a comprehensive set of worksheets that cover the electrical properties of materials and introduce students to electricity.

Learning objectives / experiments:

- Electrical properties of materials
- Simple circuits
- Heat and magnetism
- Basic circuit symbols
- Current flow
- Series and parallel circuits
- Patterns of voltage and current
- Electrical sensors
- Relays and electromagnets



Curriculum mapping

- Suitable for studying electricity as part of a science course from ages 11 to 16 (In the UK suitable for KS3 and KS4)

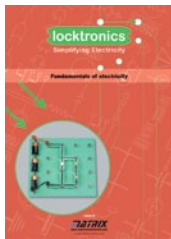
Ordering information	DIN	ANSI
Electricity, magnetism and materials solution	LK9071-2	LK9071-2A
Corresponding curriculum	LK7325 & LK7326	
You will also need		
Multimeter pack	LK1110	
Components - See page 15		

Fundamentals of electricity

This kit provides an introduction to the fundamentals of electricity. It is ideal for those who are completely new to the subject, and is suitable for use from ages 8+. The kit is supplied with 30 pages of notes and worksheets.

Learning objectives / experiments:

- What is electricity?
- Simple electrical components
- The simplest circuit
- Conductors and insulators
- Switches
- Two way switches
- Series circuits
- Parallel circuits
- Buzzers
- Motors



Curriculum mapping

- Suitable for studies in Science at KS1 and KS2: ages 5 to 11

Ordering information

Fundamentals of electricity solution	LK6444	LK6444A
Corresponding curriculum	LK6816	
Instruments may be required, please contact us for further info		
Components - See page 15		

Energy and the environment

This course provides an introduction to renewable energy generation and energy saving measures through intelligent building control. As such, it addresses the aims of a number of courses in Science and Technology. A comprehensive set of curriculum worksheets and supporting documentation deliver experiments to illuminate the issues raised.

Learning objectives / experiments:

- Advantages / disadvantages of renewable energy sources: photovoltaic, wind, wave, hydroelectric
- Solar cells and their operation
- Electricity generators
- Solar heating and energy storage
- Voltage regulation
- Efficiency of a filament lamp and LED lamp
- Insulation and double glazing
- Energy efficient building design using microcontrollers



Curriculum mapping

- Suitable for studies in science age 11 - 16 and for environmental courses. Ideal for STEM

Ordering information

Energy and environment solution	DIN LK7345-2	ANSI LK7345-2A
Corresponding curriculum	LK7122	
You will also need		
Multimeter pack	LK1110	
Components - See page 16		

Electrical and electronic principles

The kit provides a comprehensive range of practical assignments for electricity and magnetism and is ideal for those who are studying science and electricity at a more advanced level. The kit is supplied with a comprehensive set of worksheets and teachers' notes.

Note
 To add PIC investigation to this kit please see the PIC add-on kit on page 22.
 To add Operational amplifier investigation to this kit see the Op-amp add-on kit on page 30.



Curriculum mapping

- Suitable for studying electricity as part of a Physics course aged 16 to 18 (A level courses in the UK)

Ordering information		DIN	ANSI
A level electrical and electronic principles		LK9329-2	LK9329-2A
Corresponding curriculum		LK7664 & LK7773	
You will also need			
Multimeter pack	LK1110	Source - DC PSU, AC PSU and signal generator	LK6999/LK2975
Picoscope	HP8279		
Components - See page 16			

Class pool kit

This 'one per class' kit is designed to give you a flexible suite of parts that can be added to the Electrical and electronic principles pack to allow a much wider range of experiments and demonstration in Electronics from our Operational Amplifiers, PIC, Logic and Energy and environment solutions. The pack also includes useful equipment for teaching Lenz's law, Faraday's law and motor principles.

Learning objectives / experiments:

- Batteries in series and parallel
- Internal resistance of batteries
- Power dissipation and efficiency
- Potential dividers
- Resistivity
- Kirchoff's law
- AC circuits
- Capacitors
- Fleming's law
- Inductors
- Faraday's and Lenz's laws
- Transformers



Curriculum mapping

- Suitable for extending work in Physics to various topics at ages 16 to 18. Ideal for STEM
- Suitable for unit 15 of BTEC National in Applied Science: Electrical circuits and their application

Ordering information		DIN	ANSI
Class pool kit		LK6802	LK6802A
Corresponding curriculum		LK 3061, LK7122, LK7209, LK9392	
You will also need			
Multimeter pack	LK1110	Signal generator	HP7894
Picoscope	HP8279		
Components - See page 17			

Source - DC PSU, AC PSU and signal generator

This general purpose DC/AC power supply/signal generator has a wide range of applications in education: in Physics, Technology and Electronics.

The unit is housed in a rugged enclosure with a large graphical back-lit display and input controls conveniently located at the top front of the display. The power supply has a number of fixed DC voltage outputs as well as variable DC and AC outputs.

The AC signal generator output is presented in three forms: $\pm 10V$ 50ohm BNC output, high-power output via shrouded 4mm sockets for directly driving speakers and vibration generators, and a line-level output on a jack socket. This AC signal delivers 0.1Hz to 100kHz with sine, triangle, square and arbitrary waveform outputs.

The power supply operates from a supply of 110V or 240VAC.

Functions:

- Fixed -12V, 5V and +12V outputs
- Variable 3 - 10V DC output
- Signal generator output: 0.1Hz - 100kHz
- Dot matrix backlit user display
- Rugged continuously rotating control and buttons
- Supplied with technician voltage limiting software
- Shrouded safety connectors
- Waveform generator



SOURCE



Ordering information	
Source - DC PSU, AC PSU and signal generator	LK6999 / LK2975

Specification			
Output	Voltage	Current	Features
Signal generator:	Instrumentation 0.1Hz to 100kHz	50 Ohm DC coupled 10V p-p	BNC
Sine, Square, Triangle, Sawtooth, Custom	Audio Output 20Hz to 20kHz / AC power supply	Loudspeaker/Transducer AC coupled 10V p-p 1.3 Amp peak	4mm shrouded(-) 4mm shrouded(-)
		Line Out AC coupled 2V p-p 200 Ohm source impedance	Mono Jack
Power Supply	3-10V variable	up to 3A maximum	variable current limited, monitored
	-12V	up to 5A maximum	variable current limited, monitored
	-5V	up to 5A maximum	variable current limited, monitored
	-12V	up to 300 mA	current limited to 300mA

Thermodynamics kit

This kit allows engineering students to carry out a wide range of practical experiments in Thermodynamics to help them understand the temperature related behaviour of mechanical systems. The kit includes experimental apparatus including metal blocks with heating elements, linear rods with heaters, Leslie cube and Jolly bulb. The kit also includes measuring instruments such as digital thermometers, energy meter, and infrared thermometer. A downloadable manual covers all experiments and includes teacher's notes. A unique feature of the kit is that all the experiments can be completed just with electricity as the heat source - no Bunsen burner is required.

Learning objectives / experiments:

- Heat capacity of liquids
- Heat capacity of solids
- Linear expansion of heat
- Heat absorption
- Heat radiation
- Expansion of gases - Charles' law
- Boyle's law



Curriculum mapping

- Suitable for studying electricity as part of a Physics course aged 16 to 18 (A level courses in the UK)

Ordering information

Thermodynamics kit	HP4159
Corresponding curriculum	CP4261
You will also need	
Source - DC PSU, AC PSU and signal generator	LK6999 / LK2975

Ripple tank MkIII

The unit is completely self-contained with the translucent viewing screen hinging away to reveal a 12cm water tank. The tank is removable for ease of use and has an integral multi-faceted beach which virtually eliminates unwanted reflections.

Illumination is from a high intensity built-in LED which can be automatically strobed in sync with the waves to give perfectly stationary images, or switched to allow the user independent control of the wave and strobe frequencies giving the impression of wave motion across the viewing screen.

The unit is supplied with three robust dippers which can be easily adjusted to suit the depth of water being used. A selection of barriers shapes and lenses are also provided to enable reflection, refraction, diffraction and interference along with the focusing properties of lenses to be demonstrated. All of the accessories can be stored neatly inside the unit when not in use.

Curriculum mapping

- Suitable for studying as part of a Physics course aged 14 to 18 (GCSE / A level courses in the UK)



Ordering information

Ripple tank MkIII	AS0371
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Cloud Chamber

The chamber is self-contained and thermoelectrically cooled. The chamber requires no dry ice or water; the only setup necessary is the addition of isopropyl alcohol and connection to a mains socket.

The chamber contains an integrated power supply and illumination of the chamber is provided by a high intensity LED.

Using the provided source, tracks should be visible within 10 minutes.

Once running the cloud chamber can be made to run for extended periods by adding more alcohol through the access provided in the lid.



Curriculum mapping

- Suitable for studying as part of a Physics course aged 14 to 18 (GCSE / A level courses in the UK)

Ordering information

Cloud Chamber

AS4681

Matrix TSL Learning and Teaching Courses



All of the curriculum, workbooks and exercises for **all** Matrix equipment freely available:

www.matrixtsl.com/learning

Advanced physical optics kit



OptoSci's Principles of Physical Optics kit consists of four separate modules (polarisation, reflection and refraction, diffraction, interference and coherence) which enable students to experimentally investigate and acquire practical familiarity with the fundamentals of physical optics and the wave properties of light.

Learning objectives / experiments:

- Polarisation - including Malus' Law, waveplate properties, states of polarisation, strain birefringence
- Reflection & Refraction - including Snell's Law, Fresnel Equations, refractive index determination
- Diffraction - including Slits, apertures, reflection and transmission gratings, laser wavelength determination
- Interference and Coherence - including Michelson interferometer, optical surface quality, laser coherence measurements



Curriculum mapping

- Suitable for courses in Optical Science and Photonics at undergraduate level and beyond



Ordering information

Reflection & refraction kit	FP8197
Polarisation kit	FP7280
Diffraction kit	FP8104
Interference & coherence kit	FP7948
Complete advanced physical optics kit	FP4615
Modular advanced physical optics kit	FP0391

Instruments may be required, please contact us for further info

Principles of optical waveguiding kit

This kit enables students to investigate the conditions under which optical waveguiding occurs in dielectric media, and then appreciate how these fundamental principles are applied by examining mode propagation in multi-mode and single mode planar waveguides.

Learning objectives / experiments:

- Reflection and refraction, Snell's Law
- Fresnel relationships Brewster's angle, the critical angle and total internal reflection
- Prism coupling and waveguide measurements
- Step and graded index waveguides
- Measurement and analysis of mode spectra
- Mode effective indices and index profile determination
- Design of single mode waveguides



Curriculum mapping

- Suitable for courses in Optical Science and Photonics at undergraduate level and beyond



Ordering information	
Principles of optical waveguiding	FP0294
Optical waveguiding analysis software	FP7634
Instruments may be required, please contact us for further info	

Advanced fibre optic communications kit

This kit covers the experimental characterisation of all the major components of a fibre optic communications link (i.e. LED and laser diode transmitter, the optical fibre and the receiver) and then investigates and compares the limits imposed on overall LED and laser system performance by attenuation and dispersion.

Learning objectives / experiments:

- Source characterisation (LED & Laser)
- Fibre attenuation & connector loss
- Receiver noise & sensitivity
- Attenuation limited link lengths
- Fibre dispersion (material & modal)
- Bandwidth & Bit rate distance products (time & frequency domain)
- System comparison & design studies



Curriculum mapping

- Suitable for courses in Optical Science and Photonics at undergraduate level and beyond



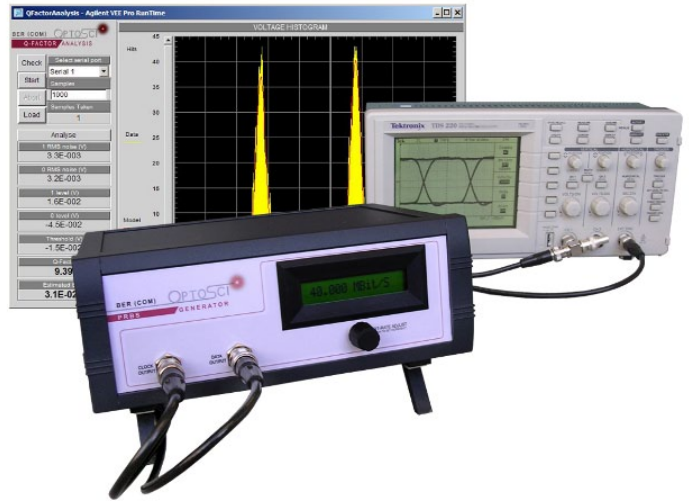
Ordering information	
Advanced fibre optic communications kit	FP4010
Instruments may be required, please contact us for further info	

Bit error rate & eye diagrams kit

This kit is designed as an extension to the FP4010 and FP1748 series of kits. This extension kit allows the student to generate and evaluate eye diagrams and investigate the effects of noise, attenuation and dispersion on eye diagrams and BER for the many communication system permutations allowed by the Advanced Fibre Optics Communications kit on page 15.

Learning objectives / experiments:

- Basics of eye patterns
- Using eye patterns as a qualitative diagnostic tool
- Rise time, pulse width and jitter measurements
- Bit-rate limitations due to noise
- Bit-rate limitations due to dispersion
- Q-factors and Bit Error Rate (BER) from noise amplitudes
- Q-factors and BER from eye pattern histograms
- Compare LED and laser response over different fibre lengths and bit rates



Curriculum mapping

- Suitable for courses in Optical Science and Photonics at undergraduate level and beyond

Ordering information

Bit error rate & eye diagrams	FP6269
Instruments may be required, please contact us for further info	

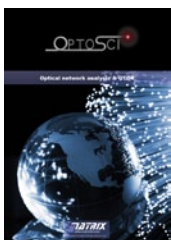


Optical network analysis & OTDR kit

This solution enables students to investigate the fundamental characteristics of optical time domain reflectometry using a commercial OTDR unit and observe how these principles are applied in practice to examine the response of optical fibre links, fibre optic components and optical fibre networks.

Learning objectives / experiments:

- Fundamental properties and operation of OTDRs (dead zone, distance and spatial resolution, dynamic range etc.)
- Event identification and location
- Line, component, splice & bend loss measurements
- Network components and their characterisation at 1310nm and 1550nm
- Multi-branch and Wavelength division multiplexed (WDM) networks
- Bi-directional OTDR measurements, with deliberately introduced faults
- Analysis of networks with deliberately introduced faults



Curriculum mapping

- Suitable for courses in Optical Science and Photonics at undergraduate level and beyond

Ordering information

Optical network analysis & OTDR	FP0374
Instruments may be required, please contact us for further info	



Erbium doped fibre amplifiers kit

This solution enables students to investigate the basic principles of optical amplification, to characterise the key technical performance parameters of EDFAs, and to develop an appreciation of the engineering applications of optical amplifiers and their limitations within these applications.

Learning objectives / experiments:

- Full gain characteristics: small and large signal gain
- Signal / gain saturation
- Pump saturation
- Transparency point, gain gradient and gain efficiency
- Saturated output power
- Amplified spontaneous emission (ASE) levels
- ASE-ASE & Signal-ASE beat noise
- Noise figure



Curriculum mapping

- Suitable for courses in Optical Science and Photonics at undergraduate level and beyond



Ordering information

Erbium doped fibre amplifiers kit

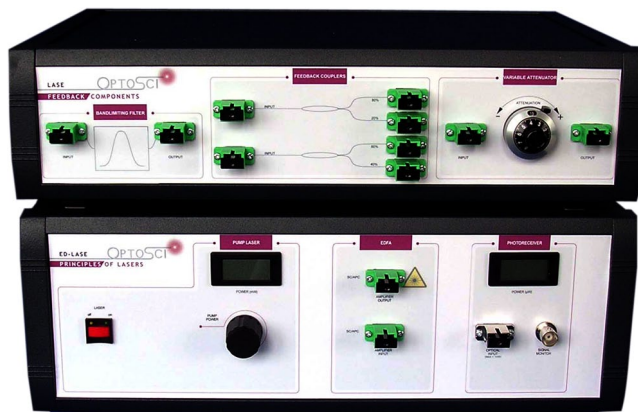
FP5366

Principles of lasers kit

This solution enables students to consolidate their knowledge and understanding and to gain practical experience in the investigation of optical amplification and lasers. Students investigate the principles and characteristics of lasers using an Erbium Doped Fibre Ring Laser.

Learning objectives / experiments:

- Construction of a fibre ring laser
- Measurement of lasing threshold
- Laser dynamics: relaxation oscillations, excitation lifetime, laser onset time
- Measurement of slope efficiency
- Effect of intra-cavity loss on the slope efficiency and threshold
- Influence of output coupling ratio on slope efficiency and threshold



Curriculum mapping

- Suitable for courses in Optical Science and Photonics at undergraduate level and beyond



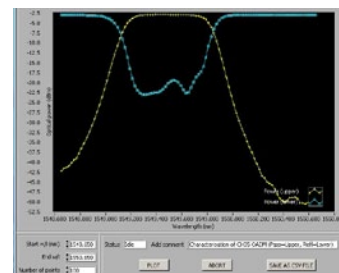
Ordering information

Principles of lasers kit

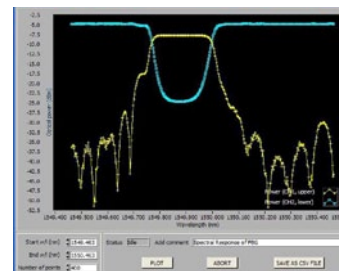
FP9068

Instruments may be required, please contact us for further info

WDM components & systems and Bragg gratings kit



Wavelength scan of OADM



A Bragg grating

The full solution here consists of a base kit: WDM components kit, and three extension modules, 1310/1550nm WDM extension kit, DWDM extension kit and the Bragg extension kit. This allows immediate or future expansion of the kit as desired. The full series of kits enable students to consolidate their knowledge and understanding and to acquire practical experience in the investigation, analysis and characteristics of optical fibre components, laser diodes, various Wavelength Division Multiplexed (WDM) systems, and Bragg Gratings.

Learning objectives / experiments:

- Measurement of insertion, back reflection /return losses and determination of isolation/extinction ratios of a series of optical components at 1550nm & 1310nm
- Characterisation & examination of the narrowband wavelength response of Bragg grating and DWDM modules
- Investigation of temperature tuning of a Bragg grating and its role as a temperature sensor
- Measurement and plotting of light, voltage, current (LVI) characteristics of lasers with operating temperature
- Characterisation of a two channel DWDM system, examination of channel add/drop, and measurement of system crosstalk / channel isolation
- Effect of wavelength drift on DWDM system crosstalk / channel isolation
- Investigation of crosstalk effects on the eye diagram / BER in DWDM systems (requires Bit Error Rate & Eye Diagrams kit)



Curriculum mapping

- Suitable for courses in Optical Science and Photonics at undergraduate level and beyond



Ordering information

WDM components kit	FP1748
1310/1550nm WDM extension kit	FP8451
DWDM extension kit	FP5180
Bragg extension kit	FP6057
Bit error rate & eye diagrams kit	FP6269
Instruments may be required, please contact us for further info	

COMPONENTS

Electricity, magnetism and materials

Components LK9071-2	
Buzzer, 12V, 15mA	Pair of leads, red and black, 1000mm, 4mm to croc clip
Voltmeter, 0V to 15V	Switch, push to make, metal strip
Resistor, 100 Ohm, 1W, 5% (DIN)	Switch, on/off, metal strip
Resistor, 12 Ohm, 1W, 5% (DIN)	Resistor, 50k, 1/4W, 55 (DIN)
Motor, 6V, open frame	LED, red
Resistor, 1k, 1/2W, 5% (DIN) (x2)	Phototransistor Carrier
Resistor, 10k, 1/4W, 5% (DIN)	Fuse / universal component carrier
Potentiometer, 10k (DIN)	Power supply carrier with battery symbol
Diode, power, 1A, 50V	Ammeter, 0A to 1A
Connecting Link (x9)	7 x 5 metric baseboard with 4mm pillars
Lampholder, MES (x3)	EMM V2 Accessories Pack
Thermistor, 4.7k, NTC (DIN)	400 turn coil carrier
Relay, reed, normally open	Power Supply

Fundamentals of electricity

Components LK6444	
Small bar magnet	Lead, red, 500mm, 4mm to 4mm stackable
MES bulb, 2.5V, 0.2A	Lead, black, 500mm, 4mm to 4mm stackable
MES bulb, 6.5V, 0.3A	Switch, push to make, metal strip
4 x 4 baseboard with 4mm pillars and battery holders	Switch, on/off, metal strip
Connecting Link	Buzzer, 6V, 15mA
Lampholder, MES	Motor 3 to 12V DC, 0.7A
Switch, reed, normally open	Power supply carrier with battery symbol
Pair of leads, red and black, 1000mm, 4mm to croc clip	

Energy and the environment

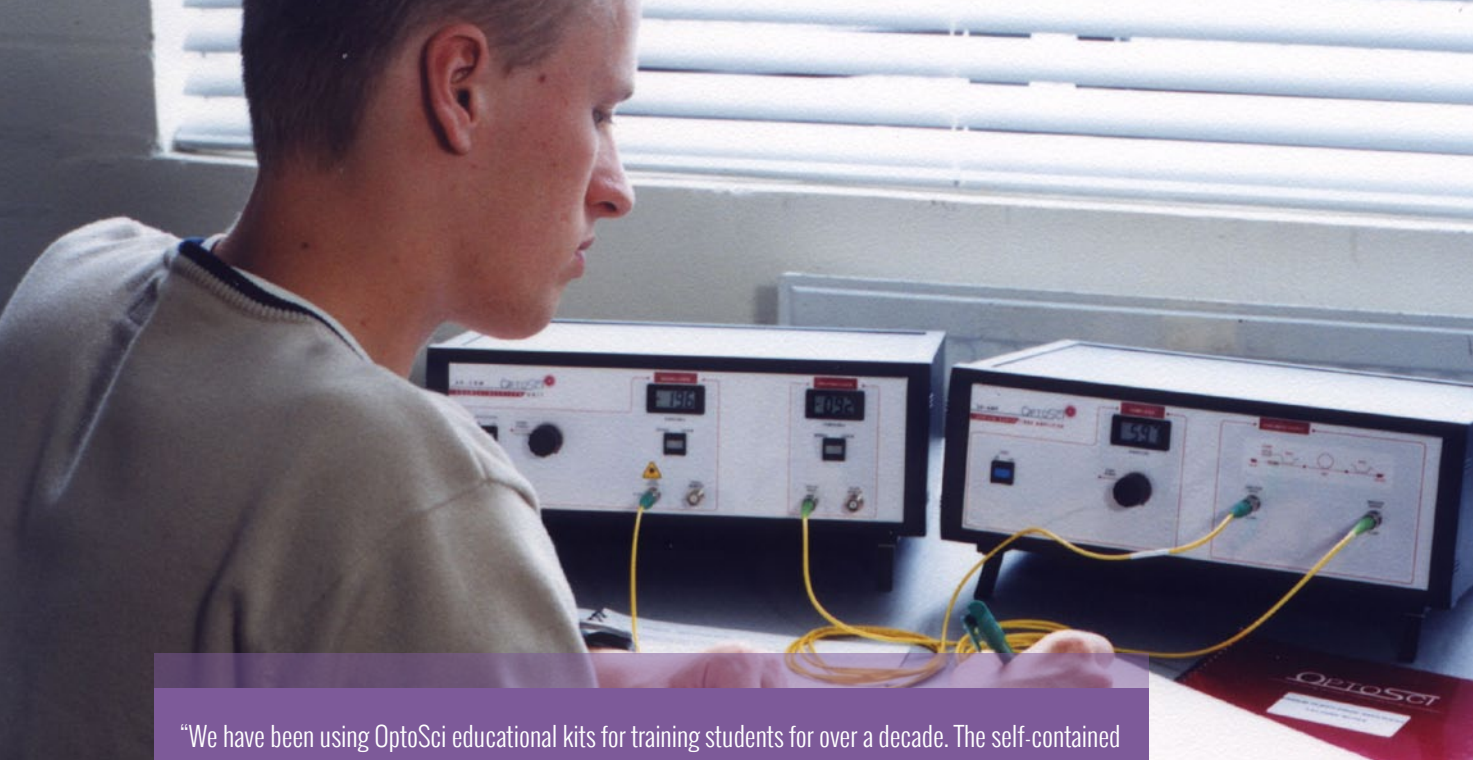
Components LK7345-2	
MES bulb, 6V,0.04A	Lead, black, 500mm, 4mm to 4mm stackable
MES bulb, 6.5V, 0.3A	Lead, yellow, 500mm, 4mm to 4mm stackable
Capacitor, 22,000uF, Electrolytic 16V	Switch, push to make, metal strip
USB reprogrammable PIC carrier with power leads	Resistor, 50k, 1/4W, 5% (DIN)
Hand cranked generator	LED,Red
Resistor, 1k, 1/2W, 5% (DIN)	Slotted opto sensor with 2mm to 4mm lead
Potentiometer, 10k (DIN)	MES bulb, 12V, LED, white
Connecting Link	Phototransistor Carrier
Lampholder, MES, for automotive LEDs WHITE	Solar cell
Lampholder, MES	Power supply carrier with battery symbol
Thermistor, 470 ohm, NTC (DIN)	Energy Meter
Lead, red, 500mm, 4mm to 4mm stackable	7 x 5 metric baseboard with 4mm pillars

Electrical and electronic principles

Components LK9329-2	
7 x 5 metric baseboard with 4mm pillars	Resistor, 68 ohm 1/2W, 5% (DIN)
2:1 transformer with retractable ferrite core	Power supply
Nichrome Wire Carrier, 0.075 x 500mm	Thermistor, 4.7k, NTC (DIN)
Nichrome Wire Carrier, 0.075 x 250mm	Capacitor, 2,200 uF, Electrolytic, 25V
Nichrome Wire Carrier, 0.21 x 500mm	Capacitor, 1 uF, Polyester
Constantan Wire Carrier, 0.075 x 500mm	Switch, on/off, metal strip
Capacitor, 22,000uF, Electrolytic 16V	Resistor, 22k, 1/4W, 5% (DIN)
Resistor, 100 ohm, 1W, 5% (DIN)	Choke, 47mH
Capacitor, 1,000 uF, Electrolytic 30V	Resistor, 2.2k, 1/4W, 5% (DIN)
Resistor, 10 ohm, 1W 5% (DIN)	LED, Red
Resistor, 47 ohm, 1/2W, 5% (DIN)	Phototransistor Carrier
Transformer, 2:1 turns ratio	AA battery holder carrier
Resistor, 1k, 1/2W, 5% (DIN)	Small bar magnet
Resistor, 10k, 1/4W, 5% (DIN)	MES bulb, 6V, 0.04A
Resistor, 270 ohm, 1/2W, 5% (DIN)	Connecting Link
Potentiometer, 250 ohm (DIN)	Lampholder, MES
Resistor, 5.6k, 1/4W, 5% (DIN)	400 turn induction coil
Resistor, 3.9 ohm, 3W, 5% (DIN)	Power supply carrier with battery symbol

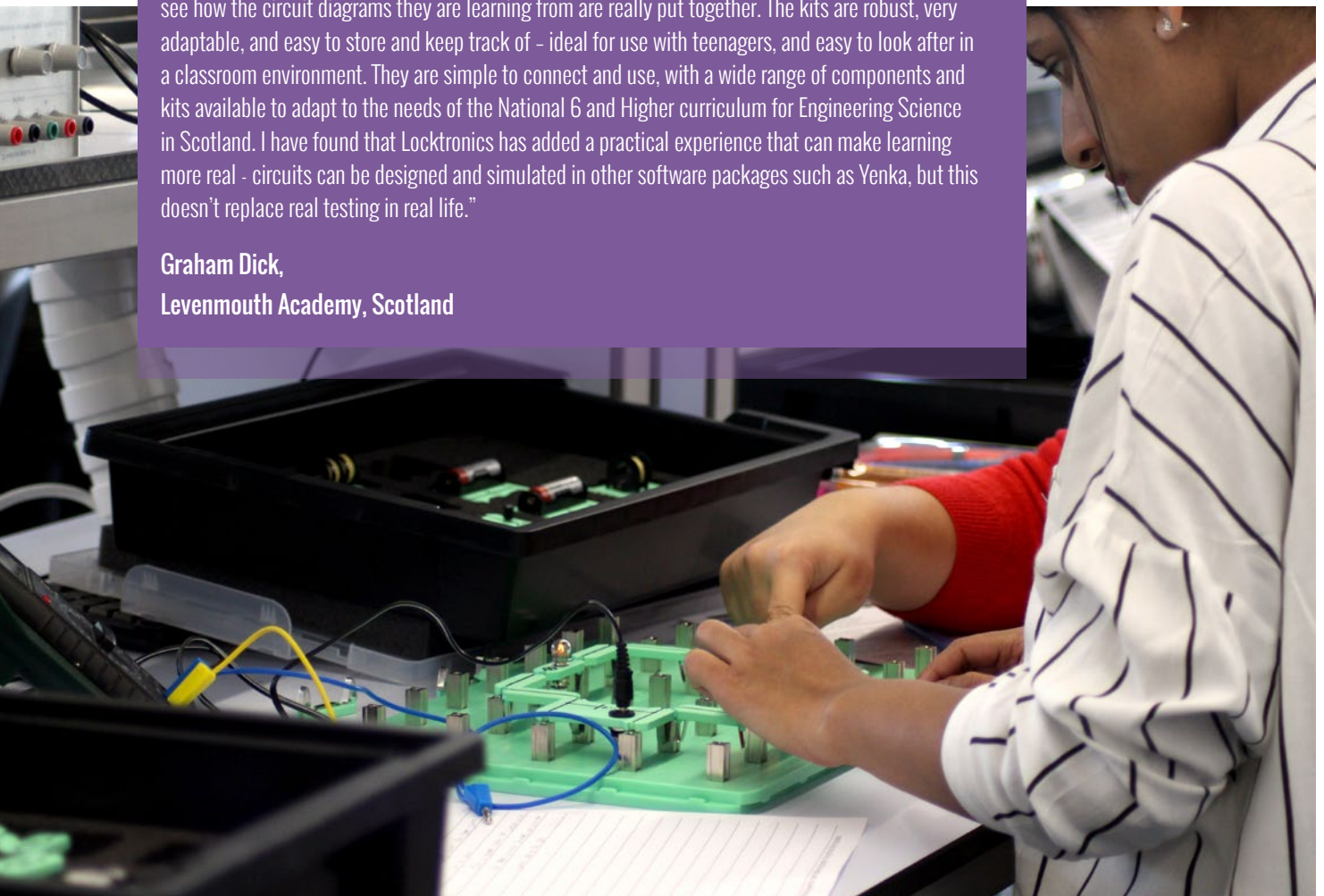
Class pool kit

Components LK6802	
Low power solar motor	Lead, red, 300mm, 4mm to 2mm stackable
USB reprogrammable PIC carrier with power leads	Lead, black, 300mm, 4mm to 2mm stackable
Hand cranked generator	Lead, black, 500mm, 4mm to 4mm stackable
Bridge rectifier	Lead, yellow, 500mm, 4mm to 4mm stackable
Op Amp Carrier (TL081) with 2mm to 4mm Leads	Lead, blue, 500mm, 4mm to 4mm stackable
Fleming's motor rule apparatus	Capacitor, 100uF, Electrolytic, 25V
AND Gate with 2mm to 4mm lead - ANSI	Capacitor, 1 uF, Polyester
OR Gate with 2mm to 4mm lead - ANSI	Capacitor, 4.7uF, electrolytic, 25V
NOT Gate with 2mm to 4mm lead - ANSI	Switch, push to make, metal strip
NAND Gate with 2mm to 4mm lead - ANSI	Switch, on/off, metal strip
NOR Gate with 2mm to 4mm lead - ANSI	Resistor, 22k, 1/4W, 5% (DIN)
Motor 3 to 12V DC, 0.7A	Choke, 10mH
Slotted opto sensor with 2mm to 4mm lead	Resistor, 10k, 1/4W, 5% (DIN)
Solar cell	Resistor, 270k, 1/4W, 5% (DIN)
Speaker	Resistor, 120 ohm, 1/2W, 5% (DIN)
Choke, 200mH	Resistor, 180 ohm, 1/2W, 5% (DIN)
Energy Meter	Potentiometer, 25 ohm (DIN)
MES bulb, 12V, LED, white	Potentiometer, 10k (DIN)
Lenz's law kit	Resistor, 100k, 1/4W, 5% (DIN)
Faraday's law kit	Capacitor, 10 uF, Electrolytic, 25V
LED, Red	Capacitor, 0.1 uF, Polyester
LED, Green	Diode, power, 1A, 50V
LED, Yellow	Connecting Link
Lampholder, MES, for automotive LEDs WHITE	MES bulb, 6.5V, 0.3A
400 turn induction coil	Resistor, variable, 250 ohm
Thermistor, 470 ohm, NTC (DIN)	Resistor, 10 ohm, 1W 5% (DIN)
Thermistor, 4.7k, NTC (DIN)	Resistor, 47 ohm, 1/2W, 5% (DIN)



“We have been using OptoSci educational kits for training students for over a decade. The self-contained experiments and detailed manuals are excellent for giving students a practical introduction to optical communications towards the end of Physics or Electronic Engineering programmes.”

Liam Barry,
Dublin City University



“Locktronics kits have been very simple to use, and the printed symbols have allowed learners to see how the circuit diagrams they are learning from are really put together. The kits are robust, very adaptable, and easy to store and keep track of - ideal for use with teenagers, and easy to look after in a classroom environment. They are simple to connect and use, with a wide range of components and kits available to adapt to the needs of the National 6 and Higher curriculum for Engineering Science in Scotland. I have found that Locktronics has added a practical experience that can make learning more real - circuits can be designed and simulated in other software packages such as Yenka, but this doesn't replace real testing in real life.”

Graham Dick,
Levenmouth Academy, Scotland

MATRIX

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