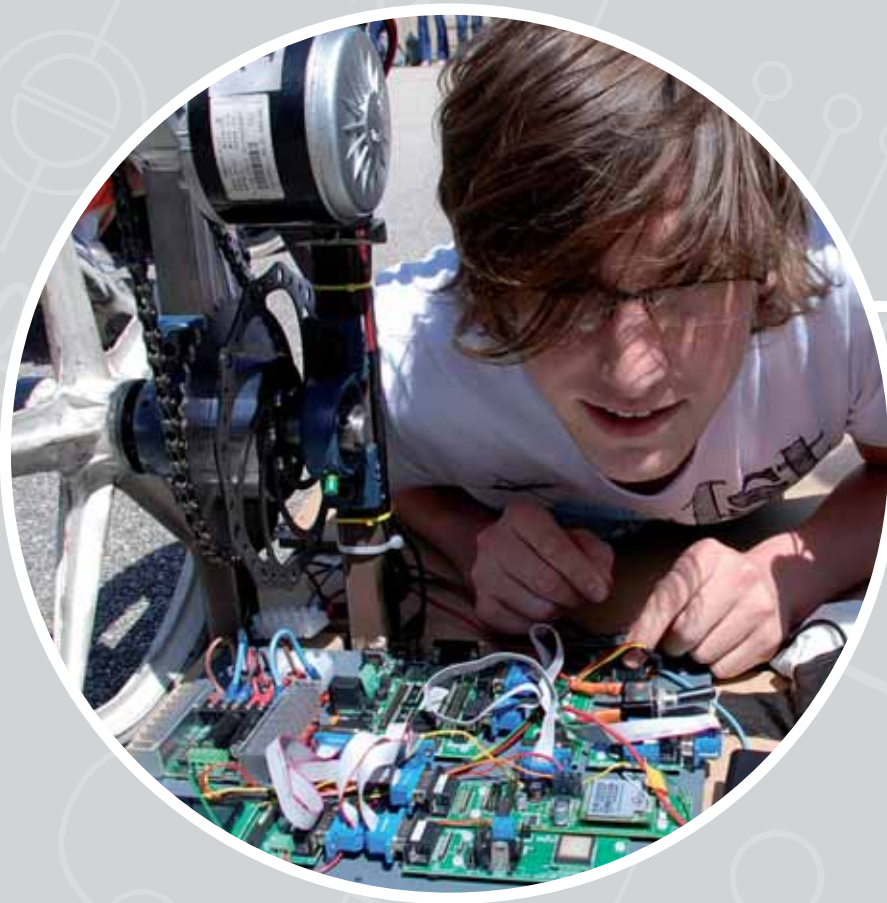


EBLOCKS[®]

Simplifying technology



Computer science

Electronics

Engineering

Includes development resources for interfacing to:
Windows, Android, Rpi, Arduino, Flowcode

Contents

Page	Products	Description
4	Flowcode	Learn about Flowcode, one of the World's most advanced graphical programming languages.
6	E-blocks	Learn about E-blocks and how you can use them to motivate and teach students.
8	E-blocks starter packs	See our resources for starting courses on e-system design and programming.
10	CAN bus, LIN bus, Bluetooth, mobile phone, embedded internet, RFID, ZigBee and USB	See how you can give your students practical experience of a range of digital communications technologies using our ready-built solutions.
14	Digital communications courses, E-blocks courseware	View further details on all E-blocks courses and courseware.
16	Hardware modules	View further details on all the individual boards in the E-blocks range.
23	E-blocks instruments	Find out more about the E-blocks instruments.
25	E-blocks accessories	See our range of E-blocks accessories.
27	FlowKit In Circuit test board	Learn how you can make your own hardware Flowcode compatible.
29	Sensors	See our range of sensors that you can use for project work and investigation.
30	ECIO devices	See our low cost programmers which allow students to learn at home.
32	Formula Flowcode	Find out how you can use robotics to motivate students to learn electronics.
34	Electronic Workstation	Find out more about the Electronics Workstation.
36	MIAC	Learn more about our low cost, PICmicro MCU rugged controller.

Digital systems course map

Page	Key objective	Hours	Solution	Hardware	Software	Curriculum
8	Starting to program microcontrollers	50	-	EB215	TEFLCSI5	Introduction to microcontroller programming
8	Learning C code for 8 bit microcontrollers	50	-	EB215	EL543SI4	EL543SI4
9	Learning assembly code for 8 bit microcontrollers	50	-	EB215	EL629SI4	EL629SI4
9	VHDL or Verilog for CPLD	50	EB287	-	Quartus II web edition (free)	ELPLDSI
9	VHDL or Verilog for FPGA	40	EB940	-	Quartus II web edition (free)	ELPLDSI
9	Learning C code for 32 bit microcontrollers	50	EB139	-	ELRMSI	ELRMSI
9	Learn DSP technology	50	EB650	-	TEDSSI5	N/A
11	CAN bus communications	20	EB237	-	TEFLCSI5	EB9012
11	LIN bus communications	15	EB413	-	TEFLCSI5	EB9016
11	Bluetooth communications	20	EB860	-	TEFLCSI5	EB9127
11	Mobile phone communications	20	EB118	-	TEFLCSI5	EB9134
12	Internet communications	40	EB643	-	TEFLCSI5	EB9222
12	RFID communications	20	EB699	-	TEFLCSI5	EB9329
12	ZigBee communications	20	EB284	-	TEFLCSI5	EB9457
12	USB communications	20	EB479	-	TEFLCSI5	EB9538

Quick reference - To find products quickly on our website, simply enter the product code in our search area and click on the link to retrieve full product details.

Introduction

For nearly 20 years Matrix has been developing and marketing high quality resources for both learning about, and building, electronic systems.

Our goals are simple; we want to make products that work well, that are flexible, that are heavily used in educational institutions, that are rugged, that are well supported with curriculum materials and technical information, that are well designed, that use up-to-date technology, that are good value for money, and that have a low learning curve.

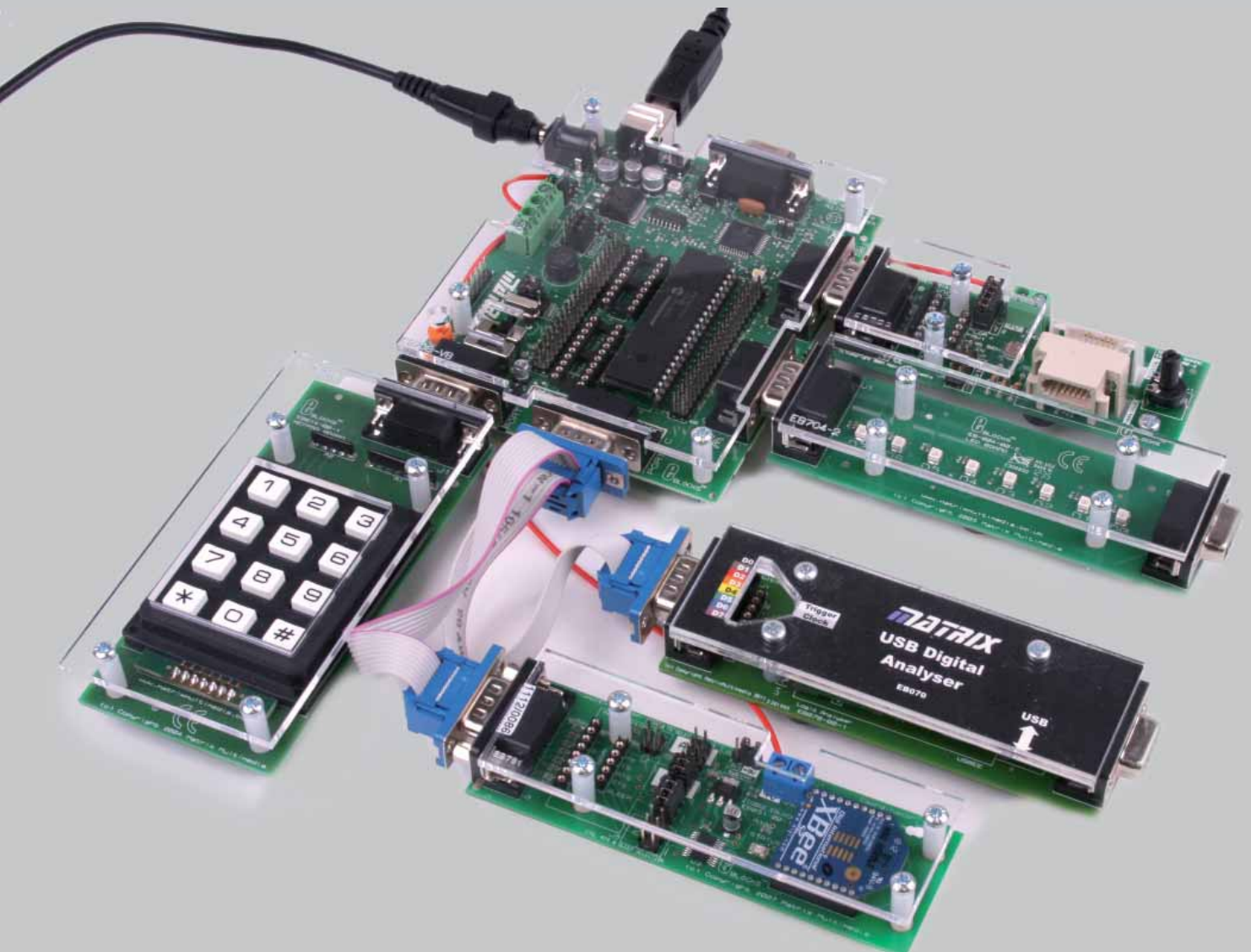
We achieve all of this. Our products are used by more than 3,000 educational institutions world-wide in 20 languages; from teaching telecommunications students in Russia how modern RFID systems function, to training automotive technicians in Hong Kong how to repair cars with faulty Electronic Control Units.

But we don't just provide resources for learning. We also provide design and development tools to some of the biggest companies in the world including Pepsi, Bentley and the UK Atomic Energy Authority. Our philosophy here is unique; we know that engineers who are developing products are continually learning. We marry the processes of learning and building electronic systems together in a range of products which provide a rapid development environment as well as a rich and motivating learning experience.

But don't take our word for all this. Log onto our website, look at the thousands of customer posts on our forums, browse our Learning Centre and examine the free courses we offer and the quality of the information we provide. Then, if you are still unsure whether our products are for you or not then please give us a call.

John Dobson
Managing Director

+44 (0)1422 252380



Flowcode 5

Flowcode is a graphical programming tool that allows those with little experience to develop complex electronic systems in minutes.

Flowcode 5 is one of the World's most advanced graphical programming languages for microcontrollers.

Flowcode's graphical development interface allows students to construct a complete electronic system on-screen, develop a program based on standard flowcharts, simulate the system and then produce hex code for PICmicro® microcontrollers, dsPIC

and PIC24 microcontrollers, AVR and Arduino microcontrollers, and ARM microcontrollers.

Flowcode includes drivers for a wide range of hardware elements - from simple switches and LEDs, through to more complex subsystems like CAN busses and TCP/IP web modules. Flowcode is well supported with a range of courses and applications, and is tightly integrated with the E-blocks range of hardware modules which minimise construction and development time.

Flowcode is available in over 20 languages and is used by thousands of engineers and educators.



1 Design

Drag and drop the flowchart icons to create a program. Click on each component to set the actions and properties you want. View the C code created, customise the C code each icon and component represents, incorporate C code from other sources.

2 Simulate

Drag and drop components onto your simulation panel. Adjust graphical properties and assign pin connections. Simulate the program and see the effects on the components and the microcontroller. Test the system's functionality by clicking on switches or altering sensor values.

3 Test

Compile and download to your system with one button click. Use the In Circuit Test feature to see your program working on-screen and on Matrix development hardware at the same time.

4 Deploy

Download your code into a microcontroller in your own circuit board and control a wide variety of system. Transfer your code to a fully functioning electrical datalogging and control system using rugged MIAC technology.

Ordering information

	PICmicro	AVR / Arduino	ARM	dsPIC / PIC24
10 user	TEFLC105	TEVR105	TERM105	TEDS105
Professional	TEFLCS15	TEVRS15	TERMS15	TEDSS15
Site licence	TEFLCSL5	TEVRSL5	TERMSL5	TEDSSL5
Student / home	TEFLCST5	TEVRST5	TERMST5	TEDSST5

For more information on Flowcode please see the Flowcode 5 data sheet available on the Matrix Multimedia website.

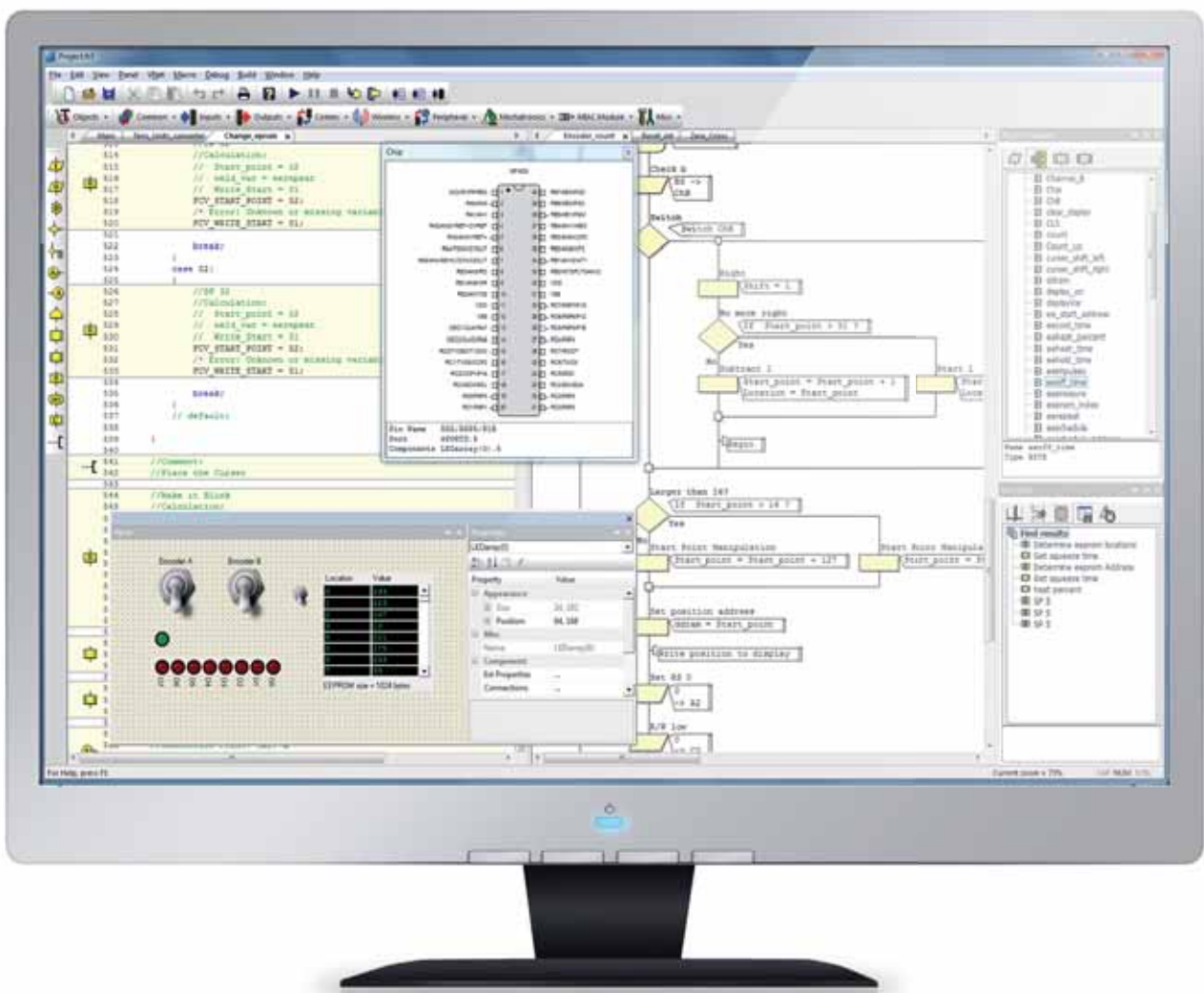
Flowcode 5

Benefits of Flowcode

- Save time - Flowcode allows you to design complex systems in minutes.
- Easy to use - Drag and drop icons onto the screen, fill in icon properties, download to your chip. No coding, no syntax.
- Error free results - Flowcode works. What you design and simulate on-screen is the result you get when you download to your microcontroller.
- Open architecture - View and manage the C code created and customise it to meet your needs.
- Hardware support - Tightly integrated with E-blocks, circuit diagrams for all supported circuits are available.
- Supported learning - Free courses and videos help you learn. Books and advanced courses are also available.
- Superb support - If you get stuck or need advice, post on our forum where our community of users will help you.
- Code reuse - Transfer your code from one microcontroller core to another with ease.

Features of Flowcode

- Supported microcontrollers - Microchip PIC 10, 12, 16, 18, dsPIC, PIC24, Atmel AVR, Atmel ARM.
- Supported communication systems - Bluetooth, CAN, FAT, GPS, GSM, I²C, IrDA, LIN, MIDI, One wire, RC5, RF, RFID, RS232, RS485, SPI, TCP/IP, USB, Wireless LAN and ZigBee.
- Supported components - ADC, LEDs, switches, keypads, LCDs, graphical colour LCDs, sensors, 7-segment displays, internal EEPROM, comms systems, touchscreen LCD, web server, RGB LED.
- Supported mechatronics - Accelerometer, PWM, servo, stepper, speech, quadrature encoder.
- Supported subsystems - MIAC, MIAC expansion modules, Formula Flowcode.
- Panel designer - Design a panel of your choice on-screen and simulate it.
- In-Circuit Test - When used with version 9 EB006 Multiprogrammer, EB064 dsPIC/PIC24 Multiprogrammer or FlowKit.
- Virtual networks - Co-simulation of many instances of Flowcode for multi-chip systems. Co-simulation of MIAC based systems with MIACbus.
- DSP library includes: input, output, sum, delay, filter, Kalman filter, Scale, Level control, FFT, Inverse FFT



E-blocks

E-blocks modules provide learners and developers with a flexible suite of electronics blocks that snap together to form a wide variety of electronic systems.

E-blocks are small circuit boards each of which contains a block of electronics that you would typically find in an electronic system.

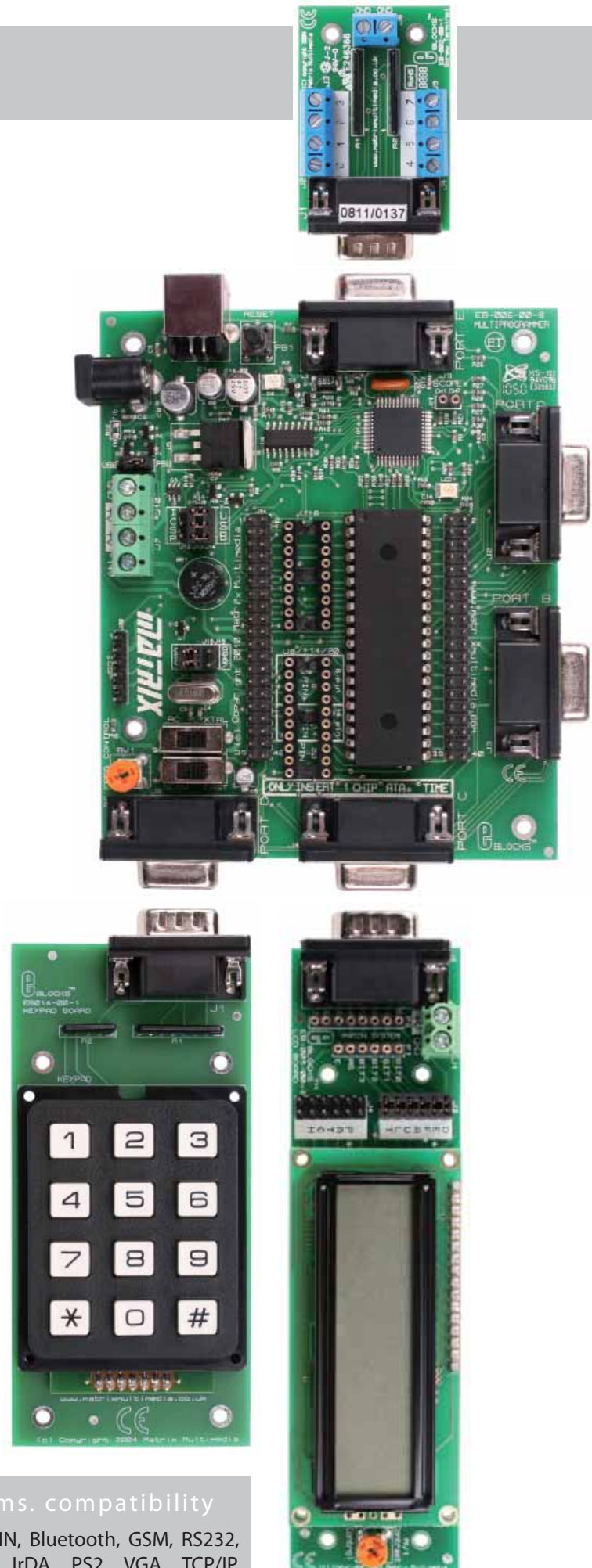
The 50 circuit boards in the E-blocks range use rugged 9-way D-type connectors as a connection bus for 8 signal lines and earth. Power (3.3V or 5V) is wired separately. This allows a complete system to be assembled in a matter of minutes. You can then select from our range of sensors and accessories to enhance the system's functionality.

Systems based on microcontrollers can be programmed using flowcharts, C, assembly, or anything else that generates an appropriate HEX file. Systems based on CPLD/FPGA technologies can be programmed in block diagrams, VHDL or Verilog. A range of CD ROM tutorials, which include compilers, development tools and manuals, provide support to students who are new to any of these technologies.

The great advantage of E-blocks in education is that they provide a very flexible set of parts for learning a range of technical disciplines and for project work. E-blocks are used by a variety of academic courses; from learning to schools to experimentation as part of a PhD.

Features of E-blocks

- Ports on upstream boards are available on D-type sockets.
- Upstream and downstream boards snap together using rugged 9-way D-type connectors.
- 12V, 5V or 3.3V power is connected using screw terminals.
- Boards mount onto a backplane using the 20mm grid.
- Clear plastic covers that prevent tampering are available for most boards.
- I/O lines on downstream boards are protected from programming errors with series resistors.
- The patch system ensures that downstream boards are compatible with all upstream devices.
- All crystals are removable so that the fundamental operating frequency can be changed.



Programmer boards

PICmicro® microcontroller
ARM® microcontroller
Atmel AVR® microcontroller
dsPIC/Pic24® microcontroller
Altera CPLD and FPGA

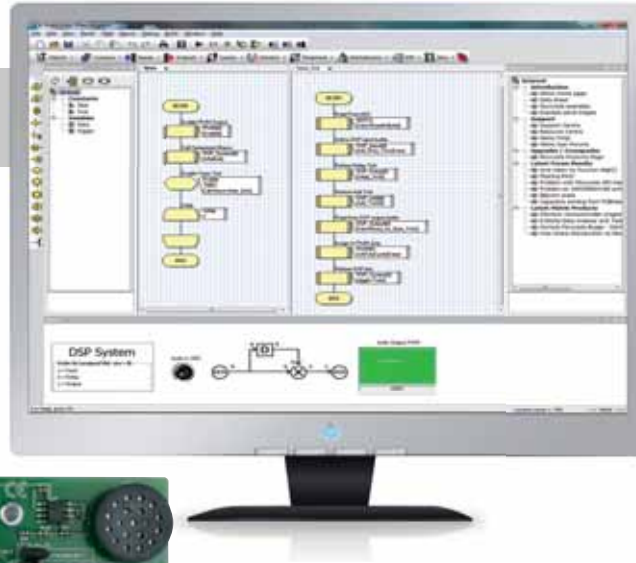
Comms. compatibility

CAN, LIN, Bluetooth, GSM, RS232, RS485, IrDA, PS2, VGA, TCP/IP, MIDI, SPI, I²C, ZigBee, RFID, VGA, USB, GPS, SD/FAT16/FAT32, RS485, RF(ISM), RC5, WiFi

E-blocks

NEW - DSP boards

A major area of focus for us in 2012 has been the development of a range of products for teaching Digital Signal Processing. Flowcode for dsPIC now includes a range of DSP components including sum, delay, filter, FFT etc. To accompany this we have developed custom A/D and D/A boards.



D/A Board



A/D Board

Institution focus - INSA Lyon

The Institution of Applied Science in Lyon is one of the best Technological Higher Education Establishments in Europe graduating over 800 engineers each year in 12 fields of specialisation.

Over a 5 year curriculum it trains humanist multi-competent engineers who must be both innovative and entrepreneurial. Each year INSA Lyon challenges its engineering students with a team based electromechanical project that students must complete. Often these projects are designed to be competitive within the department.

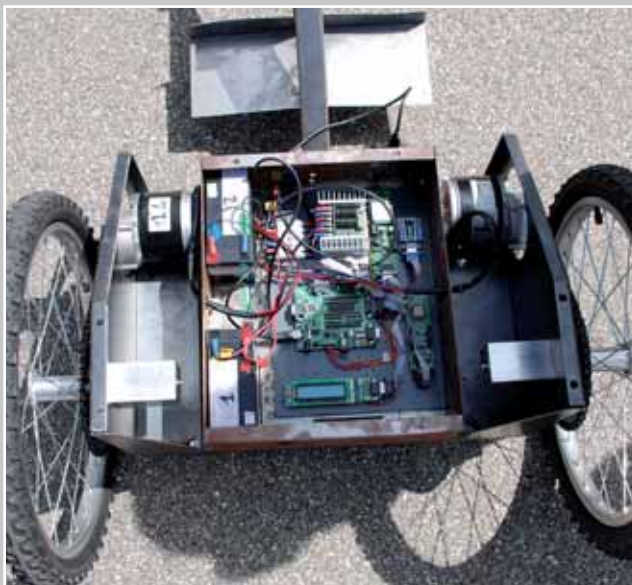
INSA Lyon 2011

In this project students were challenged with developing a mobile robot platform which could carry one person

around a building. The students were charged with designing the mechanics and the electrical systems. The students used both Flowcode and E-blocks to develop the final system. In order to debug the final design students used an E-blocks Wi-fi board to communicate to an Android tablet which was programmed to show the vehicle parameters in numerical and graphical format. The vehicle can also be driven remotely using the tilt sensor on the tablet.

INSA Lyon 2012

In this project several teams of students were challenged to make a vehicle that could carry one person around a small course with two tunnels. The four students in the team has to each drive the vehicle around one lap.



Starter packs

Starter packs are designed with educational institutions in mind: they provide a cost effective way of purchasing E-blocks for general lab use.

Each starter pack includes a device programmer board and a number of E-blocks application boards which are suitable for general lab use. The starter packs include a power supply, cables, a rugged metal backplane for mounting E-blocks on, quick snap mounting pillars, nuts and bolts, and storage trays. For each starter pack a software download utility is provided

which allows you to download your program to the device.

For some PIC based starter packs a free 50 hour CD ROM based course - 'Introduction to microcontroller programming' is included.

For FPGA based starter packs a free 50 hour CD ROM based course - 'Programmable logic techniques' is included.

CD ROM based course material which supports learning about device programming using Flowcode, C, Assembly, VHDL or Verilog, is available as an optional extra.

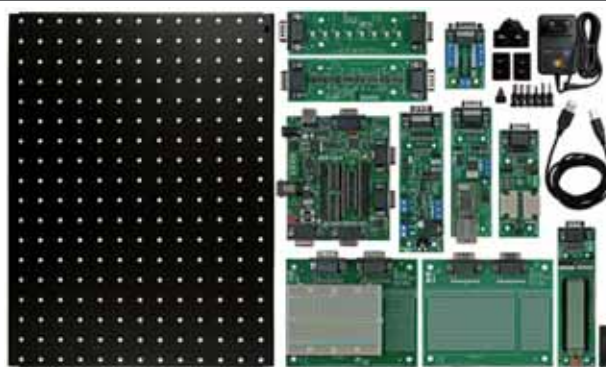


Starting to program

This starter pack is designed to introduce students to microcontrollers and their operation in electronic circuits. It can also be used for more advanced courses and for project work. This starter pack provides a good understanding of fundamental programming constructs including outputs, delays, loops, inputs, decisions, LCD displays, keypads, analogue inputs, subroutines and interrupts.

Ordering information

Standard PICmicro starter pack	EB215
Introduction to microcontroller programming CD ROM	Included

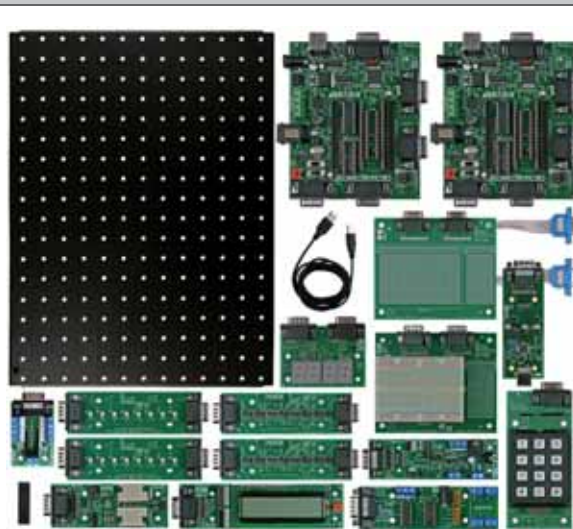


Learning C or assembly code

These starter packs provide the resources for delivering a 50 hour module in C or assembly code programming. They provide a thorough understanding of the operation of 8 bit microcontrollers and programming in the relevant language, from basic techniques to advanced concepts such as serial communication and interrupts.

Ordering information

Standard PICmicro starter pack	EB215
Deluxe PICmicro starter pack	EB110
Standard AVR starter pack	EB343
Deluxe AVR starter pack	EB219
Assembly for PICmicro microcontroller CD ROM	EL629SI4
C for PICmicro microcontrollers CD ROM	EL543SI4
C for AVR microcontrollers CD ROM	ELCVRSI

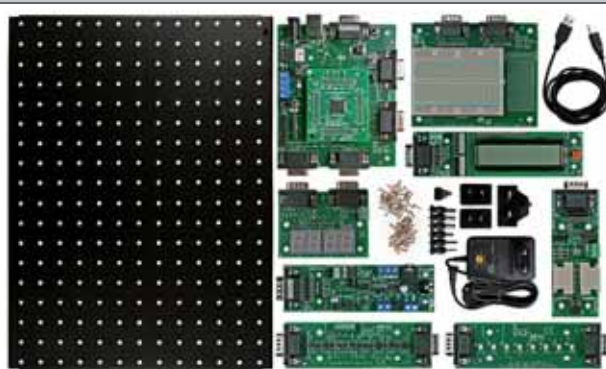


C programming for 32 bit ARM processors

These packs are designed for those who have some experience of 8 bit microcontrollers and who wish to gain an understanding of C programming for ARM microcontrollers. The packs cover basic techniques through to advanced concepts such as serial communication and interrupts.

Ordering information

Standard ARM starter pack	EB139
Deluxe ARM starter pack	EB131
C for ARM microcontrollers	ELRMSI

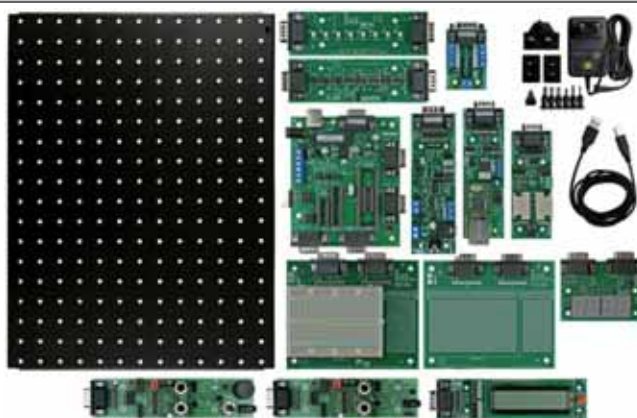


DSP starter pack

This pack is designed for those wanting to investigate the use of digital signal processing for audio and control using the popular dsPIC chipset from Microchip.

Ordering information

DSP starter pack	EB650
Flowcode for dsPIC professional	TEDSS15



COMING SOON

New FPGA starter pack is under development

Solutions

These ready-made learning solutions give educators everything needed to deliver hands-on courses on topics within the area of digital communications.

E-blocks solutions are designed for teachers who want a complete off-the-shelf course covering a topic in modern digital communications. Solutions are made up from our E-blocks hardware modules bolted onto strong metal backplanes. Each module has a clear plastic cover to prevent students changing link settings and removing chips. All cables and accessories are

supplied, and hardware is supplied in rugged plastic trays for storage and transport.

A full copy of Flowcode is included with each solution. Flowcode allows students to concentrate on learning about protocols and data structures, without getting bogged down in the coding. In some solutions additional software for analysis is provided. Each solution has a full teacher's manual including exercises, and a CD ROM with worked examples. In addition a copy of 'An introduction to microcontroller programming' CD ROM is provided as a refresher to those not familiar with Flowcode or for revision.



CAN bus training solution

This training solution is designed to facilitate the development and investigation of systems that use the CAN bus protocol. The solution is suitable for both automotive students and for electronics undergraduates. Four fully programmable CAN nodes are included in the solution, along with circuit boards which mimic the functions of indicator lamps, switches and sensors. A CAN bus analyser and message generator are also included. An 80 page teacher's manual contains a range of exercises for automotive technicians upwards.

Ordering information

CAN solution

EB237



LIN bus training solution

This training solution is designed to facilitate the development and investigation of systems that use the LIN bus protocol. The solution is suitable for both automotive students and for electronics undergraduates. Four fully programmable LIN nodes are included in the solution, along with circuit boards which mimic the functions of indicator lamps, switches and sensors. A 30 page teacher's manual contains a range of exercises.

Ordering information

LIN solution

EB413



Bluetooth training solution

This training solution allows students to carry out investigations into the Bluetooth standard using high level macros written in Flowcode. Students use the hardware, software and curriculum to investigate various Bluetooth protocols and functions including the serial protocol (SPP), local area protocol (LAP) and the headset protocol (HPP). An 80 page teacher's manual covers system set-up, Bluetooth theory and a range of exercises for students to work through.

Ordering information

Bluetooth solution

EB860



Mobile phone training selection

This training solution provides a complete course in developing communication systems. In completing the 20 hour course, students will learn about communications systems, the AT command protocol, communications strategies and many aspects of project development and management. The solution includes a fully working mobile phone based on E-blocks. A 50 page teacher's manual contains a range of exercises.

Ordering information

Mobile phone solution

EB118



Embedded internet training solution

This training solution allows students to carry out a range of experiments to gain an understanding of modern digital communications protocols including Ethernet, DLC, MAC, ARP, TCP, ICP, UDP, ICMP, HTTP and POP3, and their relative position in the OSI model. Students learn to build advanced programs including an email server and a firewall. An 80 page teacher's manual covers system set-up, digital communications theory and contains a range of exercises for students to work through.

Ordering information

Embedded internet solution

EB643



RFID training solution

This training solution provides a complete 20 hour course in developing RFID systems. It gives students who are familiar with microcontrollers an understanding of the programming involved in developing RFID systems. An E-blocks RFID board and four RFID tags embedded into credit cards are included. This hardware allows students to learn about reading and writing transponder data in both Icode and Mirfare mode. A 50 page teacher's manual contains a range of exercises.

Ordering information

RFID training solution

EB699



ZigBee training solution

This solution provides a complete 20 hour course in developing wireless area networks based on the ZigBee standard. It gives students who are familiar with microcontrollers an understanding of the programming techniques involved in developing ZigBee wireless communications systems. A ZigBee packet analyser is included in the solution, along with four fully working ZigBee nodes based on E-blocks. A 50 page teacher's manual contains a range of exercises.

Ordering information

ZigBee training solution

EB284



USB training solution

This solution allows students to carry out a number of practical exercises in USB technology. Students learn about USB through eight different systems: mouse, joystick, temperature logger, USB terminal, USB to RS232 converter, basic slave, storage scope and oscilloscope with variable trigger. By working through these exercises, students build an understanding of the various types of USB system including Human Interface Devices, communications devices and slave devices. A 50 page teacher's manual contains a range of exercises.

Ordering information

USB training solution

EB479



Digital communications courses

These combinations of teaching manuals and CD ROMS provide all the resources you need to deliver advanced digital communications courses on each topic using E-blocks and Flowcode.



These courses include printed manuals and CD ROMs. The manuals provide all the resources needed to allow instructors to deliver advanced system development courses based on microcontrollers and are split into two parts: an instructor guide and student exercises. The CD ROMs contain electronic versions of the manual in both Word and PDF formats. The CD ROMs also include worked examples to the students' exercises, drivers and other software and resources needed to complete the course. The courses focus on allowing students to understand data structures and protocols for each communication system and will give engineers experience of developing fully working communications systems. These are the same courses as used in our solutions on the previous page.

Course	Learning hours	Code
CAN bus communications	20	EB9012
LIN bus communications	15	EB9016
Bluetooth communications	20	EB9127
Mobile phone communications	20	EB9134
Internet communications	40	EB9222
RFID communications	20	EB9329
ZigBee communications	20	EB9457
USB communications	20	EB9538

E-blocks courseware

Introduction to microcontroller programming CD ROM



This new CD ROM provides a complete course in developing microcontroller based systems using Flowcode and E-blocks. The course contains a suite of 13 labs each of which has an accompanying Word worksheet. Students print a worksheet and then work through the contents of the CD ROM, developing systems using Flowcode and E-blocks to complete each lab. Each worksheet has a number of tasks graded to cater for mixed ability classes. Supervisors can use the accompanying Excel marking scheme to track the progress of students as they work through the material. This CD ROM is an excellent introductory course to microcontrollers that will be ideal for preparing students for more complex system development or for learning C programming.



Tutorial screens contain information on using E-blocks and step-by-step instructions on building flow chart programs using Flowcode.

Learning objectives

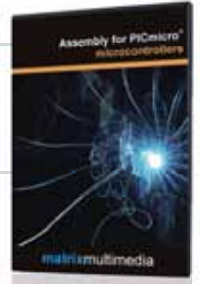
Study of the CD ROM will achieve the following objectives:

- Gain a thorough understanding of the concepts of programming microcontrollers: from basic techniques through to interrupts.
- Develop the skills and techniques required to develop electronic systems based on microcontrollers.

Ordering information

Single user	ELFCS2SI
10 user	ELFCS210
Site licence	ELFCS2SL

Assembly for PICmicro MCUs CD ROM V4



This CD ROM contains a complete 50 hour course in programming the PICmicro microcontroller. The tutorials start with fundamental concepts and extend up to complex programs including watchdog timers, interrupts and sleep modes. The CD ROM includes unique simulation tools which help students overcome key problems in programming in assembly code, and a simplified development environment is included.



Typical tutorial screen



The Virtual PICmicro microcontroller

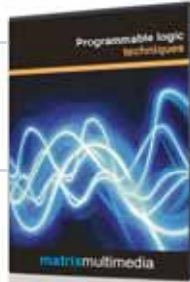
Ordering information

Single user	EL629SI4
10 user	EL629I04
Site licence	EL629SL4

E-blocks courseware

Programmable logic techniques CD ROM

This CD ROM gives a thorough introduction to FPGA programming using Altera's Quartus II Web Edition software in a 40 hour practical course. The CD starts with an introduction to designing with Quartus II using block diagrams at basic and intermediate levels. The CD ROM then takes students through the process of developing combinational and sequential logic designs using either Verilog or the VHDL descriptor language. The CD is suitable for those who have some experience of digital logic and want to get to grips with modern FPGA techniques. A number of example projects in block diagrams, Verilog and VHDL are included.



Quartus II design software



Typical tutorial screen

Ordering information

Single user	ELPLDSI
10 user	ELPLDIO
Site licence	ELPLDSL

C programming courseware and software

These CD ROMs provide you with a complete solution to teaching and learning C programming for the PICmicro, Atmel AVR and Atmel ARM microcontrollers.



The courses are structured in two parts: firstly students are taken through the fundamentals of C programming in a series of on-screen tutorials that make use of our virtual microcontroller to explain to students how C works. This well proven methodology centres around a simulation of the microcontroller which allows students to clearly see the effects on the chip, internal variables and registers as each line of C code executes.

Once students have understood the basics, they carry out a series of labs using the Integrated Development Environment (IDE) and compiler provided. Tests and exercises to reinforce learning are provided. The software tools supplied on the CD are suitable for a wide variety of projects.



Tutorial and simulation screen

Students read through the tutorials, simulate the program on-screen, compile the source code in the IDE...



...and verify the program on the hardware

Ordering information

C for 16 series PICmicro microcontrollers

Single user	EL543SI4
10 user	EL543I04
Site licence	EL543SL4

C for ARM microcontrollers

Single user	ELRMSI
10 user	ELRM10
Site licence	ELRMSL

C for AVR microcontrollers

Single user	ELCVRSI
10 user	ELCVR10
Site licence	ELCVRSL

Note that the C compiler on the C for 16 series PICmicro microcontrollers CD ROM is only licensed for educational use.

E-blocks Upstream and interface boards

<p>PICmicro® microcontroller multiprogrammer</p> <p>This board connects to a PC via USB to provide a high speed, low cost PICmicro MCU programmer for development and programming. This board can be used with assembly, C or Flowcode along with most third party compilers. The board programs a wide range of microcontroller devices and has 5 D-type sockets for E-blocks connection.</p>	
<p>Ordering information</p>	
<p>PICmicro® microcontroller multiprogrammer</p>	<p>EB006</p>



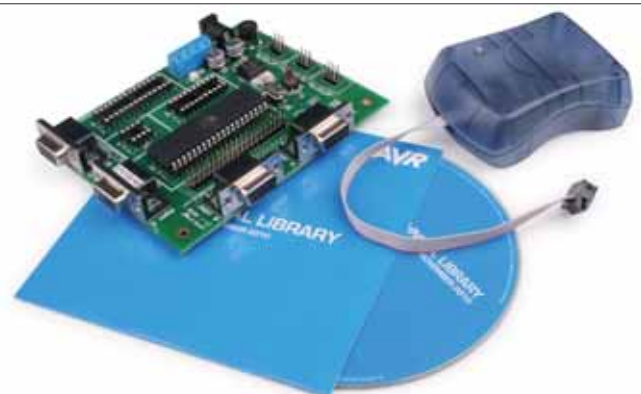
<p>dsPIC/PIC24 multiprogrammer board</p> <p>This board can be used with MPLAB or Flowcode and most third party C compilers. The board programs a wide range of PICmicro microcontroller devices from the PIC24F, PIC24H, dsPIC30 and dsPIC33 series PICmicro ranges using the programming software provided. There are 5 D-type sockets for E-blocks connection. A Microchip PICkit socket provides alternative reprogramming and debugging techniques.</p>	
<p>Ordering information</p>	
<p>dsPIC/PIC24 multiprogrammer board</p>	<p>EB064</p>



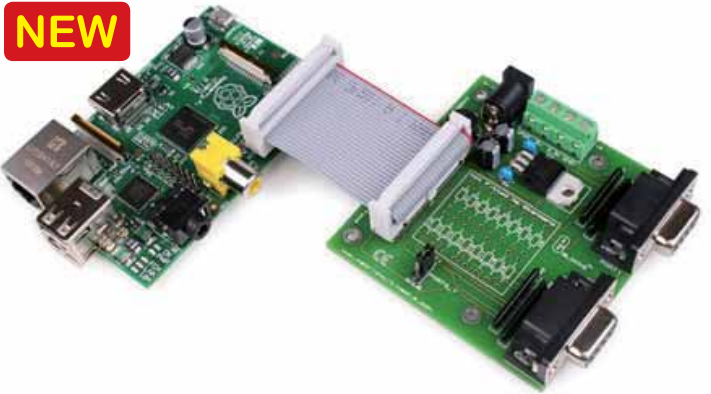
<p>ARM® microcontroller multiprogrammer</p> <p>This board is a development tool for the Atmel AT91 SAM 7 microcontroller. The SAM 7 is a 32 bit RISC device running at an internal frequency of 80MHz with 128k ROM and 32K static RAM as well as 2 USARTs, 4 x 10 bit A/D converters and a native USB bus. The board has 5 D-type sockets for E-blocks. The processor is housed on a removable daughter board so that the ARM can be incorporated into custom PCBs.</p>	
<p>Ordering information</p>	
<p>ARM® microcontroller multiprogrammer</p>	<p>EB185</p>




<p>AVR® microcontroller multiprogrammer</p> <p>This board includes everything you need to program an AVR microcontroller and develop AVR projects. The board comes with a CD ROM containing development tools (including an Integrated Development Environment for code writing) and an in-system programmer. The board programs a wide range of AVR devices and has 4 D-type sockets for E-blocks.</p>	
<p>Ordering information</p>	
<p>AVR® microcontroller multiprogrammer</p>	<p>EB194</p>



E-blocks Upstream and interface boards


<p>Raspberry Pi expansion board with cable</p> <p>This adaptor board allows you to connect a Raspberry Pi device to downstream E-blocks boards, including the prototype board, using a 26-way IDC cable. Circuitry on the adaptor board offers protection for the Raspberry Pi pins from short circuits to ground or the supply voltage and presents the 17 general purpose I/O pins on D-type E-blocks connectors. Additional zener diodes can be added to the board for further circuit protection.</p>		 <p>NEW</p>			
<p>Ordering information</p>					
<table border="1"> <tr> <td>Raspberry Pi expansion module with cable</td> <td>EB380</td> </tr> <tr> <td>Raspberry Pi expansion board and case kit</td> <td>EB385</td> </tr> </table>	Raspberry Pi expansion module with cable		EB380	Raspberry Pi expansion board and case kit	EB385
Raspberry Pi expansion module with cable	EB380				
Raspberry Pi expansion board and case kit	EB385				


<p>E-blocks interface shield for Arduino</p> <p>This board allows you to connect a standard Arduino module into an E-blocks system and take advantage of the large range of E-blocks boards. The D-type connectors provide a bus system that enable clean access to all I/O lines, allowing you to use standard E-blocks with the Arduino upstream microcontroller architecture. All the standard signals from the Arduino board are brought across onto the shield board.</p>		 <p>NEW</p>	
<p>Ordering information</p>			
<table border="1"> <tr> <td>E-blocks interface shield for Arduino</td> <td>EB081</td> </tr> </table>	E-blocks interface shield for Arduino		EB081
E-blocks interface shield for Arduino	EB081		

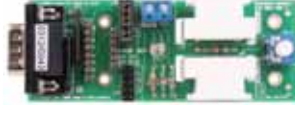
<p>PICmicro development centre kit</p> <p>If you are looking for a protected and physically compact and rugged development environment for PICmicro projects then the HP7631 is ideal for you. The HP7631 Development Centre consists of a EB006 PICmicro Multiprogrammer (with 16F1937 40 pin device) and an EB083 Combo board encased in a tough plastic enclosure. The plastic enclosure allows access to the switches and potentiometers needed for every day use but prevents users from interfering with key link settings or removing the PICmicro device. A power supply and USB cable are included.</p> <p>This product is shipped in kit form and requires some light assembly. Posidrive screw driver and pliers needed.</p>		 <p>NEW</p>	
<p>Ordering information</p>			
<table border="1"> <tr> <td>PICmicro development centre kit</td> <td>HP7631</td> </tr> </table>	PICmicro development centre kit		HP7631
PICmicro development centre kit	HP7631		


<p>Altera FPGA board</p> <p>The FPGA board contains a 10320 macrocell Cyclone IV series FPGA complete with configuration device to allow the code to be passed into the FPGA on power up. The board is packaged with and programmed via a USB-Blaster compatible USB JTAG dongle which allows the board to be re-programmed directly from within the Altera Quartus software using a standard USB port. The board provides five full E-blocks ports allowing other boards in the E-blocks range be connected to the upstream FPGA board. CD ROM courses and compilers for this board are available.</p>		 <p>NEW</p>	3.3V
<p>Ordering information</p>			
<table border="1"> <tr> <td>FPGA board</td> <td>EB089</td> </tr> </table>	FPGA board		EB089
FPGA board	EB089		


E-blocks Downstream boards


Terminal board	3.3V	5V
Allows connection to all 8 pins of a standard E-blocks port with bare wires by using screw terminals.		
E-blocks Terminal board	EB002	


Dual 7-segment display	3.3V	5V
Has a quad 7-segment common anode display with anodes controlled via one port and cathodes controlled by the other.		
E-blocks Dual 7-segment display	EB008	


Sensor board	3.3V	5V
Contains a variable resistor and a light sensor for simple analogue experiments, as well as sockets which allow users to interface to our range of sensors.		
E-blocks Sensor board	EB003	


Power board	3.3V	5V
Contains two L293 quad push pull driver chips which provide power outputs for driving lamps or motors. The board supplies 8 outputs which sink or source 500mA at up to 36V.		
E-blocks Power board	EB011	

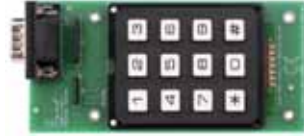
LED board	3.3V	5V
Has 8 LEDs which show the status of each bit on the port. Upstream and downstream E-blocks connectors allow this board to be used in bus configurations.		
E-blocks LED board	EB004	

IR/IrDA transceiver board	3.3V	5V
This board provides a complete solution to infrared communications - with both standard IR and IrDA protocol for communications with laptops or PDAs.		
E-blocks IR/IrDA transceiver board	EB012	

LCD board	3.3V	5V
Contains a 16 character, 2 line alphanumeric LCD display on a 5 wire serial bus.		
E-blocks LCD board	EB005	


SPI bus D/A and memory board	3.3V	5V
Adds serial memory (8K) and D/A functions (8 bit with amplifier and headphone socket) to any microcontroller / FPGA with an SPI interface.		
E-blocks SPI bus D/A and memory	EB013	


Switch board	3.3V	5V
This board contains 8 push-to-make switches. Upstream and downstream E-blocks connectors allow this board to be used in bus configuration.		
E-blocks Switch board	EB007	


Keypad board	3.3V	5V
A simple 4 x 3 keypad that allows data entry into bus based systems.		
E-blocks Keyboard board	EB014	


If you are using ARM or FPGA boards please make sure that the downstream boards you are using are 3.3V compatible.


E-blocks Downstream boards


RS232 board		3.3V	5V
		Flowcode macros available	
Provides an RS232 interface which can be used to facilitate communication between a microcontroller / FPGA and third party devices like PC serial ports, projectors etc.			
E-blocks RS232 board	EB015		


Motors board		3.3V	5V
		Flowcode macros available	
This board is based on the L298 device which can drive two motors operating from up to 46V at up to 4A each. The board can be used in a variety of motor control configurations.			
E-blocks Motors board	EB022		


Prototype board		3.3V	5V
		Flowcode macros available	
Contains a small prototype board for developing circuits and projects. Connectors for two E-blocks ports allow prototype wires and leads to be connected to the prototype board.			
E-blocks Prototype board	EB016		


Internet board		3.3V	5V
		Flowcode macros available	
Adds Ethernet functionality to a microprocessor / FPGA system without the need for developing a TCP/IP software stack.			
E-blocks Internet board	EB023		


Patch board kit		3.3V	5V
		Flowcode macros available	
Contains a small patch for developing circuits and projects. For use when a permanent circuit is required to add to your E-blocks system. D-type connectors need soldering on.			
E-blocks Patch board kit	EB017		

Bluetooth board		3.3V	5V
		Flowcode macros available	
The Bluetooth board allows you to add Bluetooth capability to any microcontroller with UART functionality.			
E-blocks Bluetooth board	EB024		

CAN bus board		5V
		Flowcode macros available
Allows you to add CAN bus functionality to any microcontroller with an SPI interface. The board includes both a CAN controller and a CAN transceiver.		
E-blocks CAN bus board	EB018	


LIN board		3.3V	5V
		Flowcode macros available	
Allows you to construct a fully working LIN bus interface from any microcontroller.			
E-blocks LIN board	EB027		


MIDI interface board		3.3V	5V
		Flowcode macros available	
With MIDI in, out and thru ports, this E-block allows any microcontroller to generate, process or respond to any MIDI datastream.			
E-blocks MIDI interface board	EB021		


Voice CODEC board		3.3V
		Flowcode macros available
This audio coder-decoder board allows students to investigate Bluetooth systems that use audio. The board is based on a Freescale MC145483 linear 13 bit CODEC.		
E-blocks Voice CODEC board	EB032	


If you are using ARM or FPGA boards please make sure that the downstream boards you are using are 3.3V compatible.


E-blocks Downstream boards


PS2 / VGA board		3.3V	5V
Flowcode macros available			
Allows you to connect standard keyboards, mice and VGA monitors to an E-blocks system.			
E-blocks PS2 / VGA board	EB033		


Sensor area network board		3.3V	5V
Flowcode macros available			
Gives the capability of developing 2.4GHz wireless networks based on the ZigBee standard.			
E-blocks ZigBee coordinator board			EB051C
E-blocks ZigBee router board			EB051R


Opto-isolator board		3.3V	5V
Flowcode macros available			
This board contains 4 separate isolated inputs to your E-blocks system for telecoms and Programmable Logic Controller applications.			
E-blocks Opto-isolator board	EB035		


RFID board		3.3V	5V
Flowcode macros available			
This board allows you to develop RFID systems based on the Mifare, ICODE and Ultralight protocols, and includes a built-in antenna.			
E-blocks RFID board	EB052		


MMC card reader board		3.3V	5V
Flowcode macros available			
This MMC card reader sits on the serial port of a microcontroller and provides up to 32GB of memory to an E-blocks system. An MMC card must be bought separately.			
E-blocks MMC card reader board	EB037		

PASCO sensor board		3.3V	5V
Flowcode macros available			
This board allows the Pasco® Scientific range of the Science Workshop sensors to be connected to an E-blocks system.			
E-blocks PASCO sensor board	EB054		

Relay board		3.3V	5V
Flowcode macros available			
This board contains 4 relays (choose high or low nibble) each rated at 250V and 6A. This is ideal for building PLC type applications.			
E-blocks Relay board	EB038		


USB interface board		3.3V	5V
Flowcode macros available			
Provides direct connection to the USB interface for microcontrollers that include an internal USB peripheral allowing you to easily communicate directly with your device.			
E-blocks USB interface board	EB055		


USB232 board		3.3V	5V
Flowcode macros available			
This board allows you to connect a microcontroller with a USART back to a PC via USB. A virtual COM port driver is supplied for interfacing to PC software applications.			
E-blocks USB232 board	EB039		


GPS board		3.3V	5V
Flowcode macros available			
Includes a UP500 GPS module from Fastrax. Once an initial position has been acquired, the GPS receiver continues to send position information directly to the microcontroller.			
E-blocks GPS board	EB056		


If you are using ARM or FPGA boards please make sure that the downstream boards you are using are 3.3V compatible.


E-blocks Downstream boards


Servo board		3.3V	5V
		Flowcode macros available	
Allows up to 8 servo motors to be connected to an E-blocks systems for use with the Flowcode Servo component.			
E-blocks Servo board		EB059	


Wireless LAN board		3.3V	5V
		Flowcode macros available	
Allows easy access to standard wireless local area networks. It is capable of being a client or a server on a network. It can serve html and javascript web pages in either mode.			
E-blocks Wireless LAN board		EB069	


RC5 infrared transceiver		3.3V	5V
		Flowcode macros available	
Allows the exploration of the RC5 and other popular IR protocols. It features a tuned and filtered 36KHz IR receiver and an amplified IR emitter.			
E-blocks RC5 infrared transceiver		EB060	


VGA board		3.3V	5V
		Flowcode macros available	
Includes a compact Serial-to-VGA graphics card controlled by a graphics controller. It allows you to add QVGA/VGA/WVGA graphics to any embedded graphics applications.			
E-blocks VGA board		EB071	


RS485 board		3.3V	5V
		Flowcode macros available	
Allows the exploration of RS485 communications. The board facilitates any type of RS485 configuration to be put together.			
E-blocks RS485 board		EB062	

Rotary encoder board		3.3V	5V
		Flowcode macros available	
Has two rotary encoders, an LED and a push switch. It does not have a start and end position so keeps turning in either direction to allow a continually turning potentiometer.			
E-blocks Rotary encoder board		EB073	

ISM band RF comms.		3.3V	5V
		Flowcode macros available	
Allows RF communications at various carrier frequencies.			
E-blocks ISM-band RF board with 433 module		EB063-433	
E-blocks ISM-band RF board with 868 module		EB063-868	
E-blocks ISM-band RF board with 915 module		EB063-915	


Slide switch board		3.3V	5V
		Flowcode macros available	
This board contains 8 slide switches with upstream and downstream D-type connector.			
E-blocks Slide switch board		EB074	


GSM board		3.3V	5V
		Flowcode macros available	
Comes complete with a SIM card socket and a small antenna. It is fitted with 2.5mm jack sockets for microphone and headphone use.			
E-blocks GSM module		EB066	


1.4" LCD multimedia board		3.3V	5V
		Flowcode macros available	
A 'SMART' board that uses TFT LCD technology with an embedded graphics controller to deliver full colour functionality to any project.			
E-blocks 1.4" LCD multimedia board		EB075-LCD144	


If you are using ARM or FPGA boards please make sure that the downstream boards you are using are 3.3V compatible.


E-blocks Downstream boards


1.5" OLED multimedia board	3.3V	5V
Flowcode macros available		
A 'SMART' board that uses Passive Matrix OLED (PMOLED) technology with an embedded graphics controller to deliver full functionality to any project.		
E-blocks 1.5" OLED multimedia board	EB075-OLED15	


DSP input board	NEW	3.3V	5V
Flowcode macros available			
The DSP input board features all the components required to allow high quality 16-bit audio into your microcontroller system. Includes on-board microphone, fully adjustable gain and filters.			
E-blocks DSP input board	EB085		


3.2" TFT LCD multimedia board with touchscreen	3.3V	5V
Flowcode macros available		
A 'SMART' board that uses TFT LCD technology with an embedded graphics controller.		
E-blocks 3.2" TFT LCD multimedia board with touchscreen	EB076-LCD32T	

DSP output board	NEW	3.3V	5V
Flowcode macros available			
The DSP output board features all the components required to allow high quality 16-bit audio from your microcontroller system. Featuring high quality potentiometers, an on-board speaker, fully adjustable gain and filters.			
E-blocks DSP output board	EB086		

LCD board	NEW	3.3V	5V
Flowcode macros available			
The new graphical display board features a new low cost 128 x 160 pixel, 16-bit colour, 1.77 inch graphical TFT display. The display features a LED backlight with microcontroller based brightness control as well as compatibility with 3V3 and 5V E-block systems.			
E-blocks LCD board	EB084		

Cap-touch board	NEW	3.3V	5V
Flowcode macros available			
The cap-touch board allows easy investigation and implementation of cap touch technology. The board features five separate cap-touch pads to allow you to command up, down, left, right and center button presses.			
E-blocks Cap-touch board	EB088		

GLCD display module	NEW	3.3V	5V
Flowcode macros available			
This low cost graphical display module features a 128 x 160 pixel 16 bit colour 1.77 inch TFT display. Connection is made using standard pins on a 0.1" grid. The module includes backlight with brightness control and is compatible with both 3.3V and 5V systems.			
E-blocks GLCD display module	EBM001		

LED array board	NEW	3.3V	5V
Flowcode macros available			
The LED array board offers an array of 8 x 5 high brightness red LEDs which can be easily controlled to create visual animations, pointers and signs. The boards daisy chain to allow large message boards to be created using only one E-blocks port.			
E-blocks LED array board	EB087		

If you are using ARM or FPGA boards please make sure that the downstream boards you are using are 3.3V compatible.

E-blocks Downstream boards

Combo board

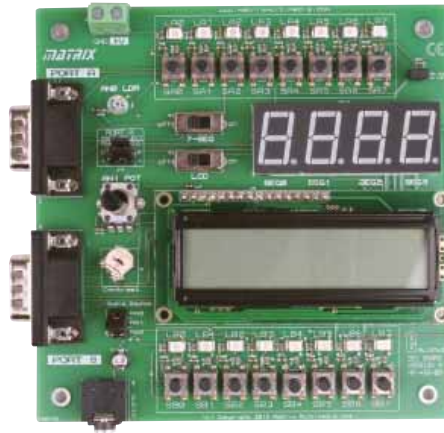
The new E-blocks combo board works with any of our upstream boards to provide a physically compact development environment for your projects. The board plugs directly onto ports A and B and provides two banks of LEDs, two banks of switches, a 2 line 16 character LCD display, a light sensor, a potentiometer mimicking a sensor, a quad 7-segment display, and an audio output jack. An EB006 PICmicro Multiprogrammer and Combo board replaces our older HP488 Development board but also gives full In Circuit Debug facilities.

NEW

3.3V

5V

Flowcode macros available



E-blocks Combo board

EB083

E-blocks Instruments

E-blocks test pod

The loop through E-blocks test pod combines state-of-the-art design with easy to use PC software to give you a complete digital test bench in a small and affordable package. Connecting to your PC, the Test Pod uses the power and speed of the USB 2.0 High-Speed bus to capture and control information from your own hardware designs.

To help you debug your designs the test pod consists of two separate functions: a signal analyser and a signal generator. The signal analyser starts out as an easy-to-use Logic Analyser and Oscilloscope and adds serial busses decoding and world class confirmability that lets you solve your electronics problems quickly. Some of the serial busses that are decoded include: I²C, SPI, Async, USB, CAN, 1-Wire, PS/2, SMBus, I2S, Sync Serial and even your own custom busses. Features include:

- 8 channels
- 24MSPS max sample rate
- Windows software
- USB powered
- Separate clock and trigger

Ordering information

E-blocks test pod	EB070
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ZigBee analyser

This wireless network analyser graphically displays wireless network traffic following the IEEE 802.15.4 specification on the 2.4GHz band. The analyser supports ZigBee, MiWi and MiWi PRP protocols. In conjunction with the hardware packet sniffer, the software can analyse complete network traffic and graphically display decoded packets. It can also display a graphical representation of the network topology and the messages as they flow through the network.

The analyser is shipped in a rugged plastic case and can be mounted onto a standard E-blocks metal backplane. This information can then be saved and/or exported for further analysis. For developing with either ZigBee or the MiWi protocols, the ZigBee analyser is an essential development tool. Connects through USB.

Ordering information

ZigBee USB analyser	HP387
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Multimeter

This high accuracy multimeter is classroom ready with a rubber holster to protect it. It has a large 3½ digit LCD display and test positions for both transistors and diodes. It measures AC and DC voltage, current and resistance.

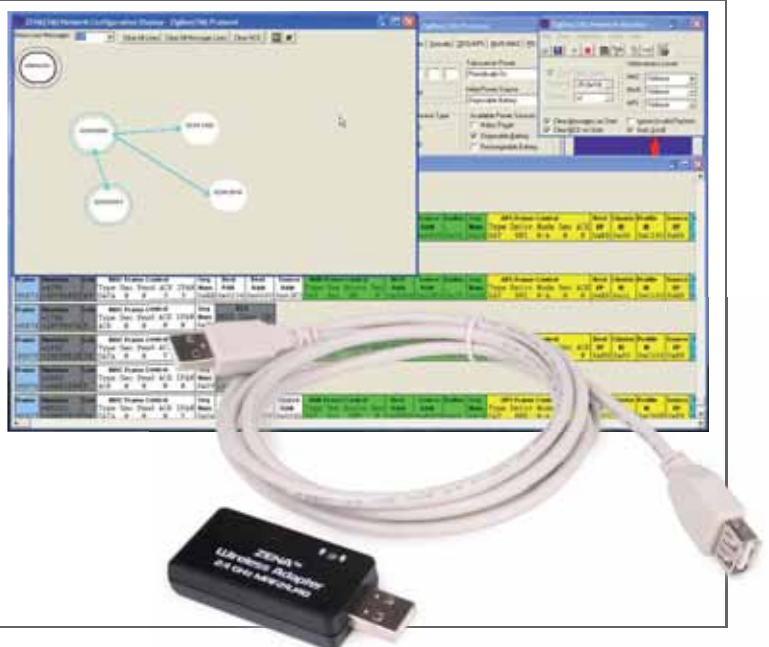
Ordering information

Multimeter	LK1110
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The signal generator software lets you create digital waveforms using the test pod and includes a host of functions:

- Signal generator software runs on your PC
- Generate sample rates between 1MSPS and 24MSPS
- 8 channels
- Sample buffer: 1 million samples up to the available PC RAM (hundreds of millions)
- Output sample clock
- External trigger input
- Movable cursors for easy measurements
- Input files saved by the Logic Analyser module to playback the capture




E-blocks Instruments

CAN analyser	
<p>This analyser provides a dual channel CAN bus interface through a standard USB interface. This analyser is capable of analysing traffic on two separate CAN busses simultaneously. The free software operates on all Windows platforms. This unit is supplied with a D-type to dual 4mm cable which makes it suitable for direct connection to MIAC units, or which can be modified for direct connection to a system's CAN bus.</p>	
Ordering information	
CAN analyser	EL3498




5MHz PC oscilloscope/signal generator pack	
<p>This pack is based on a PicoScope 2203 dual-channel PC oscilloscope which has a bandwidth of 5MHz and samples at 40M samples per second - 8 bit. It has two input channels which are used as oscilloscope or spectrum analyser inputs and it includes an arbitrary waveform generator.</p>	
25MHz PC oscilloscope/signal generator pack	
<p>This pack is based on a PicoScope 2205 dual-channel PC Oscilloscope which has a bandwidth of 25MHz and samples at 40M samples per second - 8 bit. It has two input channels which are used as oscilloscope or spectrum analyser inputs and it includes an arbitrary waveform generator.</p>	
Ordering information	
5MHz PC oscilloscope/signal generator pack	HP2577
25MHz PC oscilloscope/signal generator pack	HP8279



Free accessories with this pack: two scope probes, a BNC male to dual 4mm binding post, a pair of 4mm croc clip leads and a USB led.

Benchtop signal generator	
<p>The function generator is one of the most versatile pieces of test and measurement equipment available. It can generate a variety of precision waveshapes over a range of frequencies from mHz to MHz. It can provide a wide range of controlled amplitudes from a low-impedance source, and maintain constant amplitude as the frequency is varied. The TG300 series represents the state-of-the-art in low-cost analogue function generators.</p>	
Ordering information	
Benchtop signal generator pack	HP7894





Free accessories with this pack: this pack also includes a pair of 4mm to croc clip leads, two 4mm stackable leads and a BNC male to dual 4mm binding post.


E-blocks Accessories


ZIF socket programmer adaptor	
By putting this adaptor board on top of your EB006 PICmicro microcontroller programmer board you can create a fully functioning PIC programmer for 8, 14, 20, 28 and 40 pin PICmicro devices with easy to use ZIF (Zero Insertion Force) sockets. For a full list of devices supported please refer to the data sheet on the EB006 (available on our website). Note that the pins of the chip are not connected to the D-type sockets on the EB006.	
Ordering information	
ZIF socket programmer adaptor	EB072





Actuators training panel	
A general purpose training panel that allows students to carry out experiments with motors. The actuators on the panel include: a 7.5 degree/step stepper motor, a 120 degree servo motor and a bidirectional DC motor with gearbox and rotational feedback. Worksheets and operating instructions are included. An E-blocks compatible port facilitates connection with upstream boards.	
	
Ordering information	
Actuators training panel	HPACT


IDC cables	
These cables can be used to connect E-blocks boards together.	
	
Ordering information	
Male - Male IDC connector	EB251
E-blocks cable Male - Male 500mm	EB251B
E-blocks IDC cable	EB634
E-blocks cable Male - Female 500mm	EB634B
Dual E-blocks IDC cable	EB635

RFID cards	
A Mifare card and an I-code card are available. Each includes 1k of memory and is compatible with the E-blocks RFID card board.	
	
Ordering information	
Mifare RFID card	HP089
I-code SLI card	HP459


USB lead	
This is a standard USB lead shipped with some Matrix USB compatible products.	
	
Ordering information	
USB lead	HPUSB


Prototype board leads	
This pack of 10 multi-strand leads allows you to design circuits using a prototype board.	
	
Ordering information	
Prototype board lead pack	FLLPCK


USB high speed A to mini B	
This lead connects a USB lead to the miniature USB plug as used on MIAC and ECIO ARM.	
	
Ordering information	
USB high speed A to mini B	HPUAB


Tray trolleys	
Storage trays can be mounted into one of our tray trolleys.	
	
Ordering information	
12 tray trolley	HP2025Q
18 tray trolley	HP3025N


E-blocks Accessories


PIC programmer with ZIF sockets		
This PICmicro microcontroller programmer will program any 8, 14, 18, 28 and 40 pin PICmicro device from the 16 or 18 series of PICmicro devices. The unit has two ZIF sockets which accept 0.3" or 0.6" pitch pins. The unit is powered by USB and is housed in a rugged plastic case. A USB cable is included.		
Ordering information		
PICmicro microcontroller programmer with ZIF sockets	HP6339	


Metal backplane	
This backplane can be used to bolt development tools and E-blocks together to form a rigid backplane. The usable area is 270 x 250mm and these backplanes fit our standard trays.	
Ordering information	
Metal backplane	BP232


Storage trays	
These trays are ideal for storage of E-blocks and accessories.	
Ordering information	
Plastic tray	HP2045
Clip on tray lid	HP4039
Foam layer insert	HP3844
4 section insert	HP2935


M3 nuts and bolts	
E-blocks covers are not supplied with fittings. These are required for attaching covers.	
Ordering information	
100 x M3 anti-slip nuts	EB216
100 x M3 12mm bolts	EB217
100 x M3 25mm bolts	EB211
25 x M3 12mm spacers	EB210

Adjustable power supply	
This switched mode power supply can output seven easily selected voltages: 3V, 4.5V, 5V, 6V, 7.5V, 9V and 12V. Up to 1A of current can be supplied at all voltage settings. UK, European, US and Australian plug adaptors are included.	
Ordering information	
Power supply	HP2666

Microcontroller devices	
Chips for your project, compatible with E-blocks programmers.	
Ordering information	
PIC16F1827 chip	HP16F1827
PIC16F877A chip	HP16F877
PIC16F88 chip	HP16F88
PIC18F4455 chip	HP18F4455
PIC24FJ64GB002 chip	HP24FJ64GB002
dsPIC30F2014 chip	HP30F3014
dsPIC33FJ128GP802 chip	HP33FJ128GP802
PIC16F1937 chip	HP16F1937

E-blocks covers	
These covers extend the life of your E-blocks boards. Boards are made 'student friendly' by protecting removable components.	
Ordering information	
Covers are available for most E-blocks. The product code is the same as the code of the board the cover is for, with a '7' replacing the first '0' in the code. For example, the code for the EB003 sensor board cover is an EB703. See the Matrix website for a complete list of available covers.	

Headphones	
Headphones with microphone.	
Ordering information	
Headphones with microphone	HP347

Plastic mounting pillars	
Temporary mounting pillars to attach E-blocks to a backplane.	
Ordering information	
Plastic mounting pillars x 25	HP6219

FlowKit In Circuit Test board

The FlowKit can be connected to hardware systems to provide a real time debug facility where it is possible to step through the Flowcode program on the PC and step through the program in the hardware at the same time. This function is available with Flowcode 4.2 or later.

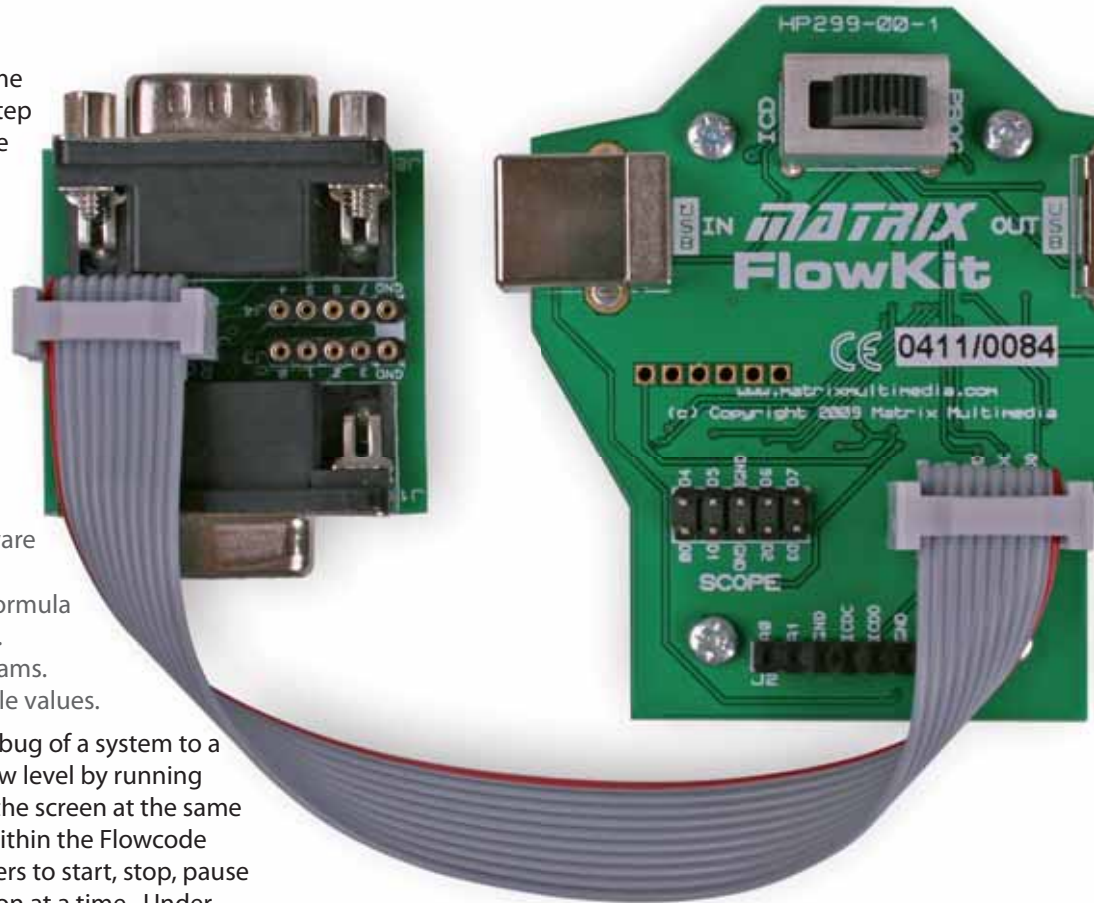
Benefits

- A fast way to solve programming problems.
- Seamless program and debug.

Features

- Compatible with a variety of hardware systems including E-blocks.
- Compatible with ECIO, MIAC and Formula Flowcode systems via the USB lead.
- Allows start, step and play of programs.
- Allows users to see and alter variable values.

Whilst Flowcode simulation allows debug of a system to a first pass, FlowKit takes debug to a new level by running the program in the hardware and on the screen at the same time. The system is controlled from within the Flowcode environment where controls allow users to start, stop, pause and step through their program on icon at a time. Under user control the Flowcode software shows the location of the program in the flow chart, the value of all variables in the program, and allows users to alter the variable values when the program is paused.



Ordering information

FlowKit In-Circuit Test board

HP299



Using FlowKit with MIAC



Using FlowKit with Formula Flowcode



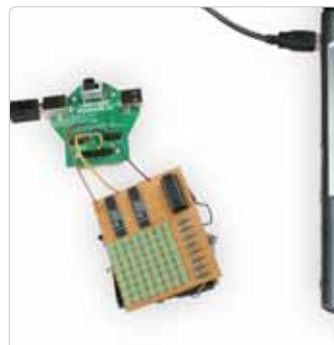
Using FlowKit with ECIO



Using FlowKit with AVR E-blocks



Using FlowKit via a PICkit 2 interface



Using FlowKit with a project



Using FlowKit with Atmel STK500



The complete FlowKit package

Vernier Sensors

The sensors you see here allow you to carry out a very wide range of projects with your E-blocks hardware and software.

All sensors plug directly into our Sensors board (EB003) and into the PICmicro development board (HP488). If you want to give students an experience of different sensor technologies then the sensors we recommend are the heart rate sensor, the temperature sensor, the motion detector and the photogate with smart pulley.

UVA/B 	HSUVA/B	Blood pressure 	HSBPS	Charge 	HSCRG	Oxidation reduction 	HSORP
CO ₂ gas 	HSCO2	Colourimeter 	HSCOL	Accelerometer 	HSACC	Barometer 	HSBAR
Differential voltage 	HSDVP	Dissolved oxygen 	HSDO	Soil moisture 	HSSMS	High current 	HSCHS
Current 	HSDCP	Force plate 	HSFP	Conductivity 	HSCON	Radiation 	HSDRM
Hand dynamometer 	HSHD	Force 	HSDFS	Photogate 	HSVPG	EKG sensor 	HSEKG
Ion electrodes 	HSCA	Magnetic field 	HSMG	Flow rate 	HSFLO	Gas pressure 	HSGPS
Oxygen 	HSO2	pH 	HSPH	Turbidity 	HSTRB	Instrumentation 	HSINA
Respiration 	HSRMB	Rotary motion 	HSRMS	Hand heart rate 	HSHGH	Motion detector 	HSMDD
				Microphone 	HSMCA	Relative humidity 	HSRH
				Salinity 	HSSAL	Temperature 	HSTMP

ECIO single board computers

ECIO single board computers provide one of the fastest and lowest cost ways of embedding advanced intelligence and control into your project.

The ECIO family of USB programmable microcontroller modules behave just like a normal microcontroller - but when you plug the USB lead in and press the reset switch you can send a new program to the device. This, along with the low cost, makes ECIO ideal for student work at home and for incorporating into student circuit boards. ECIO microcontrollers are pre-programmed with a bootloader program which allows you to send a new program to the microcontroller via USB. ECIO is compatible with hex code from any appropriate compiler including Flowcode, C compilers and MPLAB. Flowcode programs and Windows drivers are available for ECIO devices making them suitable for use with LabView, Visual Basic, C++ etc.



- 28 and 40 pin 0.6" footprint, professional capability.
- Adds USB reprogrammability to your own circuit boards.
- Programmable from USB, power from USB.
- Compatible with a free version of Flowcode.
- Compatible with Flowcode, C, Assembly, LabView and Visual Basic.

28 pin PIC 18 ECIO	
Base chip	PIC18F2455
Oscillator	4MHz ext, 48MHz internal
I/O lines	19
A/D	10 x 10 bit
A/D sample rate	100ksps
Program memory	24K bytes
RAM	2K bytes
EEPROM	256 bytes
Power	5V, USB or external
PWM channels	2
Timers	1 x 8 bit, 3 x 16 bit
Interfaces	EUSART, MI ² C, SPI, USB2.0
Package	28 pin, 0.6", DIP compatible
Ordering information	
28 pin PIC 18 ECIO	ECIO28P

40 pin PIC 18 ECIO	
Base chip	PIC18F2455
Oscillator	4MHz ext, 48MHz internal
I/O lines	30
A/D	13 x 10 bit
A/D sample rate	100ksps
Program memory	24K bytes
RAM	2K bytes
EEPROM	256 bytes
Power	5V, USB or external
PWM channels	5
Timers	1 x 8 bit, 3 x 16 bit
Interfaces	EUSART, MI ² C, SPI, USB2.0
Package	40 pin, 0.6", DIP compatible
Ordering information	
40 pin PIC 18 ECIO	ECIO40P

40 pin ARM 7 ECIO	
Base chip	AT91SAM7SI28
Oscillator	18.43MHz ext, 47.923MHz int.
I/O lines	34
A/D	8 x 10 bit
A/D sample rate	300ksps
Program memory	128K bytes
RAM	32K bytes
EEPROM	0 (internal ROM overwrite)
Power	5V, USB or external
PWM channels	4
Timers	3 x 16 bit, 2 x 32 bit
Interfaces	2 x EUSART, MI ² C, SPI, USB2.0
Package	40 pin, 0.6", DIP compatible
Ordering information	
40 pin ARM 7 ECIO	ECRM40

ECIO single board computers

E-blocks application board

The ECIO application board adds E-blocks compatibility to the ECIO 28 and 40 pin devices by providing up to 5 E-blocks ports which allows you to attach a wide range of E-blocks boards.



Ordering information

E-blocks application board

EB061

Wide prototype board

This advanced solderless breadboard has 4 sets of 6 x 28 interconnected holes which facilitates circuit construction based on 0.6" wide integrated circuits and the ECIO range.



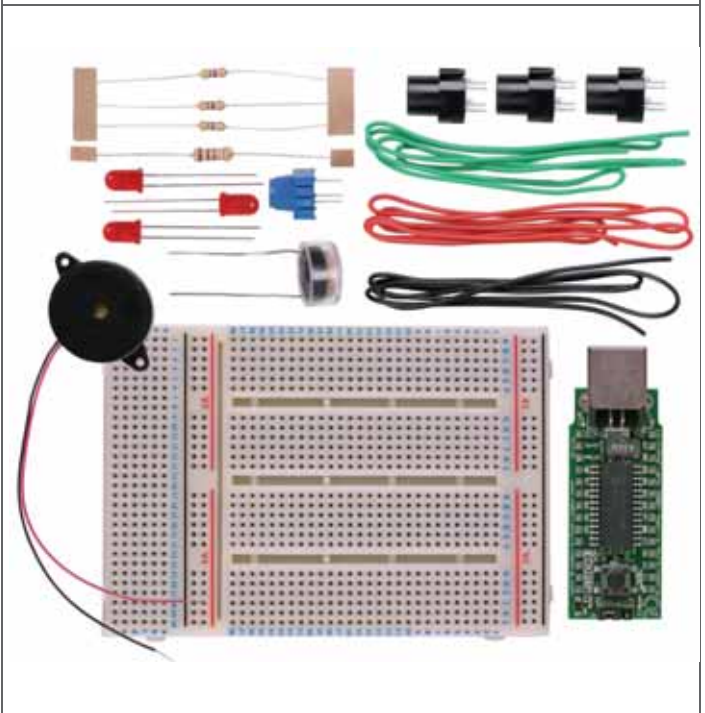
Ordering information

Wide prototype board

HPAD01

Student ECIO starter kit

This kit is designed for students and hobbyists who want to start learning microcontroller circuit development at home. The kit is supplied with a high quality HPAD01 prototype board, a 28 PIN PICmicro microcontroller ECIO device (ECIO28P), 1.5 metres of single core prototype wire (red, black and green) and 13 electronic components which allow a wide range of experiments to be conducted. A suite of worksheets which includes build and software development instructions for 10 analogue and digital experiments are available from our website.



Ordering information

Student ECIO starter kit

EC2961

Formula Flowcode

The Formula Flowcode maze solving robot vehicle can be used for a wide range of learning activities for students aged 12+.

This robot vehicle has been designed to address the requirements of the technology education curriculum between the ages of 12 to 16. It is also used up to university level for motivation, learning and project work. The robot is great for running competitions and for open days where you can motivate students to want to learn more about electronics and technology in just a few hours.

- A low cost, all-inclusive solution for technology students.
- Great for motivating students to learn more.
- Works with the free version of Flowcode.
- Superb technical specification.
- E-blocks compatible.
- Micromouse competition compatible.

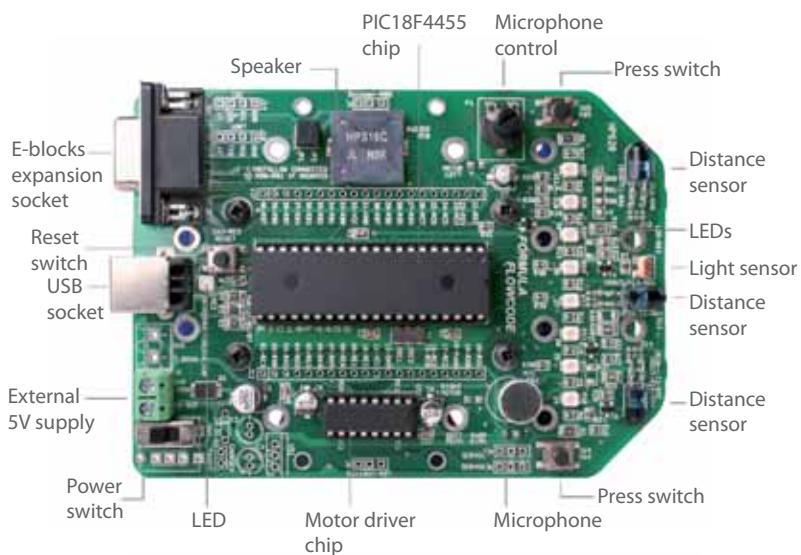
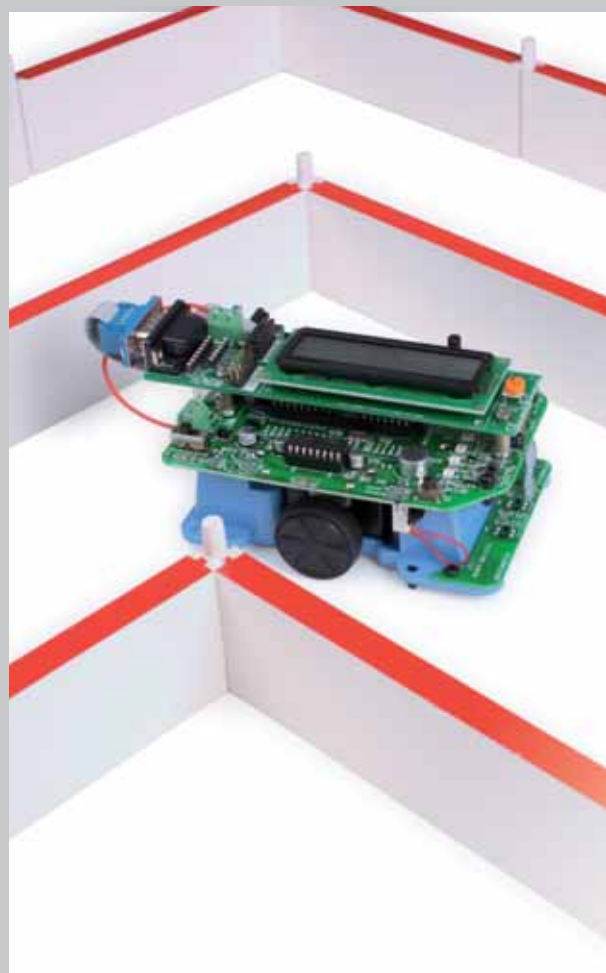
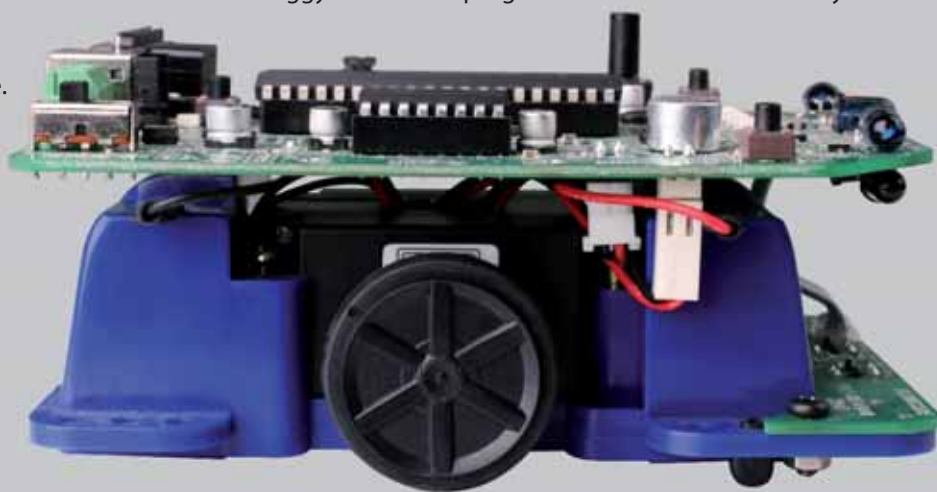
Hardware

The robot vehicle is based a plastic moulded chassis with two wheels, gearboxes and motors and is powered by AA batteries. The circuit board connects directly to a PC using the USB port and provides a high specification

PIC18F4455 controller with many features including 2 user switches, 8 LEDs, sound level sensor, light sensor, buzzer, motor controller (including Pulse Width Modulation), line follower sensors and distance sensors.

Software

The robot is supplied with a reduced functionality version of Flowcode. Students develop the program, simulate its functionality on-screen and then click on a button to download the program to the robot. Flowcode is compatible with most E-blocks add-ons and a full version can be purchased separately. The buggy can also be programmed with C and assembly.



Plastic chassis with battery compartment, motors with gear boxes and 2 wheels

Formula Flowcode

Formula Flowcode buggy

The two wheel Formula Flowcode buggy is powered from rechargeable batteries and is supplied with a function limited version of Flowcode. Students develop the program, simulate its functionality on-screen and then download the program to the buggy via USB. The buggy uses an advanced PICmicro 18 series microcontroller with internal precision motor controller circuitry. It has 3 infrared distance sensors, line following sensors, a buzzer, audio level sensor, light sensor, two spare switch inputs, 8 user programmable LEDs and various expansion busses - including an E-blocks port. The buggy can be expanded with a range of additional boards including graphical LCD displays and Bluetooth.



Ordering information

Formula Flowcode buggy	HP794
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Maze walls

These walls and posts are designed to allow you to create a maze of your own. Each wall measures 168 x 12 x 50mm. 30 walls and posts are included in the pack which allows you to make a 5 x 5 cell maze.



Ordering information

Maze walls	HP458
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Formula Flowcode starter class bundle

Includes 5 Formula Flowcode kits, 1 set of maze walls, a function limited version of Flowcode, a storage tray and a 10 user version of the Introduction to microcontroller programming CD ROM. Sufficient for 10 students working in pairs.



Ordering information

Formula Flowcode starter class bundle	HP926
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Formula Flowcode pro class bundle

Includes 10 Formula Flowcode kits, 1 set of maze walls, a site licence of Flowcode 5 pro, a site licence of the introduction to microcontroller programming CD ROM, 5 LCD displays, 5 IDC cables and 2 storage trays. Sufficient for 20 students working in pairs.



Ordering information

Formula Flowcode pro class bundle	HP454
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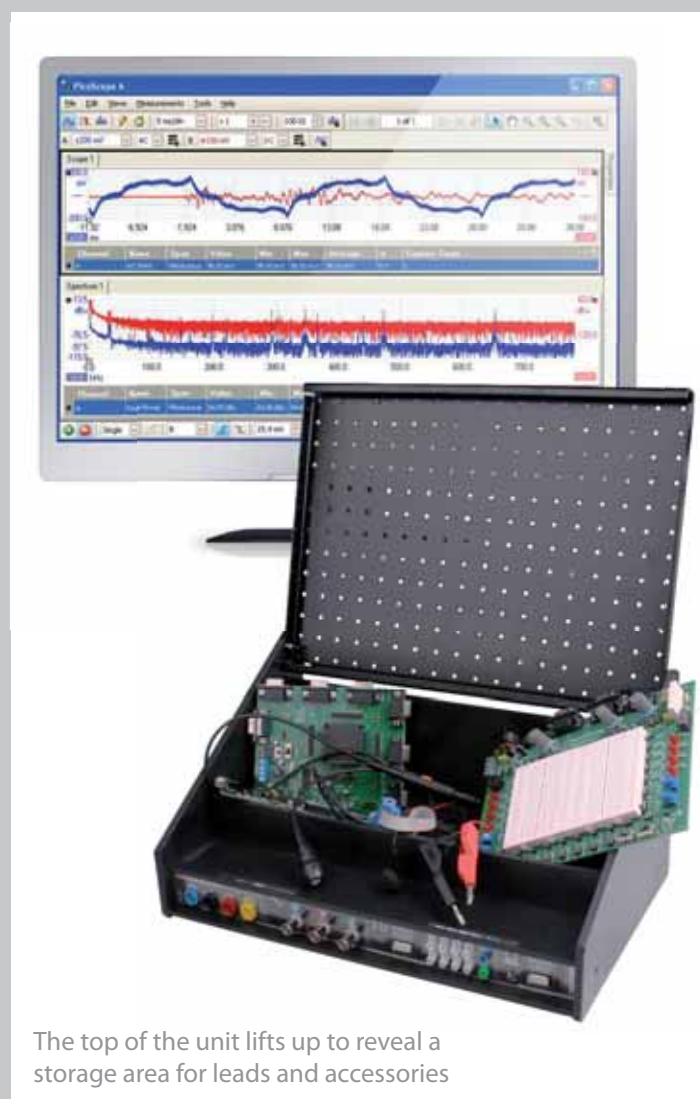
Electronic Workstation

The Electronic Workstation meets all your power and instrumentation needs for electronics education and prototyping in one self-contained, easily portable unit.

The Electronic Workstation is a multifunction electronics workbench for electronics engineers. It combines a number of instruments that make the development and learning of electronic systems easier.

The Electronic Workstation consists of a number of virtual instruments housed in a rigid plastic case. The front panel of the Electronic Workstation has 2 analogue oscilloscope inputs, a signal generator output, 8 channel logic analyser / digital signal generator connectors, 8 channel PC interface connectors which supports use with LabView, Visual Basic, C etc, and power supply outputs. The angled top of the unit is fabricated from strong anodised black aluminium with a grid of holes that make it suitable for use with E-blocks. This lifts up to reveal a storage area for leads and accessories. The oscilloscope inputs and signal generator output are presented on standard 50ohm BNC connectors. The range of leads supplied with the Electronic Workstation includes: 1 x USB leads, 2 x 9-way D-type leads, 2 x 50ohm scope probes, 10 x 2mm micro gripper analyser probes and 25 x backplane mounting pillars and red and black 4mm 'banana' leads.

A compact version of the Electronic Workstation is available, which folds down flat and comes in a kit containing the leads and accessories (see the following page for more information).



The top of the unit lifts up to reveal a storage area for leads and accessories

Features	
Power supply	
+12V (2A) / -12V (0.8A) .5V(5A)	Yes
Digital multimeter	Yes
2 channel oscilloscope	
Bandwidth	25MHz
One channel sampling rate	40MHz
Scope resolution	8 bit
Signal generator	Variable
External trigger	-
Arbitrary waveform generator	Yes
Spectrum analyser	
Bandwidth	25MHz
Logic analyser	
Channels	8
Sample rate	24MHz
Digital signal generator	Yes
Bus decoder	Yes
PC interface	
Channels	8

Electronic Workstation - desktop

The angled top of the Electronic Workstation desktop version lifts up to reveal a storage area for leads and accessories. See the previous page for a list of the leads and accessories included with this product.



Ordering information

Electronic Workstation EU	HP886EU
Electronic Workstation UK	HP886UK
Electronic Workstation USA	HP886USA

Electronic Workstation - compact

The compact version of the Electronic Workstation is housed in a plastic case with a folding backplane that can be angled at 45° of left flat.



Ordering information

Electronic Workstation with case EU	HP834EU
Electronic Workstation with case UK	HP834UK
Electronic Workstation with case USA	HP834USA

Protostation

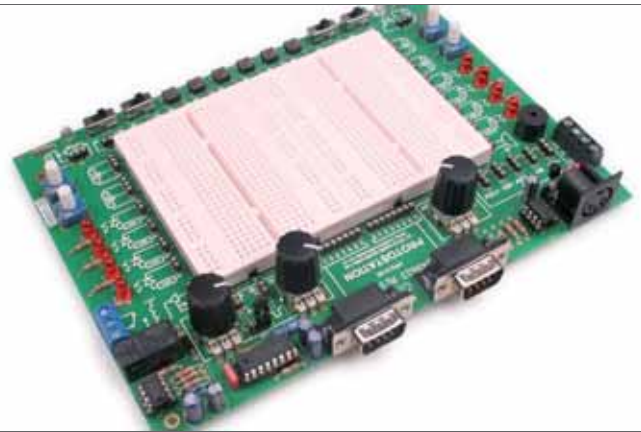
Protostation is the perfect complement to the Electronic Workstation. Together they form a complete electronics prototyping and analysis system that needs less desk space than an open textbook. Protostation can also be used on its own for the convenience of its integral signal sources and output devices.

- Large prototyping area.
- Build circuits with no soldering or tools required.
- Easy access to controls and transducers.
- Make your prototypes more portable.
- Free you work space from clutter.

The Protostation features 0.1" pitch sockets which take standard IC packages. It also contains 2 E-blocks ports, a versatile range of supply voltages, a signal generator and the following inputs and outputs:

- Inputs: Switches, potentiometers, phototransistors, thermistors, voltage source.
- Outputs: LEDs, buzzer, relay.

Protostation fixes to the backplane of the Electronic Workstation creating a compact, portable and extremely sturdy prototyping system.



Ordering information

Protostation	HP512
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MIAC e-system design suite

MIAC modules provide learners and developers with a flexible suite of rugged, high power, electronics blocks which quickly connect together to form a wide variety of control and data-logging systems.

The MIAC is a general purpose controller based on PICmicro technology which is suitable for use in many areas of technical education including mechanical engineering, automotive engineering, computer science, electronics and technology. Its electrically and mechanically rugged design makes it the ideal interface for educational projects.

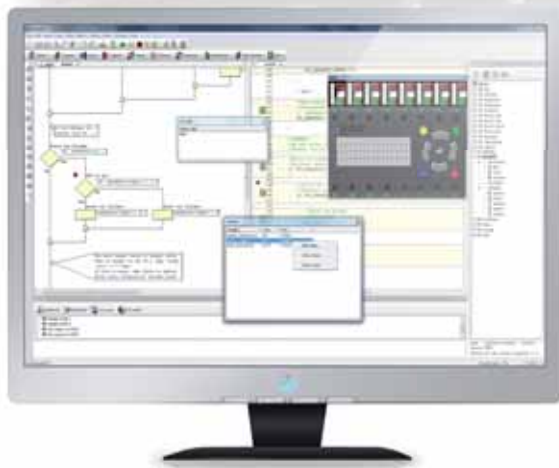
Each MIAC module contains a block of electronics which you would typically find in an industrial electronic control or data acquisition system.

The 10 modules in the range connect together using the CAN bus. The modules can be positioned next to each other or several hundred metres apart. Power is applied locally. The modules also link into a wide range of other communications systems: GSM, Bluetooth, TCP/IP, ZigBee, etc.

The system is programmed using Flowcode software. Flowcode is a graphical programming environment based on flowcharts. Flowcode includes 'drivers' for all the MIAC modules so that programming the system is easy.

Communication between modules is taken care of by Flowcode. To add a module (or second MIAC) to the system just add the module to the Flowcode simulation. Flowcode takes care of low level CAN bus commands so no understanding of CAN is needed.

MIAC modules are compatible with a vast range of industrial sensors and add-ons that sit on 25mm 'top hat' DIN rails.



Cased MIAC with Automatics

MIAC e-system design suite

MIAC (Matrix Industrial Automotive Controller) is an industrial grade control unit which can be used to control a wide range of different electronics systems.

The MIAC is a fully specified industrial electronic controller designed to operate off typical industrial control voltages: 0 - 10V inputs, 24V motor outputs, 240V switching relays. MIAC has 8 analogue or digital inputs, 4 high current relay outputs and 4 transistor outputs. The MIAC is housed in an attractive, rugged, anthracite grey plastic moulding. It has two physical mounting options: it can be mounted onto a 35mm 'top hat' DIN rail, or it can be mounted directly onto any surface using the 4 screw holes provided.

The MIAC unit has screw terminal connector inputs across the top and bottom of the unit. It has several input buttons for user control and a 4 line 16 character alphanumeric display.

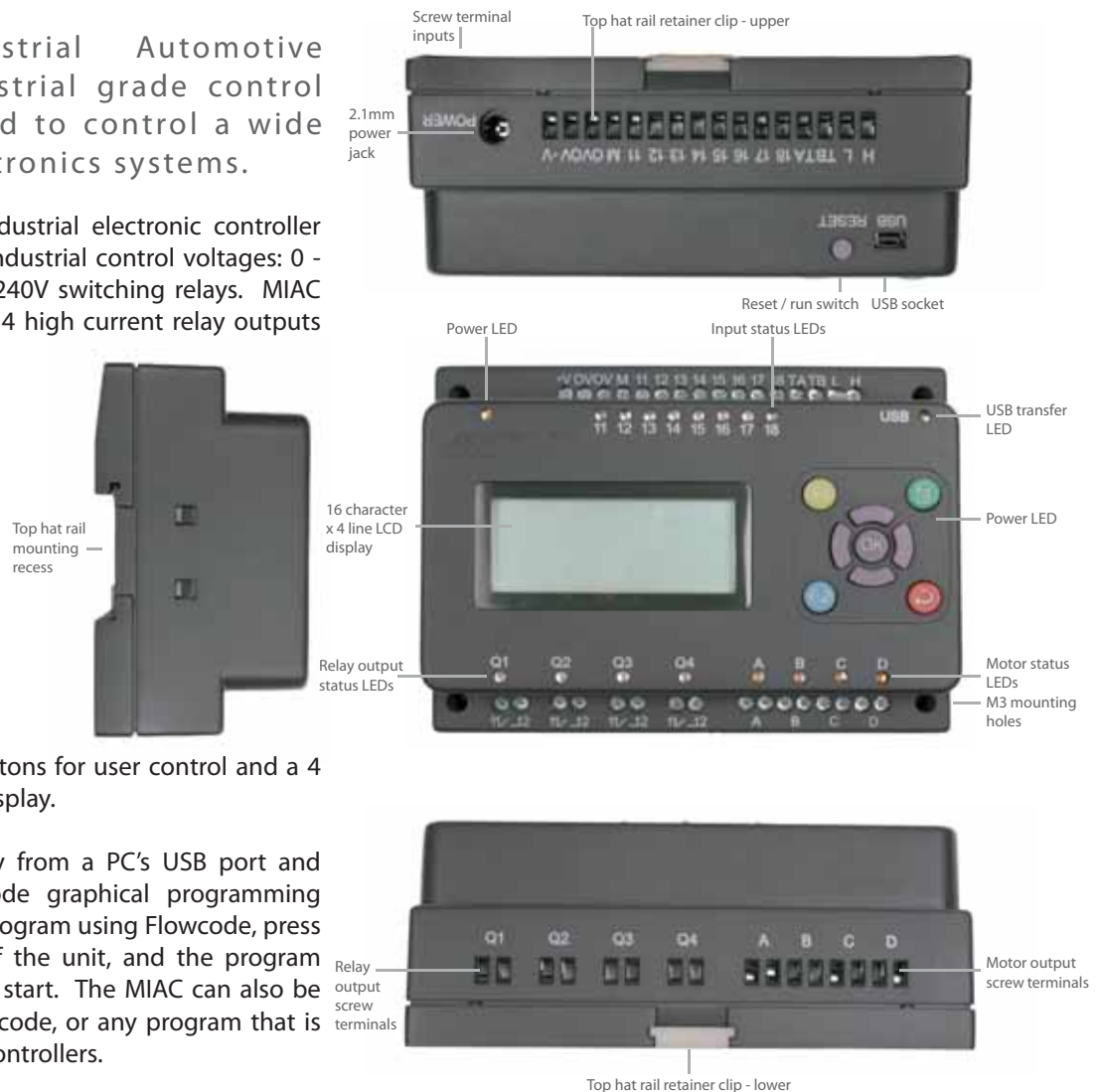
The unit is programmed directly from a PC's USB port and is compatible with the Flowcode graphical programming language. Users can develop a program using Flowcode, press the reset button on the back of the unit, and the program will automatically download and start. The MIAC can also be programmed in C and assembly code, or any program that is compatible with PICmicro microcontrollers.

MIAC is equipped with a fully operational CAN bus interface so that many MIACs can be networked together to form wide area electronic systems.

A DLL and sample programs are provided to enable MIAC to be used with PC based control programs like LabView, Visual Basic, C++ etc.



A cased MIAC with 4mm shrouded sockets is available.



Features


- Programmable from USB.
- 8 digital or analogue inputs.
- 4 relay outputs, 4 transistor outputs with PWM.
- Compatible with LabView, Visual Basic and C compilers.


Benefits


- Flexible and expandable.
- Easy to program and flowcharts, C or assembly code
- Physically and electrically rugged


Ordering information	
MIAC controller	MI0235
Cased MIAC with 4mm shrouded sockets	MI0245
Power supply	HP2666
MIAC, Flowcode 5 and FlowKit bundle	HP388
USB high speed A to mini B lead	HPUAB
MIAC and Flowcode 5 bundle	MI1472
3 MIAC units with Flowcode 5 pro	MI3487V5


MIAC e-system design suite


Basic		
Includes I/O lines including PWM outputs for motor control, 12 bit ADC outputs for precision analogue work and several TTL level serial busses for interfacing to other serial systems at the chip level.		
Ordering information		
Basic expansion module		MI1493


Advanced		
Includes I/O lines including PWM outputs, 12 bit ADC outputs, 2 x 10 bit DAC outputs and several TTL level serial busses for interfacing to other serial systems at the chip level. It also has interfaces for 2 external lab sensors and a real time clock.		
Ordering information		
Advanced expansion module		MI3486
Cased advanced expansion module		MI3955


Serial		
Gives access to commonly used serial busses. The unit includes RS232 and RS485 bus interfaces as well as TTL level serial busses (SPI, I ² C and USART). The unit also includes a number of TTL level I/O lines and a FAT16 compatible SD card.		
Ordering information		
Serial expansion module		MI8447
Cased serial expansion module		MI2839

Industrial comms.		
Includes interfaces for RS485 and TCP/IP communications. TCP/IP connection is available on a standard CAT5 socket. The module is fitted with a CAN bus interface and also allows access to several 5V microcontroller I/O lines.		
Ordering information		
Industrial comms. expansion module		MI4823
Cased industrial comms. expansion module		MI9512

ZigBee		
Two versions of the Zigbee expansion module are available: ZigBee co-ordinator and ZigBee router. Each contains a wireless ZigBee control module and access to several TTL level microcontroller I/O lines.		
Ordering information		
ZigBee expansion module		MI3842C/R
Cased advanced expansion module		MI6922C/R

Bluetooth		
This module contains a TDB BLU2i module which adds Bluetooth functionality to a MIAC system. The class 1 Bluetooth module has a transmit power of 6dBm which should give a 100 yard transmission range at a transfer rate of 100Kbps.		
Ordering information		
Bluetooth expansion module		MI4855
Cased bluetooth expansion module		MI5983

GPS		
Includes a highly sensitive fast access time Global Positioning System receiver which allows developers to build systems that can identify their own location. The unit also includes a FAT16 compatible SD card interface and TTL level I/O lines.		
Ordering information		
GPS expansion module		MI8582
Cased GPS expansion module		MI8534

GSM		
This modules is fitted with a quad band GSM unit which can be used for voice and data transmission. An internal antenna optimises the range of the module. The front of the unit has a 2mm jack socket and a SIM card socket.		
Ordering information		
Advanced expansion module		MI4897
Cased advanced expansion module		MI5197

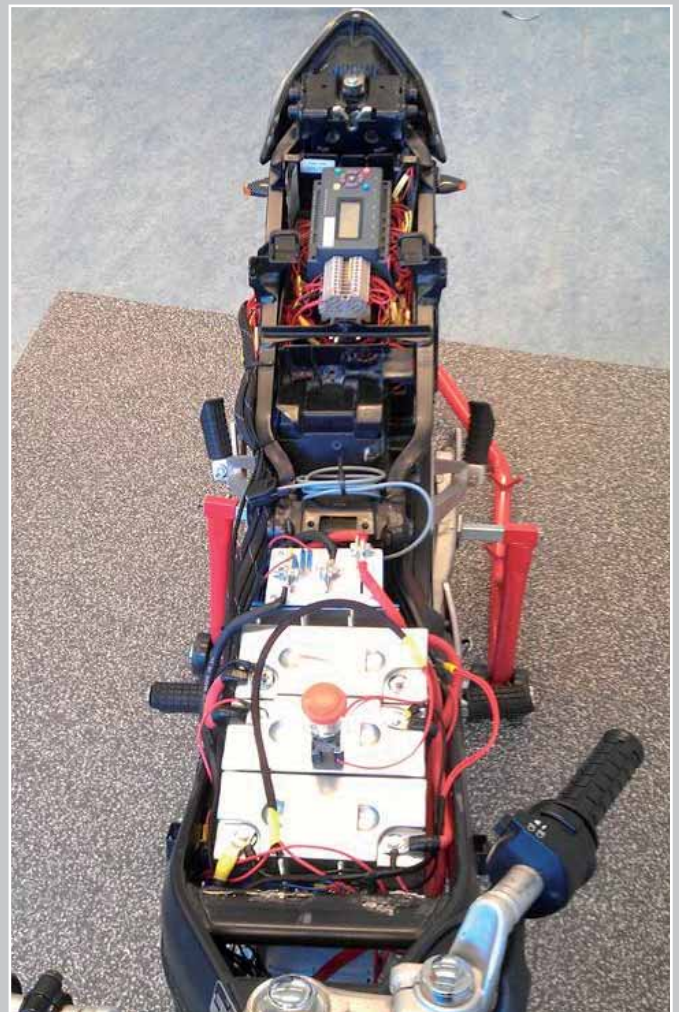
MIAC e-system design suite



A cased MIAC and a cased advanced expansion module.

MIAC bike case study

Under the guidance of teachers Osmo Lukkarila and Jyrki Tolonen, a group of ICT technician students in Oulu Vocational College in Finland took a crashed Honda CB125 motorbike and converted it to electricity. The motor they used is a permanent magnet DC motor capable of 4.8 KW continuous and 15 KW for 30 seconds. It operates from voltages of 12 to 48 VDC input and 100 amps continuous (300 amps for 30 seconds). The three batteries are 12V 20Ah LiFePO4 batteries, each with its own BMS card which balances charging and indicates if a battery is over or under charged. One of our MIAC controllers was used to control the project with all switches, lights and controls wired to it. After the MIAC was programmed and installed the bike functioned in exactly the same way as a normal bike with all the same controls.



Also available: Locktronics
& Automatics catalogues



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