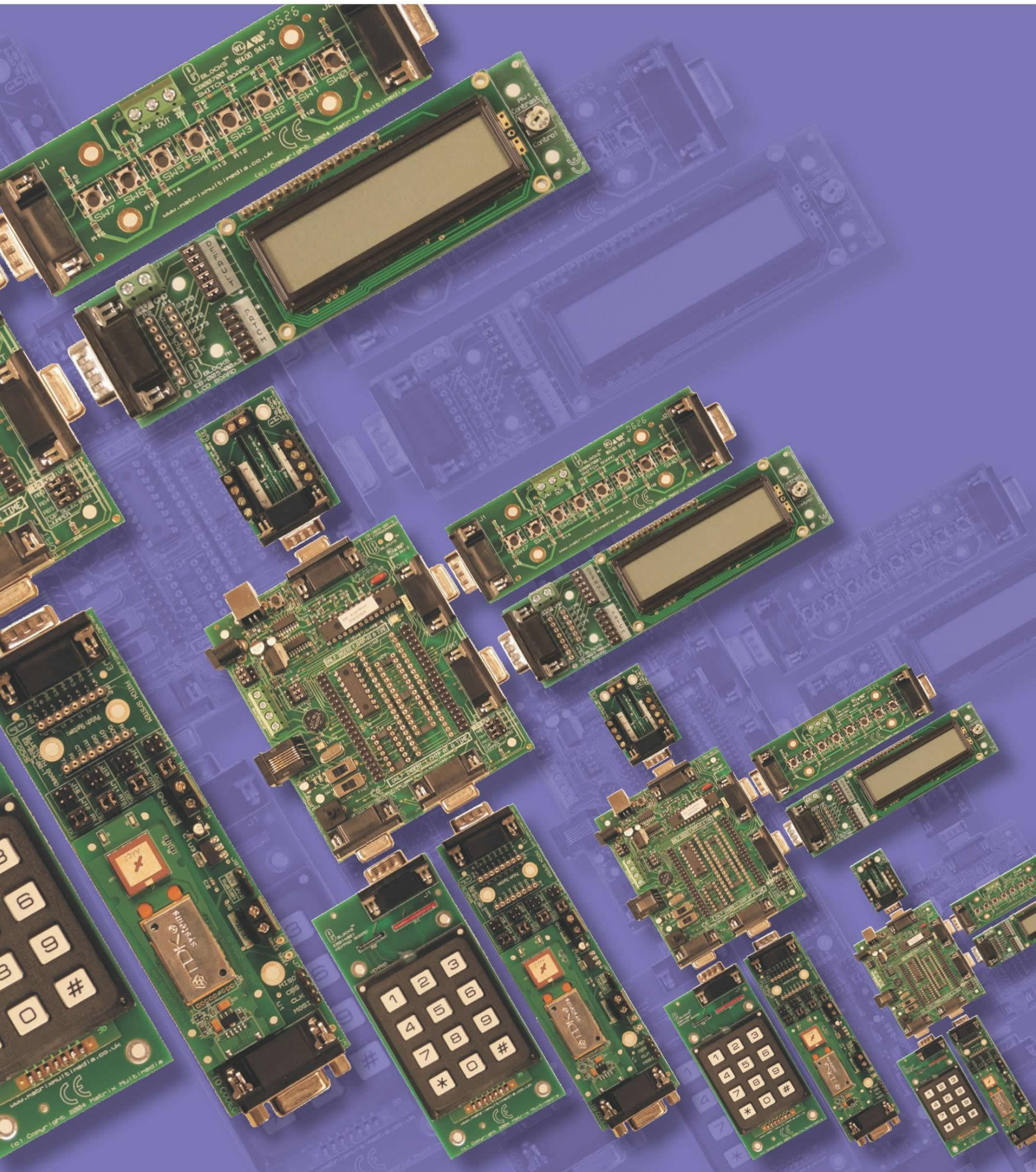


# MATRIX

getting started guide

## E-Blocks Easy Internet Bundle



# Flowcode

EB567-80-1

## E-Blocks Easy Internet Bundle

### Installing Flowcode

Instruction for installing Flowcode can be found inside the installation booklet located inside the Flowcode DVD case.

Before starting with the course it is recommended to update your version of Flowcode to the latest released version. This allows for the latest bug fixes and components to run on your machine. The latest version of Flowcode can be found by visiting the Matrix TSL website and clicking on the Flowcode page.

<http://www.matrixtsl.com/Flowcode3a-X.php>

### Getting Started with Flowcode

There is a free online course available for helping with getting started with learning Flowcode. This course covers basic principals through to designing your own programs and programming the devices. It is recommended that you take time to go through this course before proceeding with the bundle exercises to give you a better grasp of what the Flowcode program is doing.

The online course is available from the learning centre on our website or by visiting the following address:

[http://www.matrixtsl.com/lc\\_microcontroller.php](http://www.matrixtsl.com/lc_microcontroller.php)

### Flowcode Examples

A number of pre-made example files are available for download from the main Flowcode page on the Matrix TSL website. These files are also located on the Flowcode CD. Before the example files can be used you must first copy them into a folder on your hard drive.

The example programs referenced in this bundle can be found at the following web address:  
[http://www.matrixtsl.com/lc\\_bundle\\_manuals.php](http://www.matrixtsl.com/lc_bundle_manuals.php)

Or by clicking the bundle manuals link from the Learning Centre area of our website.

### Flowcode Help

There is a help file available that covers all the main features of Flowcode. This help file can be accessed by clicking the question mark icon in the main Flowcode toolbar or alternatively clicking the help menu and selecting contents.

There are also help files available for each and every component in Flowcode which explain the functionality of the component and the component macros. The component help files can be found by selecting the component on the panel and the clicking the Help button in the properties toolbar.

### General Support

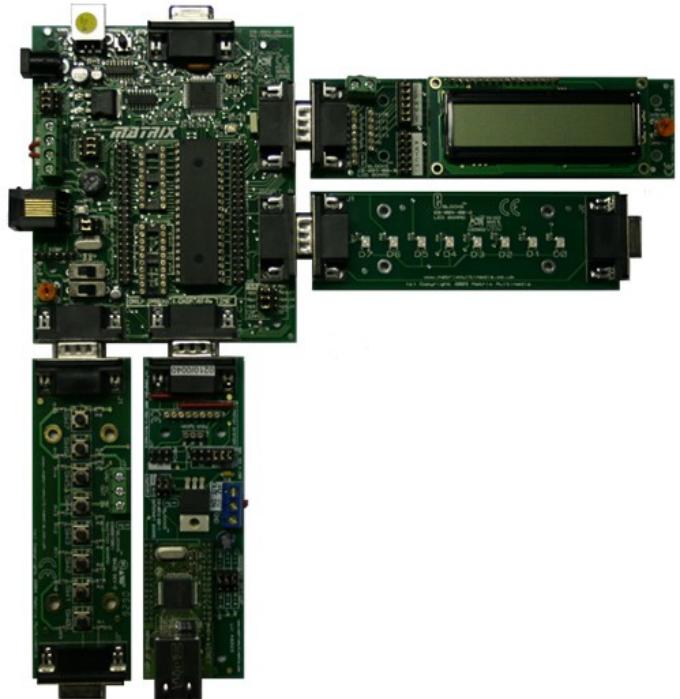
Support for frequently encountered problems can be found online on our FAQ's site. Our online forums can also be used as a general discussion area or for help or advice.

# Wiring & Testing

## EB567-80-1 E-Blocks Easy Internet Bundle

To setup your E-Blocks for use with the example programs you must perform the following actions:

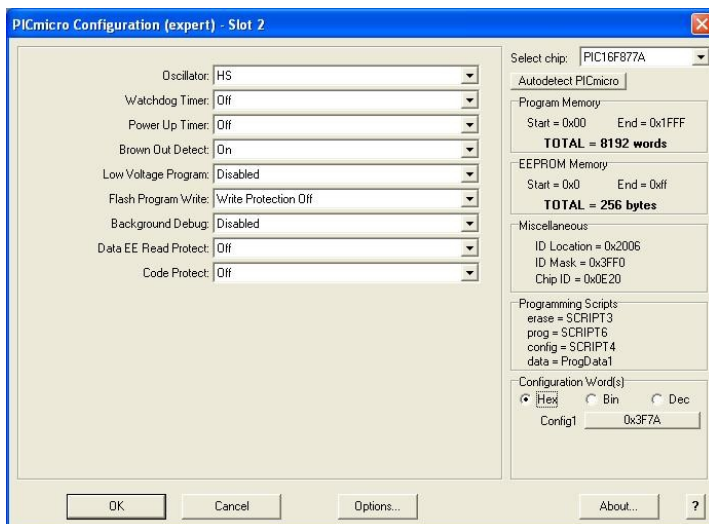
- Remove the 16F88 Device from the EB006;
- Insert the 16F877A into the EB006;
- Connect up the E-Blocks as shown on the right.
- The Internet, LCD and Switch E-Blocks all need to be connected to the +V on the EB006 via single core wire.
- Connect the Ethernet cable from the EB023 to the back of your computer or hardware router.



Before you can begin you must install the driver for the EB006 using the ELSAM CD or by visiting the Matrix TSL website: <http://www.matrixtsl.com>



The system can be tested by compiling and sending one of the example programs to the hardware. This is done by opening one of the example files in Flowcode and then clicking the compile to chip button.



The example Flowcode files contain a correct configuration so you will not have to modify the configuration to allow them to run on the hardware.

Any program you create from scratch will have to be configured as shown on the left. The configuration is specified by clicking the Chip -> Configure menu icon Flowcode and then if you need more options click the switch to expert config screen button.

Example file 1 is a good test file as it is probably the easiest way to confirm that all of your hardware is working correctly.

# TCP/IP & Webserver Components

## EB567-80-1 E-Blocks Easy Internet Bundle

The Flowcode TCP/IP or Webserver components can be added to your program by finding the component in the Peripheral section of the Flowcode component toolbar.

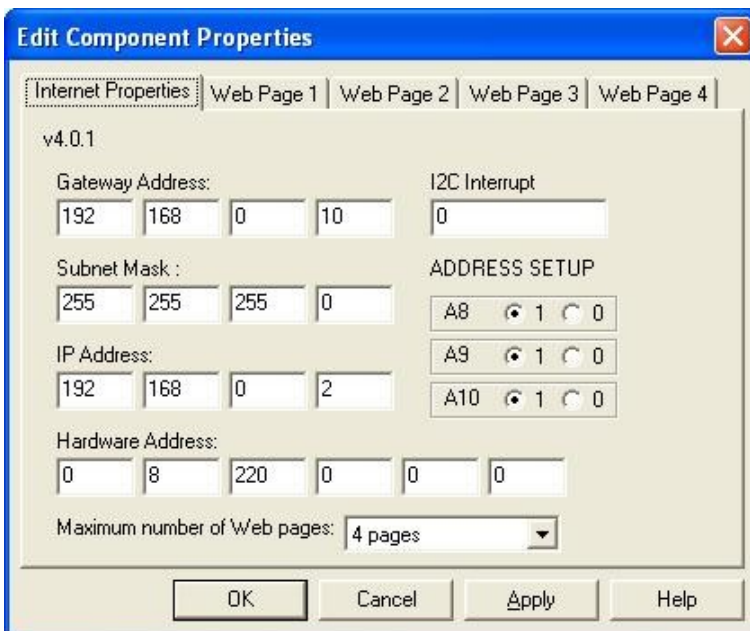


**TCP/IP Component Icon**

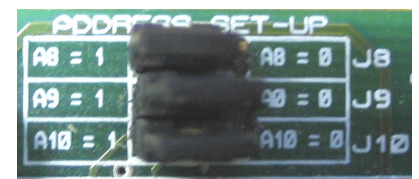


**Webserver Component Icon**

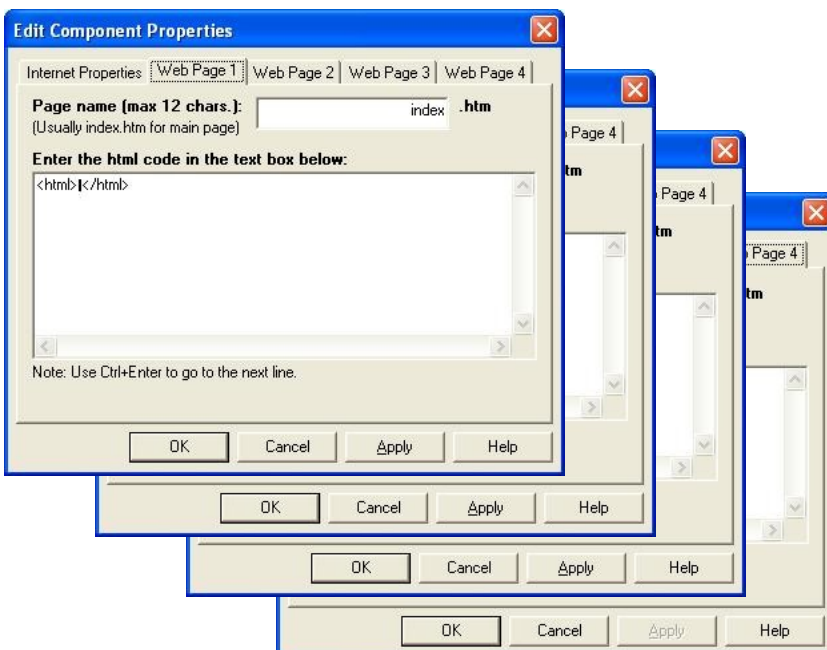
Once the component has been added to your program you will find that the component icon has been added to your panel.



The TCP/IP component and the Web-server component both share the same first property page. This sets up key features of the Internet E-Block such as the IP address, the subnet mask and the MAC address. The properties also include the pin used for the I2C / INT connection which is 0 by default. Finally there is the I2C device address that is defined by the jumpers on the Internet E-Block. This setting must match your E-Block setting or the I2C connection to the internet module will not function correctly.



The address on the board must match the settings in the properties

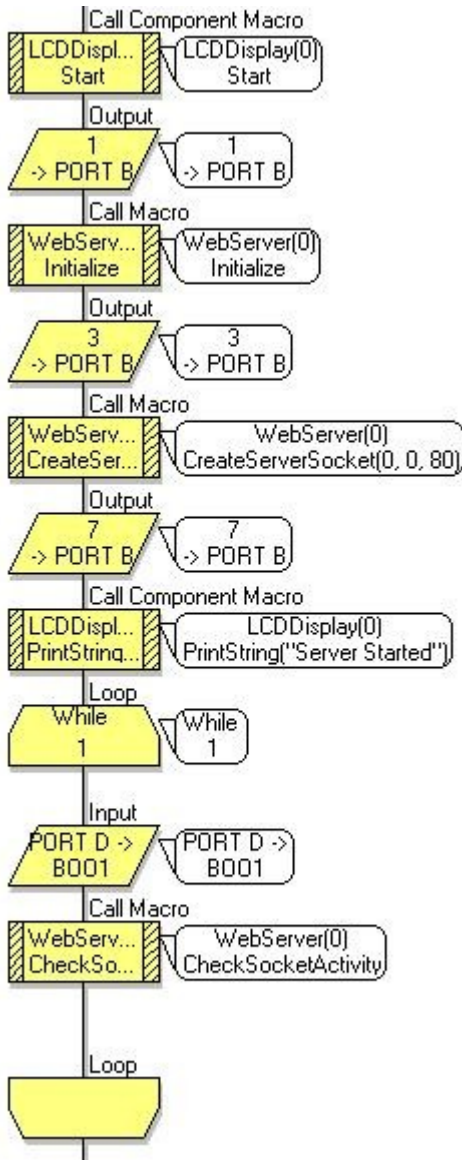


The webserver component also has a further four property pages to define the contents of the internet pages. The component is capable of hosting up to four internet html pages so you should put your html into these property pages. The URL name of the page is also defined on the respective property page. Javascript is also allowed in these HTML pages.

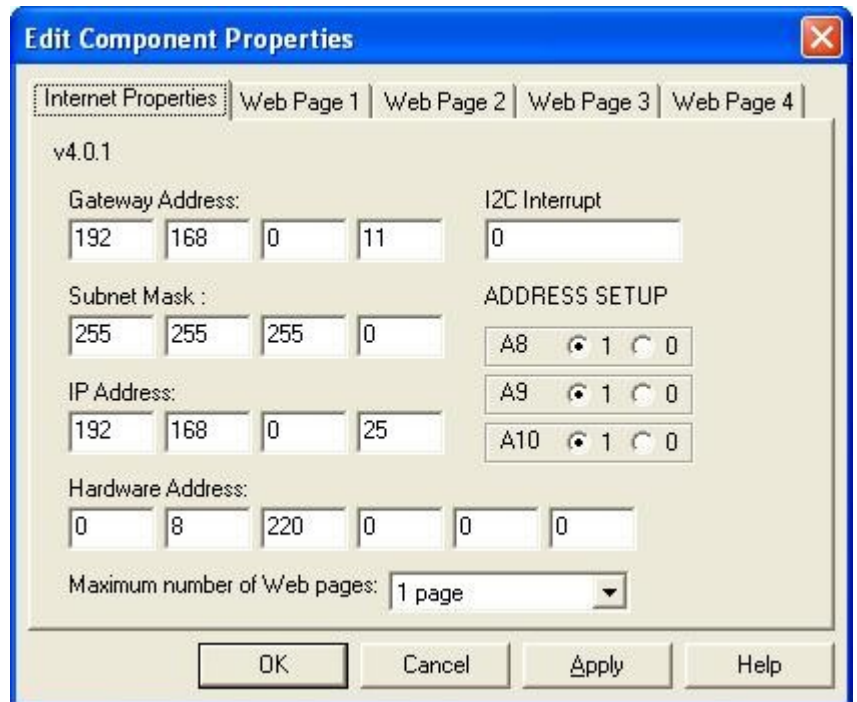
# Example 1

## EB567-80-1 E-Blocks Easy Internet Bundle

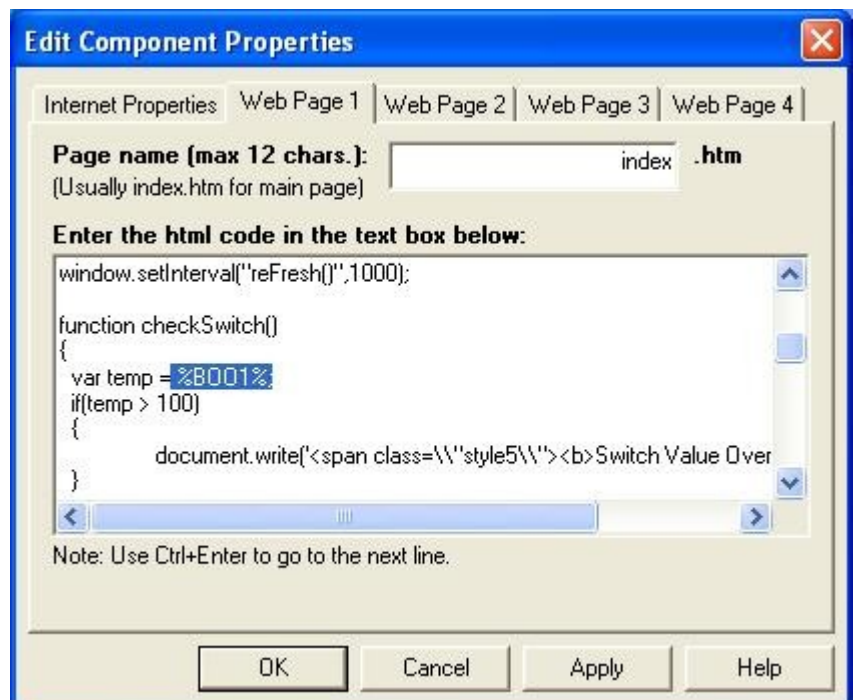
Example 1 demonstrates the usage of the Webserver component. The server is initialised and then the program enters a infinite loop where the value of the switch E-Block is read into variable BOO1. The CheckSocketActivity macro function must be called as part of the main program loop as this allows remote page requests to be detected and serviced.



Variables can be embedded into the HTML code by using percentage characters on either side of the variable name as shown on the right.

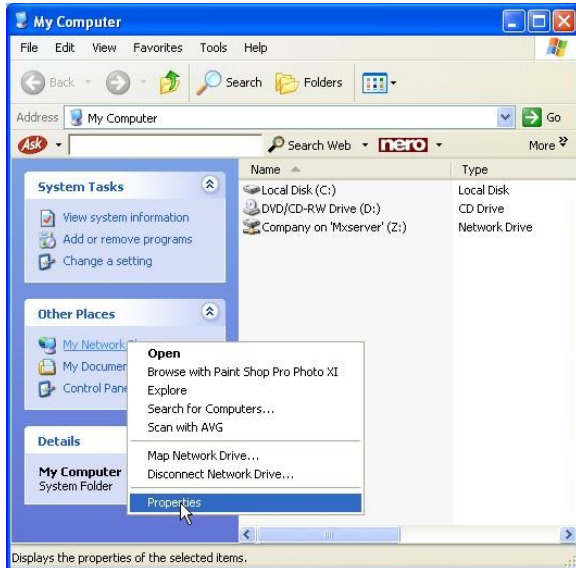


The IP address for the example is set to 192.168.0.25



# Example 1

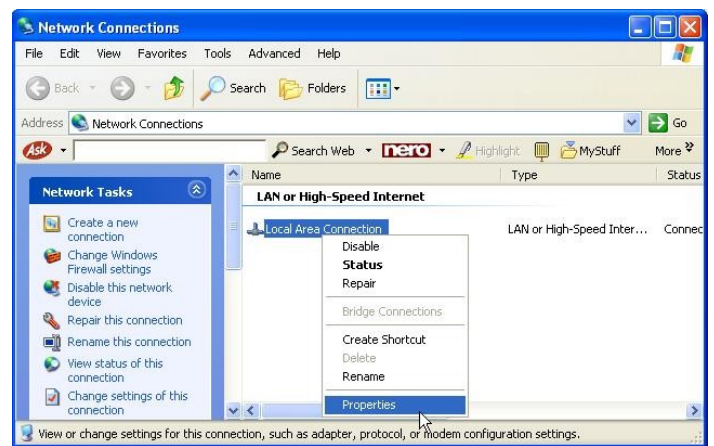
## EB567-80-1 E-Blocks Easy Internet Bundle



To configure your computer for use with the Web-server component you will have to ensure that your computers IP address is compatible with the Webserver's IP address. For an IP address to be compatible you will need to ensure that the first three numbers of the address match the first three numbers of the IP address used on the device.

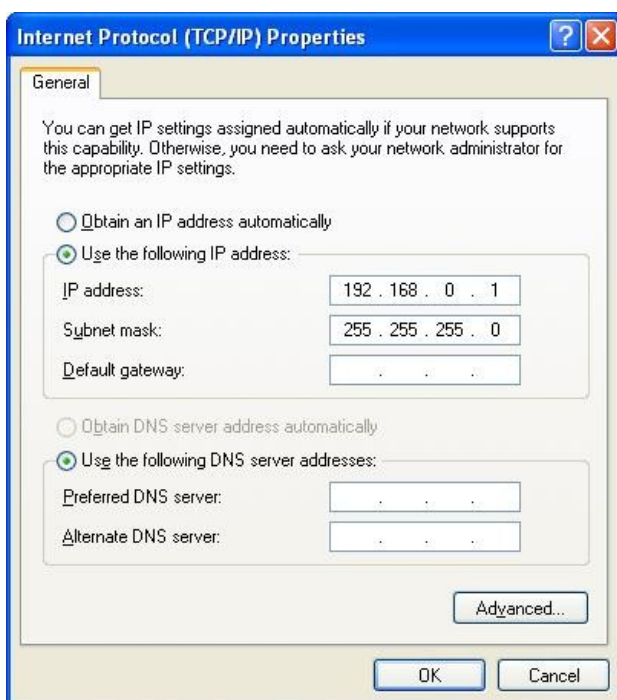
To manually change your IP settings on your computer start by right clicking my network places and selecting properties.

Here you will see your network adapters. Right click your local area connection and select properties.

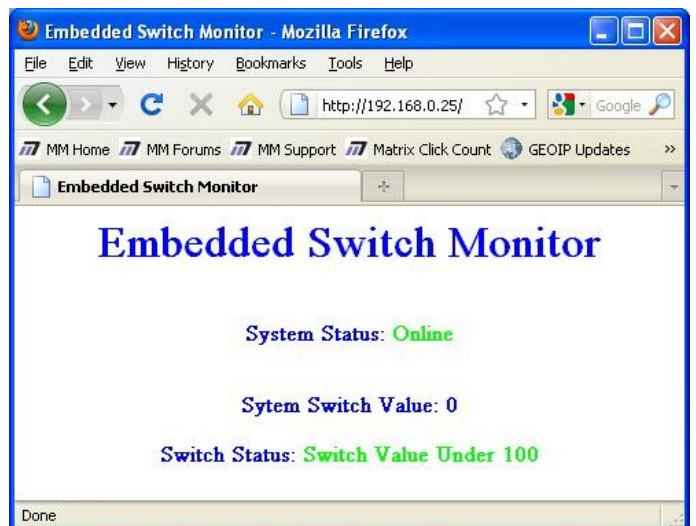


Then select the Internet Protocol (TCP/IP) and click properties.

Now you can manually specify your own IP address. Once you are finished click ok twice to close the dialogue windows.



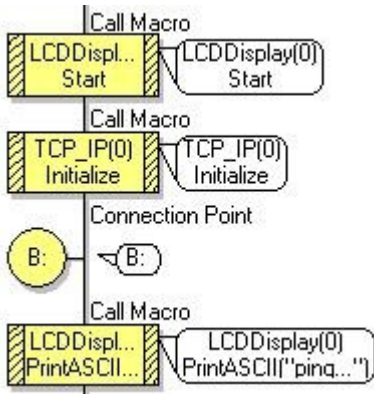
Once you have set up your IP address for use with the webserver you can simply type the address of the webserver into your internet browser. The page will then display your HTML code and automatically refresh using the javascript refresh function.



# Example 2

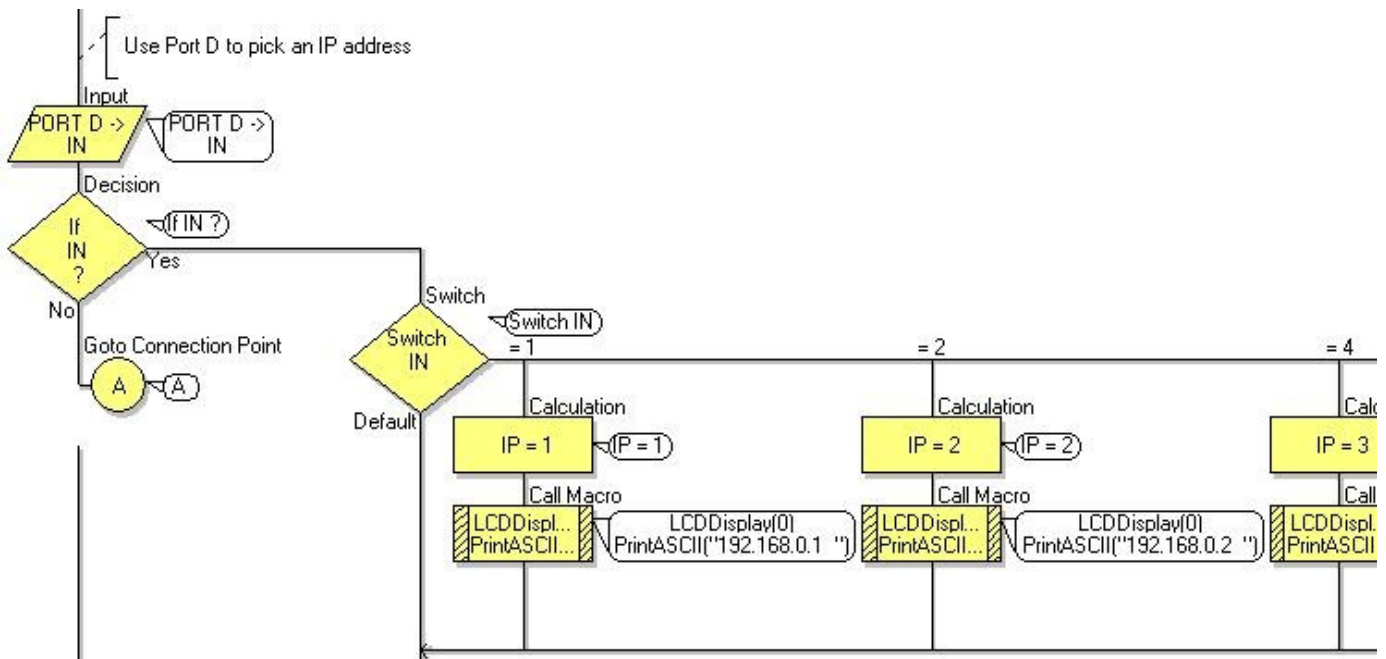
## EB567-80-1 E-Blocks Easy Internet Bundle

Exercise 2 uses the TCP/IP component and creates a simple ping system that can be used to detect if a particular IP address is being used on a network. This is useful to allow you to scan for computers on a network or simply to ensure an address is valid before we start sending data to it.



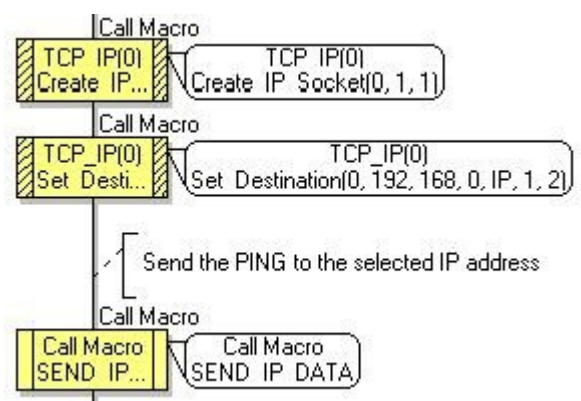
The program starts by initialising the LCD and the TCP/IP components to allow them to function correctly. We also define a connection point so we can jump back to the start of the program at any point.

Once the initialisation is out of the way the program then checks the switches for a button press. If no press is detected then the program loops back to the beginning to re-scan the switches. Once a switch press has been detected the last digit of the IP address to ping will be assigned.



Next we create a IP socket to carry the data and define the destination by passing the IP parameters to the Set\_Destination component macro.

The Send\_IP\_Data macro then uses the TX\_Start, TX\_SendByte and TX\_End component macros to send the ping data to the IP address.



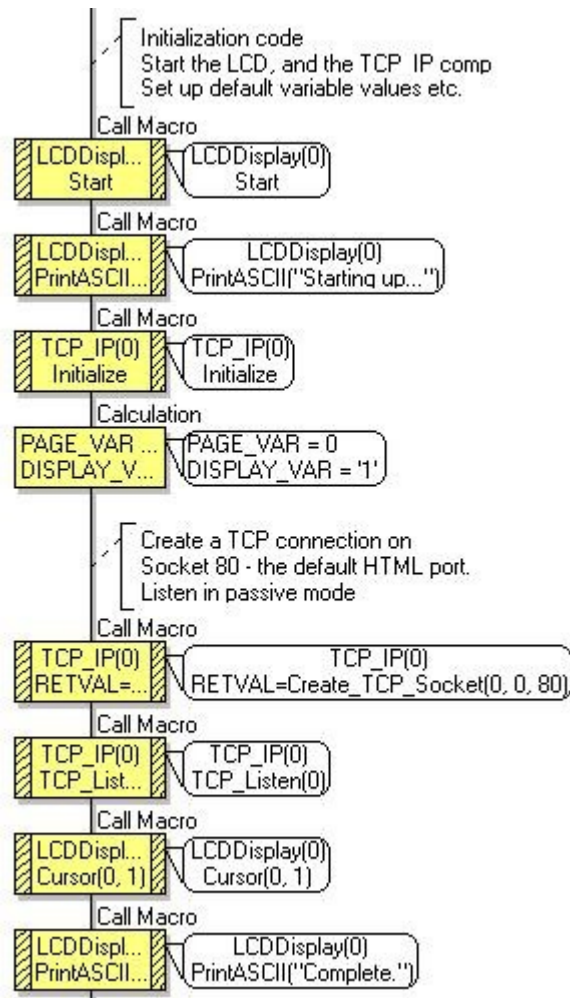




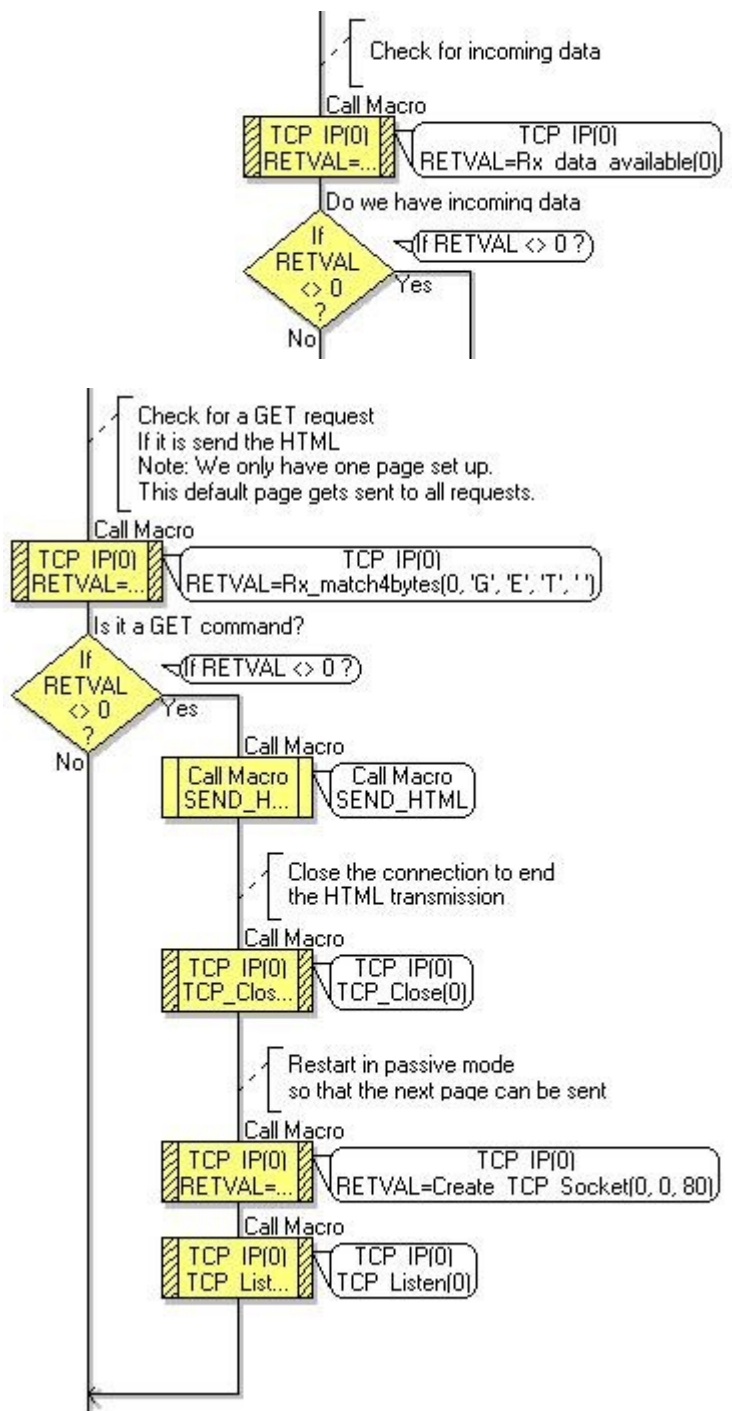
# Example 3

## EB567-80-1 E-Blocks Easy Internet Bundle

Exercise 3 demonstrates a broken down version of the Webserver component where we can parse the incoming requests, send html to a web browser and also echo the request data from the computer to the LCD.



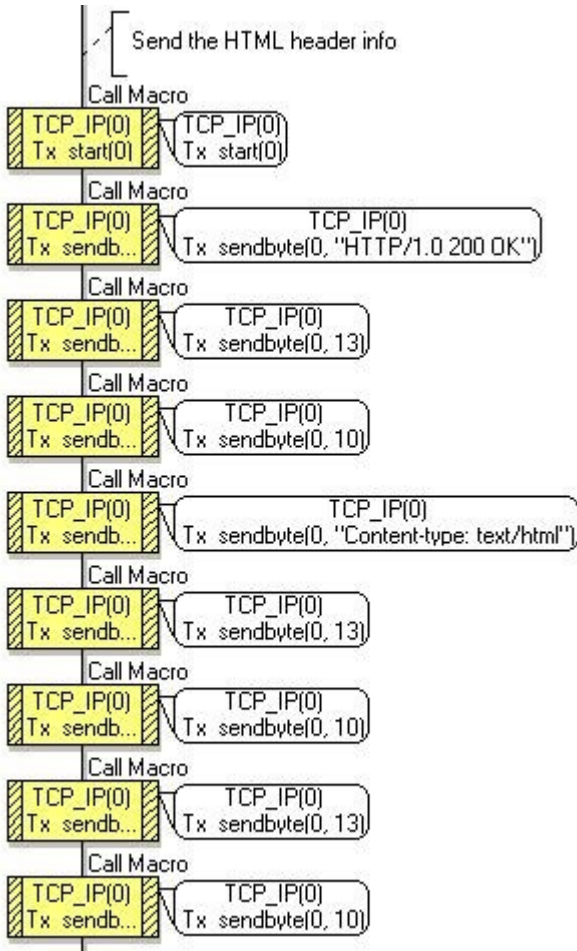
At the start of the program we initialise the Internet and LCD E-Blocks and then we create a socket attached to port 80 (standard browser port) and start a listener for any incoming request on that port.



If we receive incoming data then it is parsed using the RX\_Match4Bytes component macro. If the data is a GET instruction eg send from a web browser then we can use the Send\_HTML macro to forward HTML data to the remote computer.

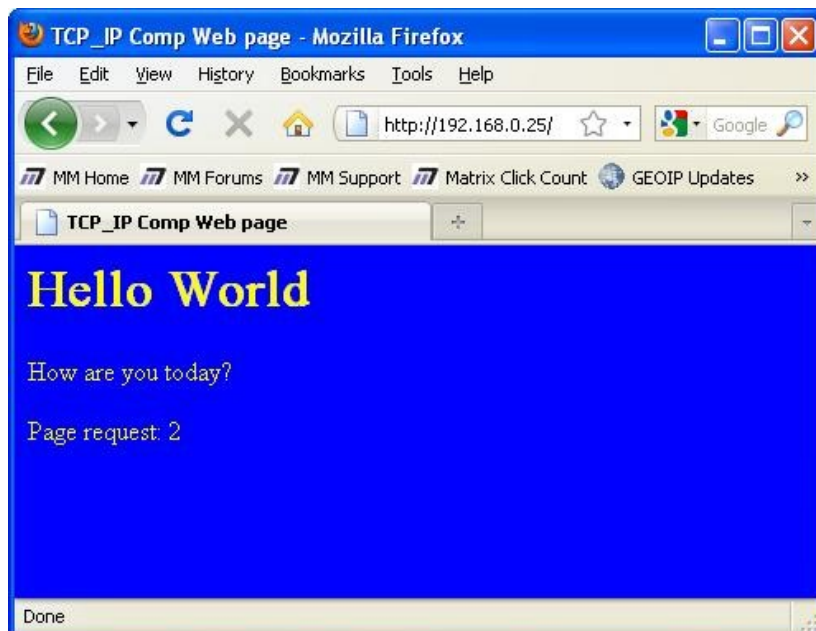
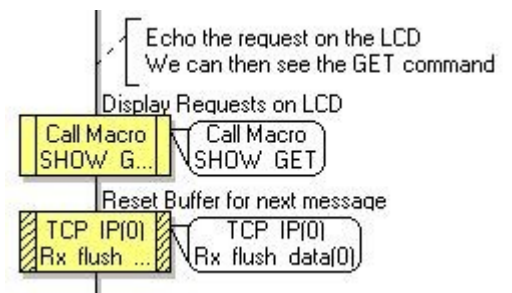
# Example 3

## EB567-80-1 E-Blocks Easy Internet Bundle



The HTML is sent out by using the TX\_Start, TX\_sendbyte and TX\_end macros. These macros all reference socket 0 that we created at the beginning of the program.

When we have finished sending out the data then we collect the remainder of the incoming request and forward it to the LCD.



To request the page from the embedded device you simply have to ensure that your computer has a compatible IP address by following the method shown in Example 1.

Once you have a compatible IP address setup on your computer you can request the html from the device by simply typing the IP address of the device into your internet browser.

# Troubleshooting

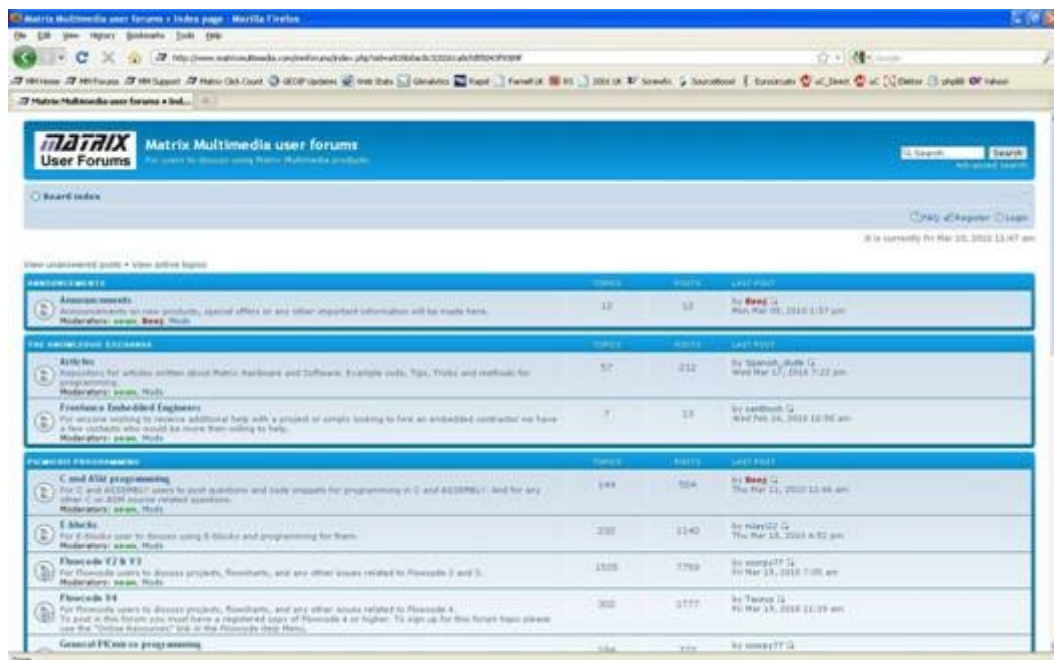
## EB567-80-1 E-Blocks Easy Internet Bundle

If you are having any problems getting up and running with any of the examples or any of the Flowcode components then the first port of call is to ensure you have your boards plugged together and wired correctly. As a rule of thumb any board with a screw terminal and a +V marking should be connected via a single core wire to the +V screw terminal on the corresponding Multiprogrammer.

If you do run into any problems then there is help and advice available from our online user forums located here:

<http://www.matrixsl.com/mmforums/>

The Articles section contains quite a few examples, as well as hints and tips to aid in your applications



There is also an online video demonstrating Flowcode, available from the videos section of our website: [http://www.matrixsl.com/lc\\_videos.php](http://www.matrixsl.com/lc_videos.php)

# Other Products

## EB567-80-1 E-Blocks Easy Internet Bundle

Matrix TSL is a leading global technology company. Over the years we have developed a portfolio of award-winning products which have applications in Education, Industry and in the home.

Learning is at the heart of much of what our company does, and the philosophy of all Matrix learning products is based on 'learning by doing'. Each year Matrix spends around 25% of turnover on research and development to ensure that our learning and development resources are world class.

### MIAC PLC

MIAC (Matrix Industrial Automotive Controller) is an industrial grade control unit which can be used to control a wide range of different electronic systems including sensing, monitoring and automotive. It has a number of applications in industry and learning.



### Formula Flowcode

Formula Flowcode is a robot vehicle which is used to teach robotics, and to provide a platform for competing in robotics events.



### ECIO



ECIO devices are powerful USB programmable microcontrollers with either 28 or 40 pin standard DIL (0.6") footprints. They are perfect for student use at home, project work and building fully integrated embedded systems.

### FlowKit

The FlowKit allows for in circuit debugging directly from within Flowcode. This is the same ICD debugging feature that is included with our version 7 EB006 Multiprogrammer boards.



### Flowcode + E-Block Technology bundles



Matrix TSL technology bundles are based on a combination of two of our most popular products, E-Blocks and Flowcode.



### Other bundles in the range

- Easy Mobile Communications Pack
- Easy Zigbee Pack
- Easy RFID
- Easy Internet
- Easy CAN Bus
- Easy GPS
- Easy USB
- Build your own PC Interface
- Build your own PLC
- Build your own Data-logger