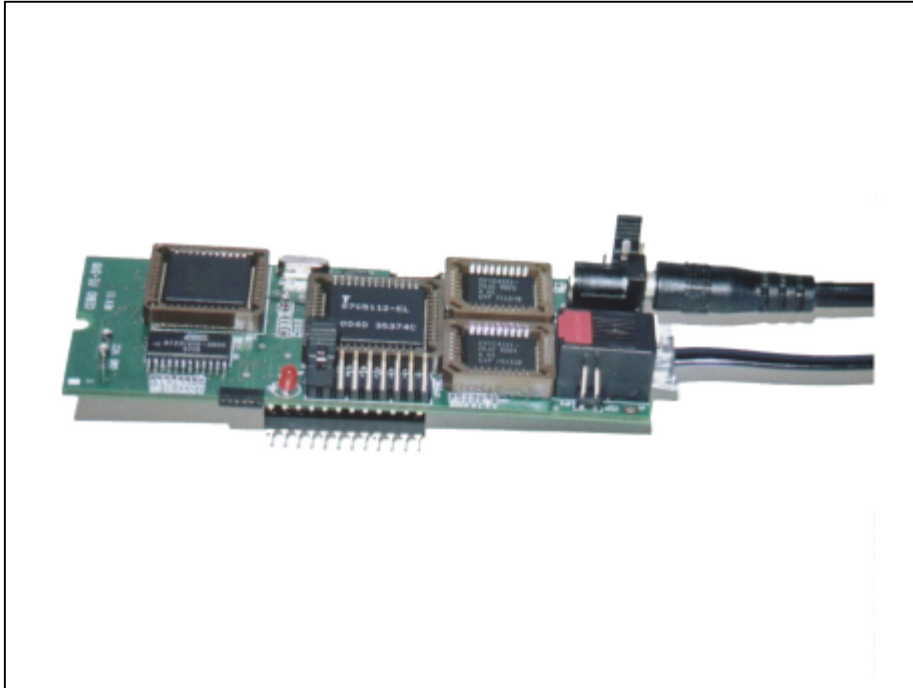


# ***CEIBO FE-5111***

## ***Development System***



*Development System for Atmel W&M T89C5111 Microcontrollers*

## **FEATURES**

- ❖ **Emulates Atmel W&M T89C5111**
- ❖ **4K Code Memory**
- ❖ **Real-Time Emulation and Trace**
- ❖ **Frequency up to 33MHz/5V**
- ❖ **ISP and X2 Mode Support**
- ❖ **MS-Windows Debugger For C And Assembler**
- ❖ **Emulation Headers and Signal Testpoints**
- ❖ **Target Board and Programmer Included**
- ❖ **Serially Linked to IBM PC at 115Kbaud**

## DESCRIPTION

Ceibo FE-5111 is a development system that supports ATMEL W&M T80C5111 microcontrollers with 6/12 clocks/cycle at any frequency allowed by the devices. It is serially linked to a PC or compatible systems and can emulate the microcontrollers using either the built-in clock generator or any other clock source connected to the microcontroller. Emulation is carried out by loading the system with the user software and an embedded monitor program. FE-5111 locates the monitor in the upper 4K of the code memory space. Two working modes are available: real-time and simulator. In the **real-time mode** the user software is executed transparently and without interfering with the microcontroller speed. Breakpoints can be added to stop program execution at a specific address. Real time trace is available. The **simulation mode does not implement all the chip options** and it is intended only for software debugging of the basic 8051 functions. **Use the system in emulation mode.** The simulation mode is used to debug the software without any hardware. FE-5111 may be disconnected while using the simulation mode. The software includes C and Assembler Source Level Debugger, On-line Assembler and Disassembler, Trace, Conditional Breakpoints and many other features. The system is supplied with Windows debugger software, RS-232 cable and a power supply.

**The system 2 main components are:**

1. FE-5111 - In-circuit Emulator
2. DB-5111 - Development Board

## SPECIFICATIONS

### SYSTEM MEMORY

FE-5111 provides 4K of code memory. This is all the available memory for the TT80C5111 low-pin-count microcontroller.

### REAL-TIME TRACE

FE-5111 provides 1K of instruction trace. This memory may optionally increased to 8K.

### BREAKPOINTS

Breakpoints allow real-time program execution until an opcode is executed at a specified address.

### WINDOWS DEBUGGER

The FE-5111 software includes a source level debugger for Assembler and high-level languages C and others with the capability of executing lines of the program while displaying the state of any variable. The debugger uses symbols contained in the absolute file generated by the

most commonly used Assemblers and High Level Language Compilers. The CEIBO Windows Debugger runs only under Windows 95 or later and also under Windows NT.

#### **KEIL $\mu$ VISION2 DEBUGGER**

***This debugger may also be used to operate the emulator.*** Some files have to be added to the original Keil package and those can be downloaded from [www.ceibo.com](http://www.ceibo.com).

#### **SUPPORTED MICROCONTROLLERS**

The system supports ATMEL W&M T80C5111 microcontrollers. The standard supported package for emulation is DIL-24. Other packages need mechanical adapters available from Ceibo.

#### **FREQUENCY**

FE-5111 runs from the clock source supplied by the user hardware or from the internal programmable clock generator, which can be set under software control. The minimum and maximum frequencies are determined by the emulated chip characteristics, 32KHz- 33MHz for the current silicon version.

#### **HOST CHARACTERISTICS**

PC or compatible systems with 8 MByte of RAM, one RS-232C interface card for the PC, Windows 95 or later.

#### **INPUT POWER**

5V-, 1.5A power supply supplied.

#### **MECHANICAL DIMENSIONS**

4cm x 10cm.

#### **ITEMS SUPPLIED AS STANDARD**

Development system including emulator, development board, DIP emulation header, Windows software with source level debugger, on-line assembler and disassembler, user's manual and RS-232 cable.

#### **HARDWARE DESCRIPTION - FE-5111 EMULATOR**

The first step required to work with the FE-5111 board is to be able to identify its different parts and to understand how the electronics function. This will help you to take full advantage of all the FE-5111 capabilities. On the bottom side of the FE-5111 you will see a phone jack. It is used to serially link the FE-5111 to your computer and to utilize the software in emulation mode instead of just the simulator. The emulation mode is used to interact with the hardware while the simulator is independent of any hardware connection. The RS-232 cable connections are given separately. On the right side of the RS-232 connector you will see the power jack (J2). You need to connect the 5V power supply to this jack. JP3 selects the operating voltage, that can be 3.3V or 5V. A built in DC to DC converter (VR1) provides the 3.3V, as

the power supply is 5V only. A POWER LED indicates whether or not the power is applied to the system. It is located on the left side of the emulator board (LD1). U1 is the microcontroller used for your emulation. It is placed on a 52-PLCC socket. The "bond-out" chip is T87C5112. On the other bottom side of the emulator board there is a DIL-24 plug, that you may connect to a target board or the development board supplied with the system. ***Make sure that pin #1 of the DIL plug is to pin #1 of your target.*** The emulator and plug are clearly marked (see emulator left upper corner).

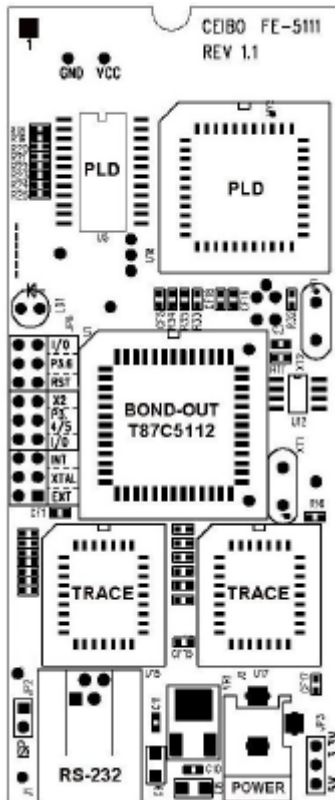


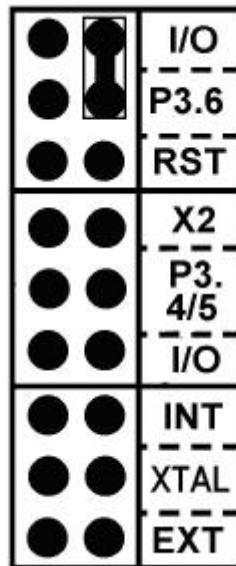
FIGURE 1: FE-5111 Emulator

JP2 is a connector necessary only for firmware updates. It is on the left bottom side. Make sure that the cap is ***not placed on it*** to work properly. If any firmware update will be necessary, follow the instructions that will come with it in [www.ceibo.com](http://www.ceibo.com). Two testpoints are available to check the power supply: Vcc and GND. ***Vcc from the emulator is disconnected in the emulator plug: Pin 7 of the T87C5111 emulator plug (on the bottom side of the emulator) is disconnected. Therefore, follow the instructions given in Chapter 2 before connecting the power supply to your target or to the emulator.*** JP2 is a connector necessary only for firmware updates. It is on the left bottom side. Make sure that the cap is ***not placed on it*** to work properly. If any firmware update will be necessary, follow the instructions that will come with it in [www.ceibo.com](http://www.ceibo.com).

## JUMPER SETUP - FE-5111 EMULATOR

FE-5111 has jumpers to select different options that cannot be set by means of software:

**Port 3.6 Selection** - Pin 8 in DIL-24: this pin can be I/O or RST. The jumper options are:



**FIGURE 2: P3.6 - I/O**

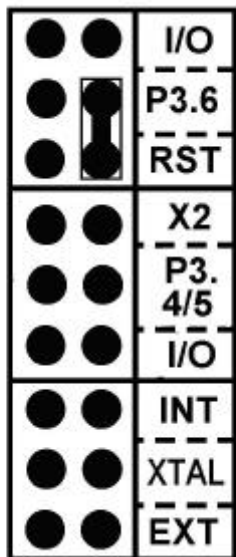


FIGURE 3: P3.6 - RST

**Port 3.4 and 3.5 Selection** - Pin 9 in DIL-24: this pin can be I/O or output the crystal oscillator (XTAL2). Both Pin 9 and 10 can be also I/O. The jumper options are:

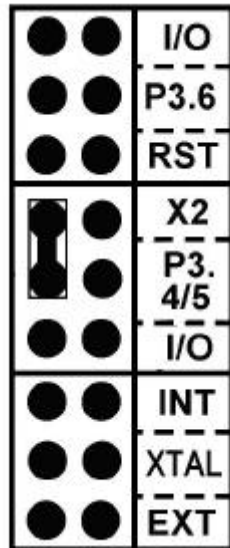


FIGURE 4: P3.5 - XTAL2 Output

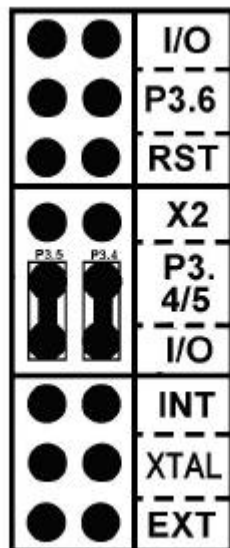


FIGURE 5: P3.4 and P3.5 - I/O

**Crystal Source Selection** - The emulator can get the crystal lines from Pin 9 and 10 (External - belonging to the target) or connected internally to the emulator clock generator. The two options setting are:

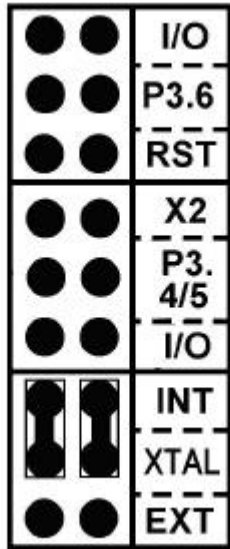


FIGURE 6: Internal XTAL

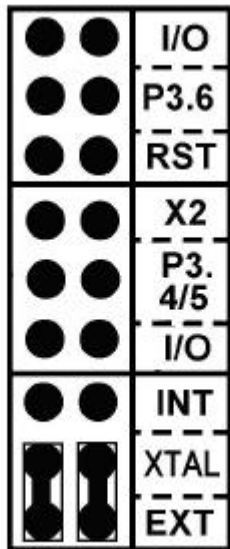


FIGURE 7: External XTAL

## HARDWARE DESCRIPTION - DB-5111 DEVELOPMENT BOARD

This board is supplied to be used as a possible target and to test your software. It provides the following functionality:

**1. Testpoints for Port Lines.** All the port lines (P1, P3 and P4) are accessible through these testpoints. Furthermore, some chip options can be defined by placing jumpers as in the emulator. These options are shown in the following Figure 1.9.

The available options are:

P3.4 and P3.5 - I/O or XTAL inputs: if the jumper is placed, then P3.4 and P3.5 are routed to the Oscillator Options circuit on the board, which is explained separately. Leaving open the lines, provides direct connection to I/O lines.

P3.6 - I/O or RST input: if the jumper is placed, then P3.6 routed to the on-board reset circuit, that is just a resistor and a capacitor. Leaving open the line, provides direct connection to I/O lines.

VREF - this testpoint is connected to pin 5 of the T87C5111 chip. If connecting the jumper to VPOT, then the built in VPOT potentiometer can be used to provide a voltage reference for analog to digital conversion. Otherwise, you can connect to the VREF pin any other voltage source.

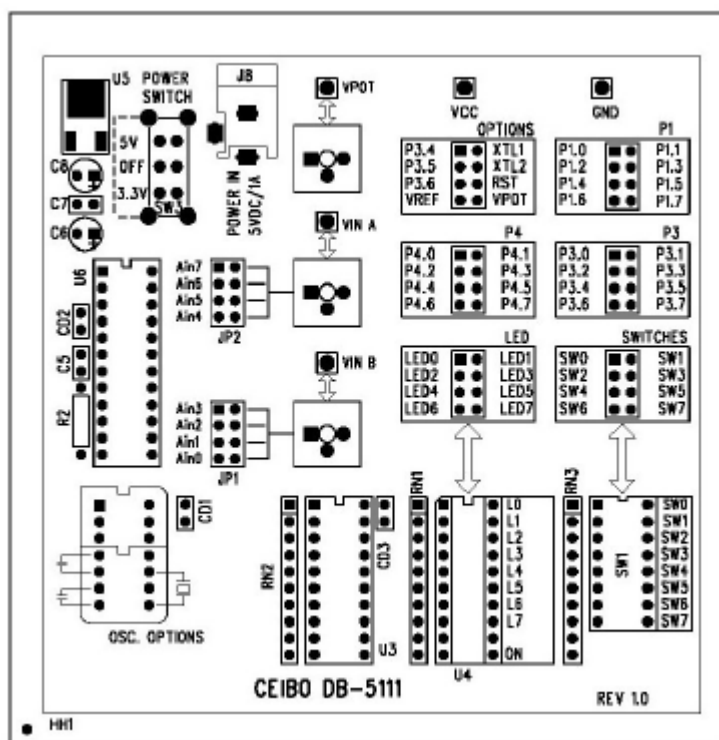


FIGURE 8: DB-5111 Development Board

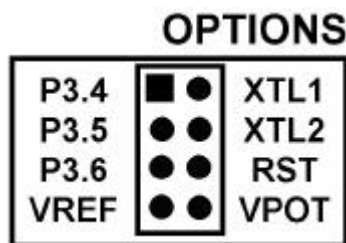


FIGURE 9: T87C5111 Options



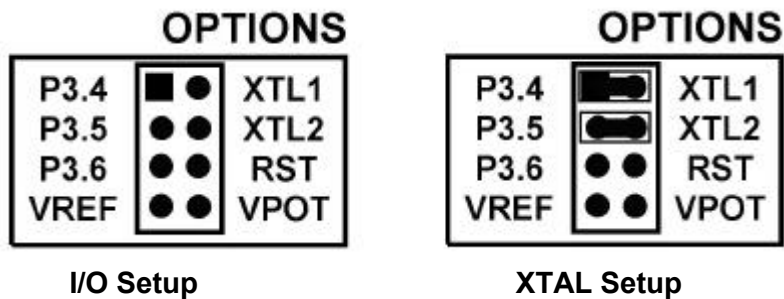


FIGURE 10: Port 3.4 and 3.5 Setup

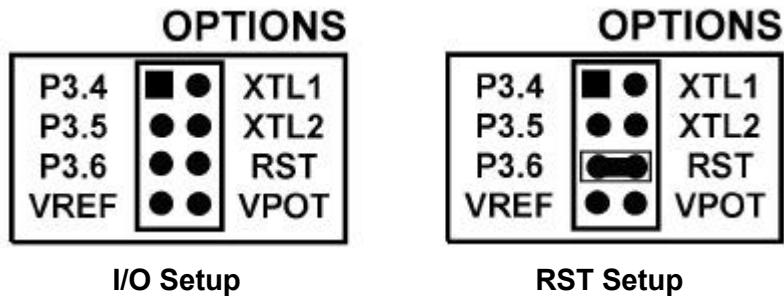


FIGURE 11: Port 3.6 Setup

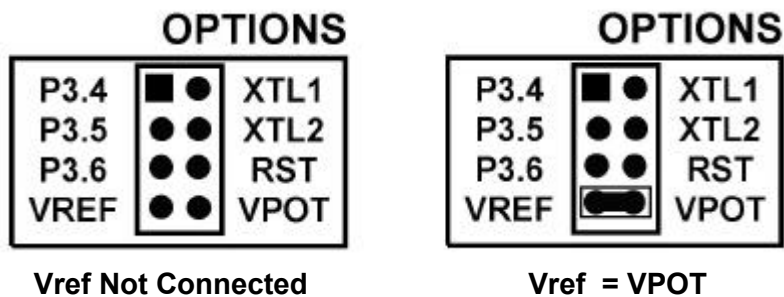


FIGURE 12: VREF Connection

**2. LEDs.** One LED is the ON/Off indicator while L0 to L7 can be used to display high-levels while connecting them to the Ports or other signals. An 8-pin jumper is supplied for that connection.

**3. Switches.** The SWITCHES connector provides logic states to input ports. The same supplied 8-wire ribbon cable can be used to connect the ports to the Switches, thus allowing to easily test your program.

**4. Sockets.** DIP and PLCC for microprocessors can be connected to this board. **You may connect FE-51RD2 emulator to PLCC-44 socket.** In such a case, make sure that U1 socket does not have a microprocessor on it.

**5. Power Switch.** The power switch is on the left side of the board. It has three positions: OFF, 3.3V and 5V. Although the input voltage is always 5V, the system has a built-in voltage regulator (U5) that drops the voltage to 3.3V if the switch is set accordingly. ***Use the power supply included in the system*** and connect it to the Power In jack (J8).

**6. Potentiometer** This 50KOhm potentiometer is used to get on TP1 analog input from 0 to Vcc (which is 3.3V or 5V according to the power switch position).

**7. Oscillator Options.** This board can be used to connect a full size crystal oscillator (16-DIP), half size (8-DIP) or a 2-pin crystal with capacitors as shown on the board.

**8. Analog Inputs.** Two potentiometers are provided to supply analog inputs: Vin-A and Vin-B. If any jumper cap is placed, the corresponding analog input will be connected to one of the two potentiometers.

## **EMULATION RESTRICTIONS**

The following restrictions are valid for FE-5111:

1. The program uses 3 Bytes of the internal stack memory.
2. The stack pointer may not be defined below address 7.
3. The first instruction (address 0000h) must be 3-bytes long. For example: use LJMP and not SJMP or AJMP as the first instruction.
4. Breakpoints cannot be set to the Reset Vector (address 0000h-0002h). Any other location is allowed, included inside interrupt service routines. Read more about breakpoint setting in Chapter 6.
5. The Simulator can simulate timers only in Timer Mode and while the Gate control is 0. Some other specific hardware and real-time functions may not be supported by the simulator and in any case the emulation mode is always recommended.
6. The simulation mode supports only the basic functions of the 8051 microcontrollers. Special registers and functions of some derivatives may be not supported in the simulation modes. Use the real-time mode for fully support of dedicated functions.

**FE-5111 - ORDERING INFORMATION**

<i><b>Item</b></i>	<i><b>Description</b></i>
FE-5111	Emulator for T89C5111
DB-5111	Development Board