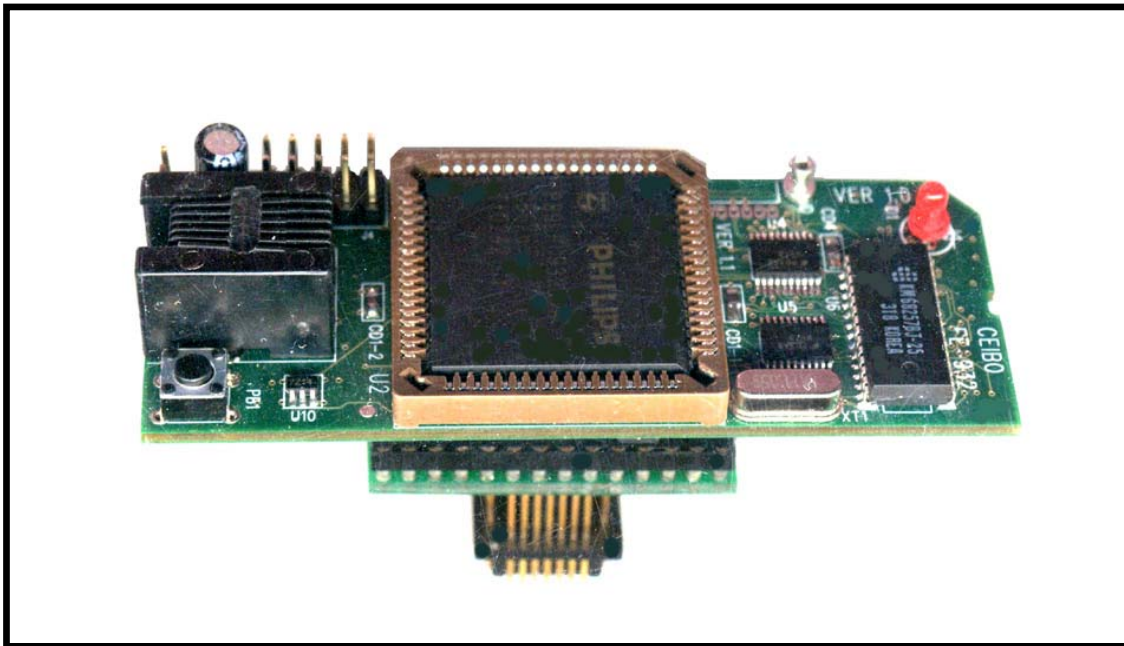


CEIBO FE-900 Development System



Development System for Philips/NXP P89LPC9xx Microcontrollers

FEATURES

- **Emulates Philips / NXP P89LPC9xx**
- **Real-Time and Transparent Emulation up to 18MHz**
- **8K or 16K Emulation Memory**
- **Real-Time Trace**
- **Uses Philips Bond-Out Technology**
- **Ceibo Windows Debugger**
- **High-Level Support for all C/C++ Compilers and Assemblers**
- **On-Line Assembler and Disassembler**
- **Target Board, ISP Programmer and Power Supply Included**
- **PLCC-28 Emulator Plug Included**
- **Serially Linked to PC at 115Kbaud**

DESCRIPTION

Ceibo FE-900 is a development tool that supports Philips Semiconductors /NXP P89LPC9xx microcontrollers at any frequency allowed by the devices. It is serially linked to a PC and can emulate the microcontrollers using any clock. Emulation is carried out by loading the system with the user software and using a special bond-out chip. All the 8K or 16K code (depending on the installed Bond-Out chip) are all available to the user. The system uses standard devices for real-time and transparent emulation. The emulator is not frequency or voltage restricted, so it can be used to emulate the microcontroller in the complete range of parameters defined by the device. 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. The simulation is intended only for software debugging of the basic 8051 functions. FE-900 may be disconnected while using the simulation mode. The software includes C and Assembler Source Level Debugger, On-line Assembler and Disassembler, a limited C Compiler and many other features. The system is supplied with MS-Windows debugger software, RS-232 cable power supply, mechanical adapters and other accessories.

SPECIFICATIONS

SYSTEM MEMORY

FE-900 provides 8K or 16K of code memory depending on the installed bond-out chip. This is all the available memory for the P89LPC9xx microcontroller.

BREAKPOINTS

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

WINDOWS DEBUGGER

The FE-900 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 XP or later and also under Windows NT.

SUPPORTED MICROCONTROLLERS

The system supports PHILIPS SEMICONDUCTORS / NXP P89LPC9xx microcontrollers. The standard supported package for emulation is PLCC-28. Other packages need mechanical adapters available from Ceibo.

FREQUENCY

FE-900 runs from programmable clock generator, which can be set under software control.

The minimum and maximum frequencies are determined by the emulated chip characteristics, up to $f_{max}=18\text{MHz}$ for the current silicon version.

HOST CHARACTERISTICS

PC or compatible systems with one RS-232C interface card for the PC, Windows 98 or later.

POWER

3.3V, 1.5A power supply supplied.

MECHANICAL DIMENSIONS

3cm x 8cm.

ITEMS SUPPLIED AS STANDARD

Development system including emulator, development board, PLCC-28 emulation header, ISP programmer, Windows software with source level debugger, on-line assembler and disassembler, user's manual, power supply and RS-232 cable. Power cord is not included. Other mechanical adapters are optional.

PARTS OF THE SYSTEM

1. FE-900 - In-circuit Emulator
2. DB-LPC900 - Development Board
3. MP-LPC900 - ISP Programmer

HARDWARE DESCRIPTION

FE-900 EMULATOR

The first step required to work with the FE-900 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-900 capabilities.

On the bottom side of the FE-900 you will see a phone jack. It is used to serially link the FE-900 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.

A POWER LED indicates whether or not the power is applied to the system. It goes ON for a while when powering up the system. Then, it indicates three states:

LED OFF: the emulation is halted.

LED ON: the emulator executes the user code.

LED BLINKING: error condition.

On the other bottom side of the emulator board there is a DIP-28 plug, that you may connect to PLCC-28 adapter supplied with the system or directly to the development board, also supplied with the system. ***Make sure that pin #1 of the PLCC plug is to pin #1 of your target.*** The emulator and plug are clearly marked (see emulator left upper corner).

JP1 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.

DB-900 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. Please note that ***Port 0 is open-drain*** and if you want to see a high level on these lines you must ***add pull-up resistors***.

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-900 emulator to DIP-40 socket using the supplied 28-DIP to 40-DIP socket converter.*** 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 (which actually is also set to 3.3V for the P89LPC9xx support). Although the input voltage is always 5V, the system has a built-in voltage regulator (U5) that drops the voltage to 3.3V. ***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. ISP Connector. J7 is an ISP connector that can be used directly with MP-LPC900 programmer to program the microcontroller installed on the 40-DIP socket through the socket converter. A 10-pin ribbon cable is supplied for this purpose.

8. 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.

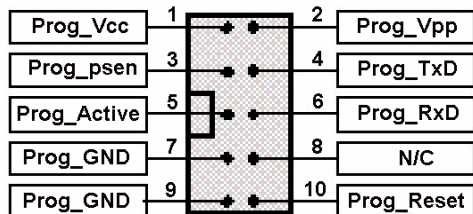


FIGURE 1.2: ISP CONNECTOR

9. Future Options. The board is prepared to be used with future derivatives, as shown on J9 connector. Additional frequency options for new derivatives are prepared with C1, C2 and Y1 crystal placements.

MP-900 PROGRAMMER

This small board contain the RS-232 interface to ISP signals. Use it together with the supplied 10-pin ribbon cable and the software driver available from Philips Semiconductors website.

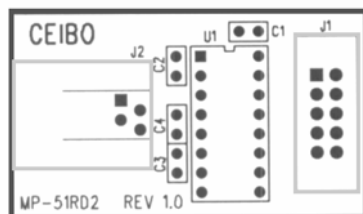


FIGURE 1.3: MP-LPC900 PROGRAMMER

EMULATION RESTRICTIONS

The following restrictions are valid for FE-LPC900:

1. The stack pointer may not be defined below address 7.
2. 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-900 - ORDERING INFORMATION

Specify the required bond-out chip while ordering FE-900, according to the device to be emulated, as given in the following table. Currently there are 3 available options: LPC932, LPC936 and LPC938:

Emulated Chip	Package	Package Description	Number of pins	Bondout	EEPROM	Memory size	Operating frequency
P89LPC901FD	SOT96-1	SO8	8	LPC932		1K	0~18
P89LPC901FN	SOT97-1	DIP8	8	LPC932		1K	0~18
P89LPC902FD	SOT96-1	SO8	8	LPC932		1K	7.3728
P89LPC902FN	SOT97-1	DIP8	8	LPC932		1K	7.3728
P89LPC903FD	SOT96-1	SO8	8	LPC932		1K	7.3728
P89LPC9103FTK	SOT650-1	HVSON10	10	LPC938		1KB	0-18
P89LPC9107FDH	SOT402-1	TSSOP14	14	LPC938		1KB	0-18
P89LPC912FDH	SOT402-1	TSSOP14	14	LPC932		1K	0~12
P89LPC912HDH	SOT402-1	TSSOP14	14	LPC932		1K	0~12
P89LPC913FDH	SOT402-1	TSSOP14	14	LPC932		1K	0~12
P89LPC915FDH	SOT402-1	TSSOP14	14	LPC938		2K	0~IRC
P89LPC916FDH	SOT403-1	TSSOP16	16	LPC938		2K	0~IRC
P89LPC917FDH	SOT403-1	TSSOP16	16	LPC938		2K	0~IRC
P89LPC920FDH	SOT360-1	TSSOP20	20	LPC932		2K	0~12
P89LPC921FDH	SOT360-1	TSSOP20	20	LPC932		4K	0~12
P89LPC922FDH	SOT360-1	TSSOP20	20	LPC932		8K	0~12
P89LPC922FN	SOT146-1	DIP20	20	LPC932		8K	0~12
P89LPC924FDH	SOT360-1	TSSOP20	20	LPC938		4K	0~12
P89LPC925FDH	SOT360-1	TSSOP20	20	LPC938		8K	0~12
P89LPC930FDH	SOT361-1	TSSOP28	28	LPC932		4K	0~12
P89LPC931FDH	SOT361-1	TSSOP28	28	LPC932		8K	0~12
P89LPC932A1FA	SOT261-2	PLCC28	28	LPC932		8K	0~12
P89LPC932A1FDH	SOT361-1	TSSOP28	28	LPC932		8K	0~12
P89LPC932A1FHN	SOT788-1	HVQFN28	28	LPC932		8K	0~12
P89LPC933FDH	SOT361-1	TSSOP28	28	LPC936		4K	0~12
P89LPC934FDH	SOT361-1	TSSOP28	28	LPC936		8K	0~12
P89LPC935FA	SOT261-2	PLCC28	28	LPC936		8K	0~12
P89LPC935FDH	SOT361-1	TSSOP28	28	LPC936	512	8K	0~12
P89LPC935FHN	SOT788-1	HVQFN28	28	LPC936		8K	0~12
P89LPC936FA	SOT261-2	PLCC28	28	LPC936	512	16KB	0~12
P89LPC936FDH	SOT361-1	TSSOP28	28	LPC936	512	16KB	0~12
P89LPC9381FA	SOT261-2	PLCC28	28	LPC938		4KB	0~18
P89LPC9381FDH	SOT361-1	TSSOP28	28	LPC938		4KB	0~18
P89LPC938FA	SOT261-2	PLCC28	28	LPC938		8KB	0~18
P89LPC938FDH	SOT361-1	TSSOP28	28	LPC938		8KB	0~18
P89LPC938FHN	SOT788-1	HVQFN28	28	LPC938		8KB	0~18