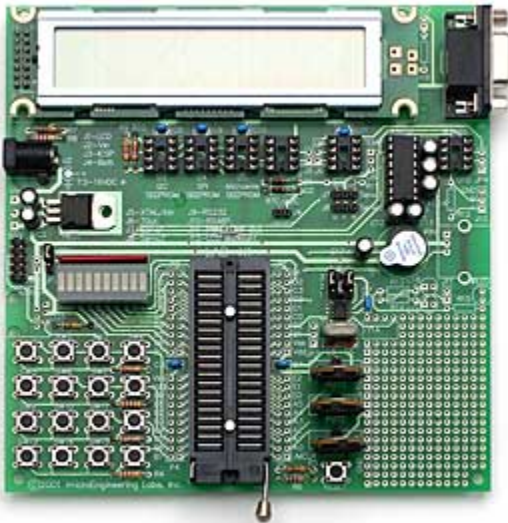


MICROENGINEERING PIC DEVELOPMENT BOARD-LAB-X1.



The LAB-X1 is microEngineering Labs, Inc.'s first pre-assembled experimenter's platform. While [PICPROTO](#) boards allow you to create your own projects with a minimum of hassle, the LAB-X1 goes one step further. It provides an assembled testbed containing most of the circuitry commonly used with PICmicro® microcontrollers (MCUs).

The LAB-X1 contains the circuitry required by the PICmicro to operate: 5-volt power supply, oscillator, reset circuit, as well as additional application circuits. The crystal controlled oscillator includes jumpers to set speeds of 4MHz, 8MHz, 10MHz, 12MHz, 13.32MHz, 16MHz and

20MHz.

Application circuits include a switch matrix, potentiometers, LEDs, LCD module, serial EEPROMS*, real time clock*, temperature sensors*, servo connectors, RS232 interface, RS485 interface*, IR interface* and speaker. A prototyping area is also included in case we missed your favorite circuit.

Many different projects may be created using the LAB-X1. Some examples include calculators, LCD clock, digital thermometer, LCD backpack, tone dialer, TV remote control and many more. The LAB-X1 can run programs written in assembler, C and [PICBASIC™](#) or [PICBASIC PRO™](#).

The LAB-X1 includes [in-circuit programming](#) connectors so the resident PICmicro MCU may be reprogrammed on the fly (requires flash device) using programmers that support this feature. Because the LAB-X1 itself is not a programmer, a separate PICmicro microcontroller programmer, such as the [melabs Serial Programmer](#) is required to program a PICmicro MCU.



NEW! Connect to the Microchip ICD or ICD2!

ICD to 10-pin Ribbon Adapter

All of the PICmicro MCU I/O pins are brought out to headers next to a 40-pin ZIF socket. This allows connection to off-board circuits as well as allowing on-board circuits to be connected to other pins, if desired. The LAB-X1 is designed to work with 40-pin PICmicro MCUs, but may be jumpered to work with smaller devices. It is recommended



the LAB-X1 be used with the 40-pin [PIC16F877A](#) (available separately). This flash device has 8K of code space, 33 I/O pins, 8 ADC channels and may be reprogrammed again and again.

Features:

- Inputs: 16 switch keypad, 3 potentiometers, IR, temperature, real time clock
- Outputs: LED bargraph, 2x20 LCD module, speaker, DTMF, PWM, IR, 2 RC servo connectors
- I/O: RS232 interface, RS485 interface
- Serial EEPROM: I2C, SPI, Microwire
- Misc: Reset button, 5-volt regulator, 40-pin ZIF socket for PICmicro MCU (device optional)
- Jumper selectable oscillator from 4MHz to 20MHz
- In-circuit programming/debug connectors
- Prototyping area for additional circuits
- Available assembled, as a kit or as a bare PCB
- Size is 5.5" x 5.6"

Inc.'s first pre-assembled experimenter's platform. While [PICPROTO](#) boards allow you to create your own projects with a minimum of hassle, the LAB-X1 goes one step further. It provides an assembled testbed containing most of the circuitry commonly used with PICmicro® microcontrollers (MCUs).

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Application circuits include a switch matrix, potentiometers, LEDs, LCD module, serial EEPROMS*, real time clock*, temperature sensors*, servo connectors, RS232 interface, RS485 interface*, IR interface* and speaker. A prototyping area is also included in case we missed your favorite circuit.



MICROENGINEERING EXPERIMENTER BOARD-LAB-X2.



The LAB-X2 Experimenter Board combines the convenience of the LAB-X1 with the simplicity and flexibility of the PICPROTO™ boards.

The LAB-X2 contains the circuitry required by the PICmicro® MCU to operate: 5-volt power supply, oscillator, reset circuit, as well as an RS-232 serial port and basic analog and digital I/O. Both 40 and 28-pin DIP microcontrollers are accommodated. All of the pins on the MCU are wired to a 40 pin connector which can be used to connect your prototype circuitry.

The LAB-X2 can run programs written in assembler, C and PICBASIC™ or PICBASIC PRO™. The [in-circuit programming](#) connector allows the resident PICmicro MCU to be reprogrammed on the fly (requires flash device) using programmers that support this feature like our [melabs Serial Programmer](#).



It is recommended the LAB-X2 be used with the 40-pin PIC16F877 or the 28-pin PIC16F876 (available separately). These flash devices may be reprogrammed again and again.

Since you build your project on a separate protoboard, you can use the LAB-X2 for concurrent development of several projects without the hassle of disassembly or the expense of multiple development boards. Just reprogram the X2 and move it to the next project.

The interface connector on the X2 will also accept individual wires, allowing you to use solderless circuit strips for quick, easy prototyping.

The LAB-X2 is available in either assembled or bare PCB form. A parts list and schematic are included.



Features:

- Inputs: 3 pushbuttons, 1 potentiometer
- Outputs: 3 LEDs, 1 RC servo connector
- I/O: RS232 interface
- Misc: Reset button, 5-volt regulator, 4MHz crystal oscillator
- In-circuit programming connector
- Prototyping area for additional circuits
- Available assembled as a bare PCB
- Size is 4.9" x 2.25"



MICROENGINEERING EXPERIMENTAL BOARD-LABX3



The new LAB-X3 is microEngineering Labs, Inc.'s newest experimenter's platform. It provides a full complement of hardware peripherals for an 18-pin microcontroller such as the PIC16F84 or PIC16F628.

The LAB-X3 contains the circuitry required by the PICmicro® MCU to operate: 5-volt power supply, oscillator, reset circuit, as well as an RS-232 serial port, 2-line x 20-character LCD module, and basic analog and digital I/O. The board is designed to accommodate 18-pin MCUs, including the popular PIC16F84A and the new PIC16F62x.

Many different projects may be created using the LAB-X3. Some examples include LCD clock, servo controller, LCD backpack, and many more. The LAB-X3 can run programs written in assembler, C and PICBASIC™ or PICBASIC PRO™. Sample programs are included.

The [in-circuit programming](#) connector allows the resident PICmicro MCU to be reprogrammed on the fly (requires flash device) using programmers that support this feature like our [melabs Serial Programmer](#). It is recommended the LAB-X3 be used with the 18-pin [PIC16F648A or PIC16F84A](#) (available separately). These flash devices may be reprogrammed again and again.



Connect to the Microchip ICD or ICD2!

[ICD to 10-pin Ribbon Adapter](#)

The LAB-X3 is available in either assembled or bare PCB form. A parts list and schematic are included.

Note: The 16F87 and 16F88 USART pins do not match the connections on the LAB-X3.

The [PIC16F648A](#) or [PIC16F84A](#) is recommended.



Features:

- Inputs: 1 pushbutton, 1 potentiometer
- Outputs: 2 LEDs, 1 RC servo connector, 2x20 LCD module
- I/O: RS232 interface
- Misc: Reset button (may be programmed as input with the 16F62x MCUs), 5-volt regulator, 4MHz crystal oscillator
- In-circuit programming connector
- Prototyping area for additional circuits
- Available assembled as a bare PCB

Size is 4.9" x 3.30"



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MICROENGINEERING EXPERIMENTAR BOARD-LABX4.

The new LAB-X4 is microEngineering Labs, Inc.'s newest experimenter's platform. It provides a full complement of hardware peripherals for an 8-pin microcontroller such as the PIC12F675 or a 14-pin like the PIC16F676.



The LAB-X4 contains the circuitry required by the PICmicro® MCU to operate: 5-volt power supply, oscillator, reset circuit, as well as an RS-232 serial port, 2-line x 20-character LCD module, and basic analog and digital I/O.

Many different projects may be created using the LAB-X4. Some examples include LCD clock, servo controller, LCD backpack, and many more. The LAB-X4 can run programs written in assembler, C and PICBASIC™ or PICBASIC PRO™. Sample programs are included.

The [in-circuit programming](#) connector allows the resident PICmicro MCU to be reprogrammed on the fly (requires flash device) using programmers that support this feature like our [melabs Serial Programmer](#). It is recommended the LAB-X4 be used with the 8-pin [PIC12F675](#) or 14-pin [PIC16F676](#) (available separately). These flash devices may be reprogrammed again and again.



NEW! Connect to the Microchip ICD or ICD2!

[ICD to 10-pin Ribbon Adapter](#)

The LAB-X4 is available in either assembled or bare PCB form. A parts list and schematic are included.

The [PIC12F675](#) or [PIC16F676](#) are recommended.



Features:

- 14-pin dip socket for 8- or 14-pin PICmicro MCU
- 5-volt regulator
- Reset/push button
- Potentiometer
- LED plus power LED
- 2 line by 20 character LCD module
- LCD serial controller
- RS232 interface
- EPIC™ in-circuit programming connector
- Layout for oscillator
- Layout for I2C serial EEPROM
- Prototyping area for additional circuits RS232 interface
- EPIC™ in-circuit programming connector
- Layout for oscillator
- Layout for I2C serial EEPROM

Prototyping area for additional circuits

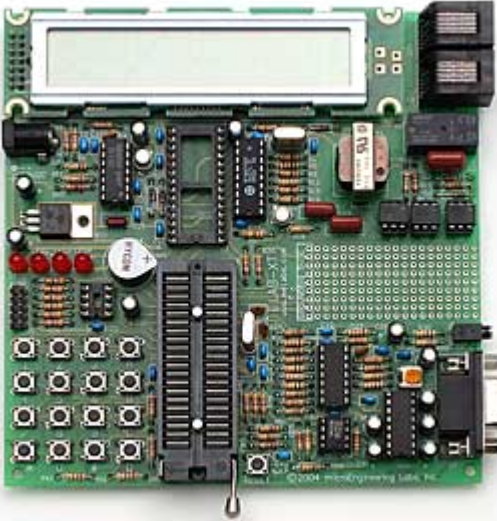


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MICROENGINEERING EXPERIMENTAL BOARD-LAB-XT

The LAB-XT Experimenter Board is perfect for those interested in telephony and telephone projects. It is pre-assembled with the most popular telephony functions.



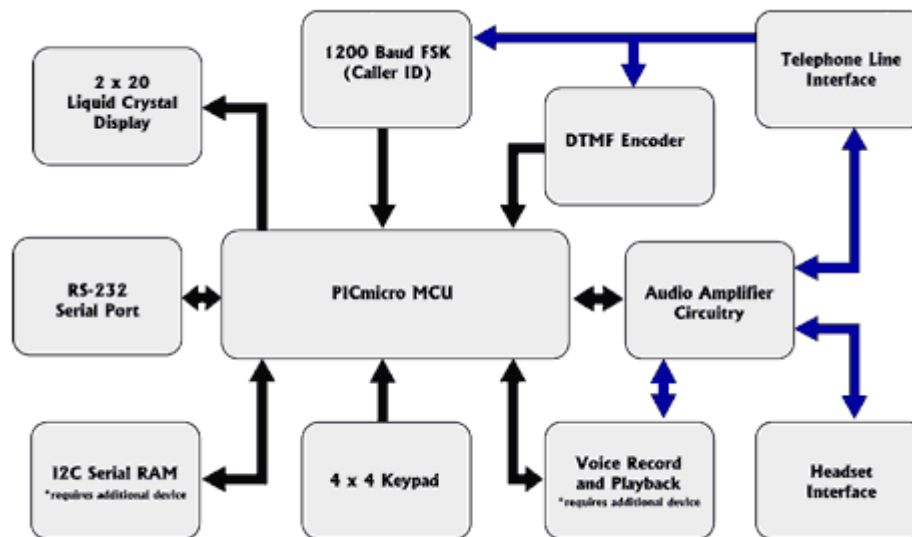
PICBASIC PRO™ sample programs are included to help you learn how each section of hardware operates. (Since the LAB-XT is designed with a 20MHz clock, use with the standard PICBASIC™ Compiler is not recommended.)

The LAB-XT is designed specifically for experimenting with telephony devices. It includes the circuitry needed to interface to a standard, loop-start telephone line, or POTS line.

The LAB-XT is meant to be used as a development tool only. Although the circuitry is fully compatible, it is not certified by any regulatory agency for connection to a telephone network. Development should be performed using telephone line simulators for testing. Should you decide to ignore this warning, microEngineering Labs, Inc. accepts no liability for fines or damages resulting from unauthorized connection to a telephone network.

Many projects are possible including telephone, digital answering machine, call forwarder, callback device, caller ID terminal, telemarketing blocker, DTMF remote control, DTMF digit grabber, call data recorder, and more.





LAB-XT Block diagram

The LAB-XT line interface is fully isolated with a transformer and opto-isolators. It senses loop current and ring signal, and is equipped with a relay-switched load that allows the MCU to switch the line off-hook and on-hook.

DTMF digits are received with a dedicated IC (MT8870), which the MCU can then query for the dialed digit information. The LAB-XT can send and receive both DTMF and pulse-dialed numbers.

An FSK device (NJM2211) receives caller id information and converts it to 1200 baud serial which the MCU can read. PICBASIC PRO sample programs are provided that show how to interpret the received caller information string.

A 2x20 LCD module allows you to display user prompts and caller id. A PC-mounted speaker is included, allowing audible ring tones. Red LEDs are provided for status indication and debug purposes.

The 4x4 keypad matrix can be used for control and can be configured as a standard telephone keypad. PICBASIC PRO sample programs demonstrate keypad dialing.

The built-on audio amp is capable of driving a headset (headset not included). It also has filtering to accommodate the PICBASIC PRO DTMFOUT and FREQOUT commands. This allows you to generate prompt tones, dial tone, busy signal, ringback, special information tones and more.

A socket and peripheral circuitry is provided for the use of a Winbond/ISD voice record and playback device. This allows you to build devices with voice prompts and record



audio from the telephone line. (The voice record/playback device is not included. ISD4003 is recommended.)

Additional Features:

- RS232 interface for data I/O
- Socket for serial I2C EEPROM (memory not included)
- Reset button
- 5-volt regulator
- 40-pin ZIF socket for PICmicro® MCU (MCU not included)
- In-circuit programming connector
- Prototyping area for additional circuits
- Available assembled or as a bare PCB
- Full documentation including schematic
- PICBASIC PRO sample programs included
- Size is 5.5" x 5.6"

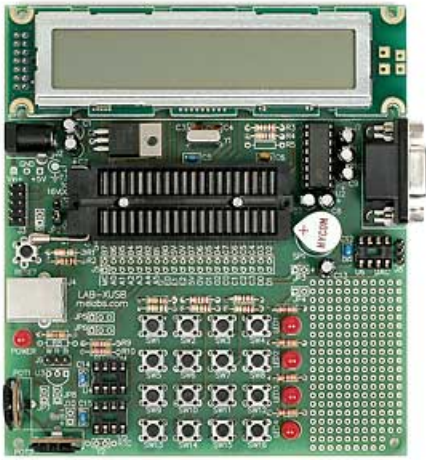
The [PIC16F877A](#) is recommended.

The assembled version includes:

- 40-pin ZIF socket for PICmicro® MCU (MCU not included)
- 5-volt regulator
- 20MHz clock crystal
- Reset button
- 16 switch keypad
- LED indicators (2 dedicated, 1 shared, 1 power)
- 2 line by 20 character LCD module
- Speaker
- Dual RJ-11 modular connectors
- Headset interface and connector (headset not included)
- RS232 interface with 9-pin D connector
- FSK decoder for 1200 baud Caller ID (NJM2211)
- DTMF receiver (MT8870)
- Bi-directional audio amplifier
- Isolated telephone line interface
- Socket for voice recorder/player (device not included)
- Socket for I2C serial EEPROM (device not included)
- in-circuit programming connector
- Prototyping area for additional circuits



MICROENGINEERING EXPERIMENTAR BOARD-LAB-XUSB.



The LAB-XUSB is a platform for experimenting with PIC(R) microcontroller (MCU) applications. It contains the circuitry required by the PIC(R) MCU to operate: 5-volt power supply, oscillator, reset circuit, as well as additional application circuits including switches, potentiometers, LEDs, LCD module, RS232 interface, USB interface and speaker, among others. A prototyping area is also included in case we missed your favorite circuit.

Many different projects may be created using the LAB-XUSB. Some examples include a calculator, LCD clock, digital thermometer, LCD backpack, data logger and many more. All of the PIC MCU I/O pins are brought out to a header that allows connection to off-board circuits.

The LAB-X1 can run programs written in assembler, C and [PICBASIC™](#) or [PICBASIC PRO™](#). It includes an in-circuit programming connector so the resident PIC MCU may be reprogrammed on the fly (requires flash device) using programmers that support this feature like the EPIC™ Programmer and the melabs Serial Programmer.



The LAB-XUSB is designed to work with 40-pin PIC MCUs and is available in either assembled or bare-board form. A parts list and schematic, along with PICBASIC(TM) and PICBASIC PRO(TM) example programs, are included. It has the following features:



The LAB-XUSB includes [in-circuit programming](#) connectors so the resident PICmicro MCU may be reprogrammed on the fly (requires flash device) using programmers that support this feature. Because the LAB-XUSB itself is not a programmer, a separate PICmicro microcontroller programmer, such as the [melabs Serial Programmer](#) is required to program a PICmicro MCU.



NEW Connect to the Microchip ICD or ICD2!

[ICD to 10-pin Ribbon Adapter](#)

The LAB-XUSB is designed to work with 40-pin PICmicro MCUs. It is recommended the LAB-X1 be used with the 40-pin PIC18F4550. This flash device has is equipped with the USB module necessary to build USB peripherals.

The PIC18F4550 is recommended.

The assembled version includes:

- 40-pin ZIF socket for PIC MCU
- 5-volt regulator
- 20MHz oscillator
- Reset button
- 16 switch keypad
- 2 potentiometers
- 4 LEDs
- 2 line by 20 character LCD module
- Speaker
- RC servo connector
- RS232 interface
- USB connector
- Socket for digital to analog converter (device not included)
- Socket for I2C serial EEPROM (device not included)
- Socket for Dallas DS1307 real time clock (device not included)
- Pads for Dallas DS18S20 temperature sensors (device not included)
- In-Circuit programming connector
- Prototyping area for additional circuits

