The $25 Son of a cheap timer

This is not suitable for a beginner. You must have soldering skills in order to build this kit.

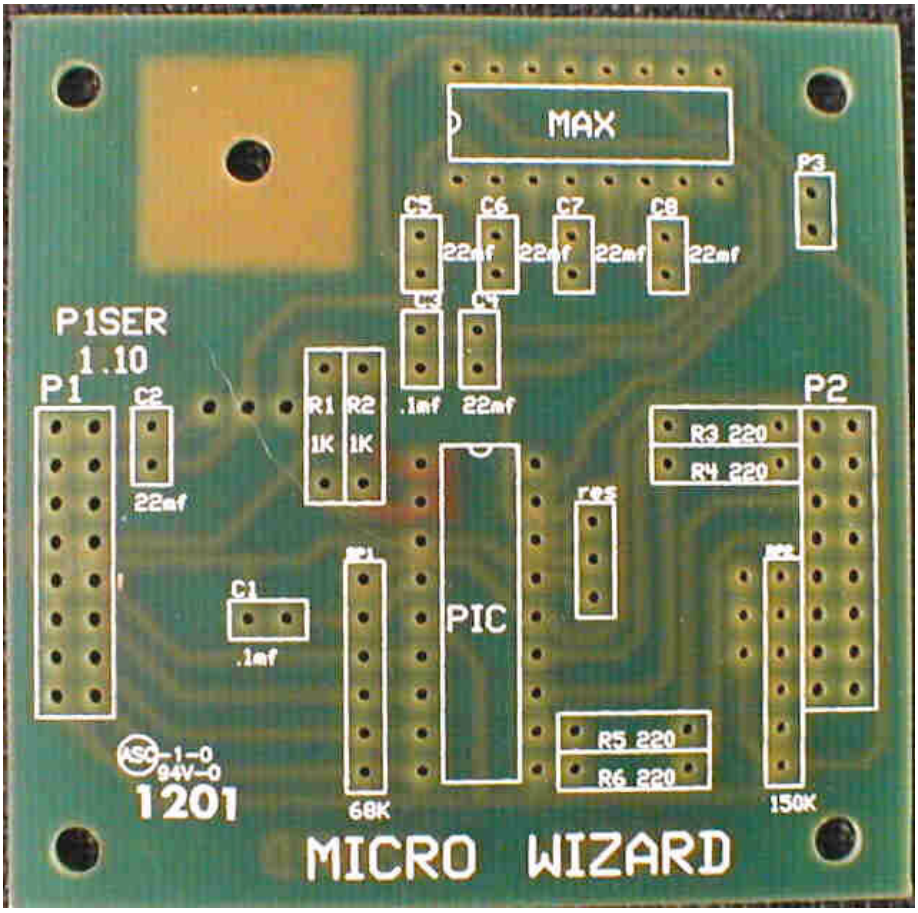
Micro Wizard has been manufacturing Pinewood Derby timers for over 10 years. We are now marketing a new very low cost timer based on our P1 timer. This Timer is geared more for the serious hobbyist/(tightwad). The kit requires soldering and is geared to save every penny. Our new kit does not include any connectors like our assembled timers. This saves us $$ on the cost of the kit and we pass the savings to you. You can then build the kit by soldering the cable directly to the circuit board or you can buy some IDC connectors and add them yourself. Instead of providing the new kit with an AC adapter you run it directly from a 6-volt battery that you provide. By running the board directly from a battery we can also eliminate the 5 volt 7805 voltage regulator. We only include the electronics in our "cheap kit" - no enclosure or frame, so carpentry skills are also required for a nice finished product. To reduce the cost even more we will only post the directions on the Internet. You will not get any directions with your kit. So you may want to read these directions and print them before you order the kit. If you're a real man you will just look at the photos anyway, and discard the written directions.

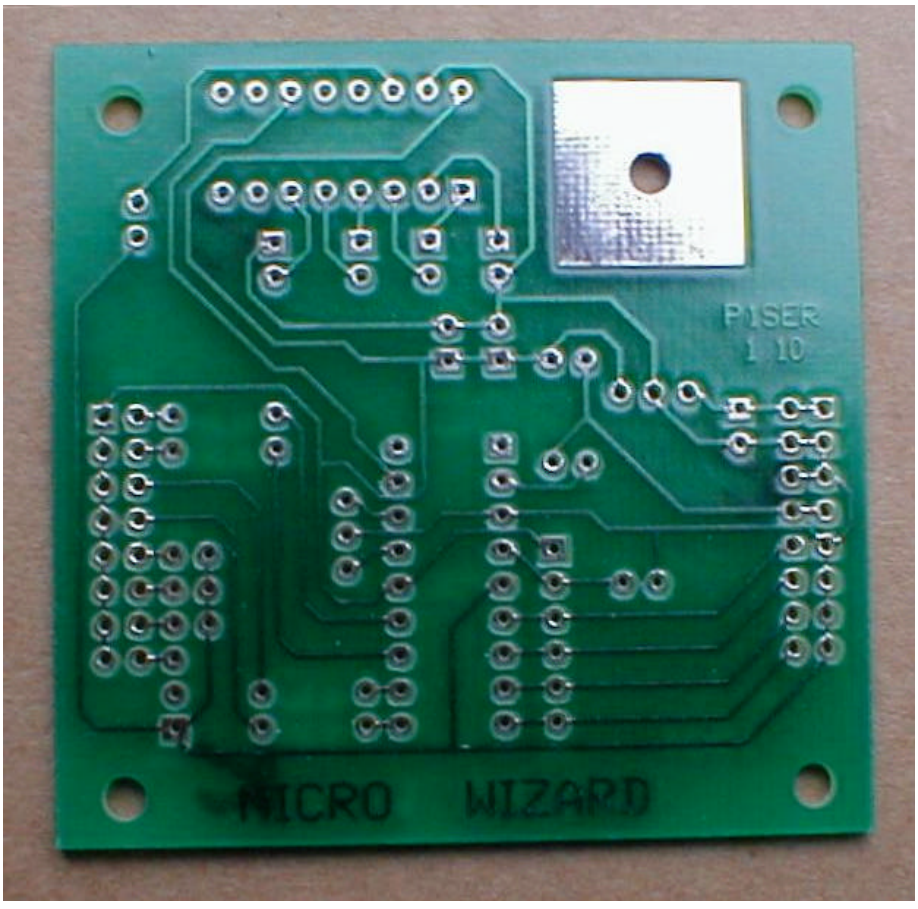
What you get

1 Single sided circuit board with silkscreen
1 Preprogrammed microcontroller
1 4mhz resonator with built-in caps
1 18-pin socket for microcontroller (I debated this extravagance, but it only adds minimally to the cost of the kit.)
1 Diode in place of the 7805-voltage regulator.
2 1K-ohm resistors
4 220-ohm resistors
2 0.1mf caps.
1 10mf cap
1 68k ohm resistor network
1 150-ohm resistor network
1 multi color ribbon cable
4 phototransistors
4 ir leds
4 leds

What is not included

Directions
Reset switch
Framework or enclosure
Battery, battery holder or power adapter


MAX
P3
C5
C6
C7
C8
22mf
22mf
22mf
22mf
P1SER
1.10
P1
C2
22mf
R1
R2
1K
1K
.1mf
22mf
P2
R3 220
R4 220
C1
.1mf
PIC
R5 220
R6 220
68K
150K
1201
MICRO WIZARD


P1SER
1.10
MICRO WIZARD

Notes on assembling the circuit board.

(Important! Be sure you are grounded before handling the microcontroller chip. Static electricity can damage it!)

The silk screen on the circuit board is a pretty good guide to assembling the circuit board. The exceptions are, 150K on the silk screen should be 150. All 22mf on the silk screen are now 10mf. You need to check the bottom of the board to find where pin 1 is, it will be the square pad. The square pad is positive for the electrolytic capacitors. Pin 1 is on top for the 68K network and on the bottom for the 150-ohm network. NOTE: When handling the microcontroller, you have to be very careful of static electricity. It can damage the chip. Most of the time static is not a problem, but if you can see or hear static, then take precautions.

What does what

The +6 volts comes in the board via the brown and red wires of the ribbon cable, it goes through a 10mf cap C2 and a diode. The diode helps protect the circuit from reverse polarity and drops the voltage a bit. If you want to run a power adapter you should replace the diode with a 7805 to 220 voltage regulator. After the diode, the power goes to a 0.1 cap C3 and the microcontroller. The other 0.1 cap C1 is for the power-up reset of the microcontroller. The 1k-ohm resistors R1 and R2 are for the reset switch. The 220 ohm resistors R3-R6 are dropping resistors for the high bright display LED's. The 68K resistor network RP1 is a pull up for the sensors and reset. A smaller value resistor network will make the sensors less sensitive to light and make a faster power-up reset. The 150 ohm network RP2 is the dropping resistor for the high output infrared LEDs. Next to the microcontroller is a 3 pin ceramic resonator with build in capacitors. The resonator is the clock for the microcontroller, without it nothing happens. You must cut the ribbon cable in two - the sensor side (left side of circuit board) will be longer than the output side (right side of circuit board).

NOTE: If you have less than 4 lanes, don't hook up the sensors for the lanes not in use.

How to wire the ribbon cable connection

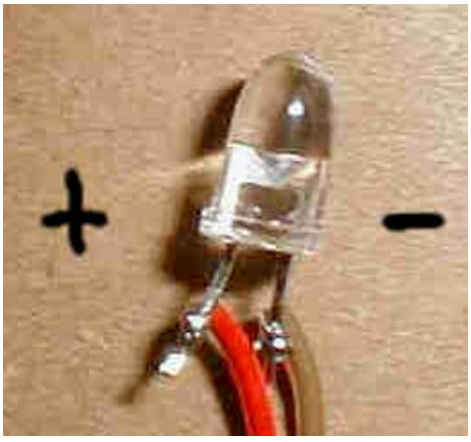
Left side of circuit board

Power +	Brown	*	*	Red	Power +
Power –	Orange	*	*	Yellow	Power –
Reset/ Start Switch -	Green	*	*	Blue	Reset/Start Switch -
Reset/Start Switch +	Violet	*	*	Gray	Reset/Start Switch +
Sensor-	White	*	*	Black	Sensor+
Sensor-	Brown	*	*	Red	Sensor+
Sensor-	Orange	*	*	Yellow	Sensor+
Sensor-	Green	*	*	Blue	Sensor+

Right side of circuit board

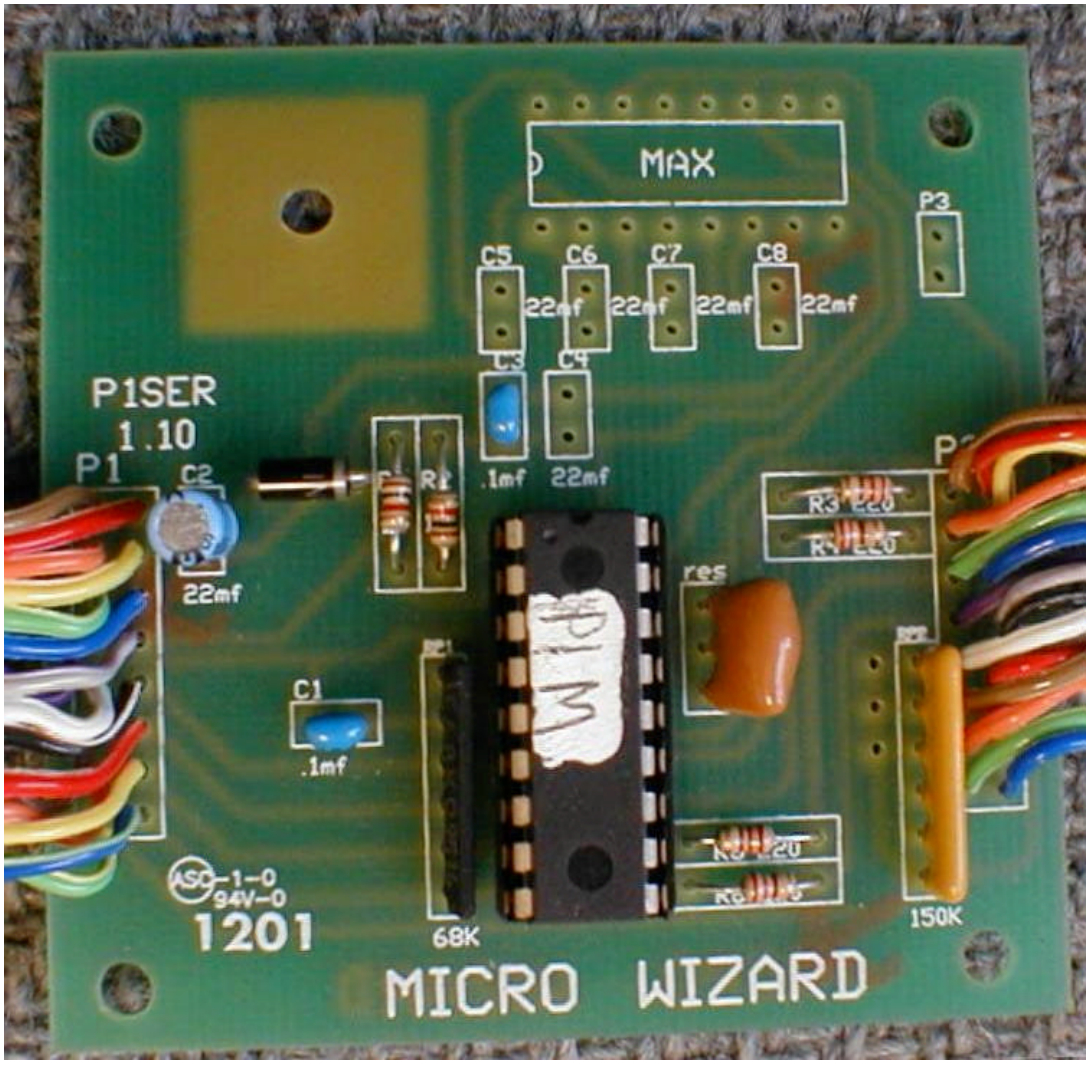
Display LED-	Brown	*	*	Red	Display LED +
Display LED-	Orange	*	*	Yellow	Display LED +
Display LED-	Green	*	*	Blue	Display LED +
Display LED-	Violet	*	*	Gray	Display LED +
IR LED-	White	*	*	Black	IR LED +
IR LED-	Brown	*	*	Red	IR LED +
IR LED-	Orange	*	*	Yellow	IR LED +
IR LED-	Green	*	*	Blue	IR LED +

Phototransistor



Hi-Brite LED

Infrared LED


MAX
P3
C5
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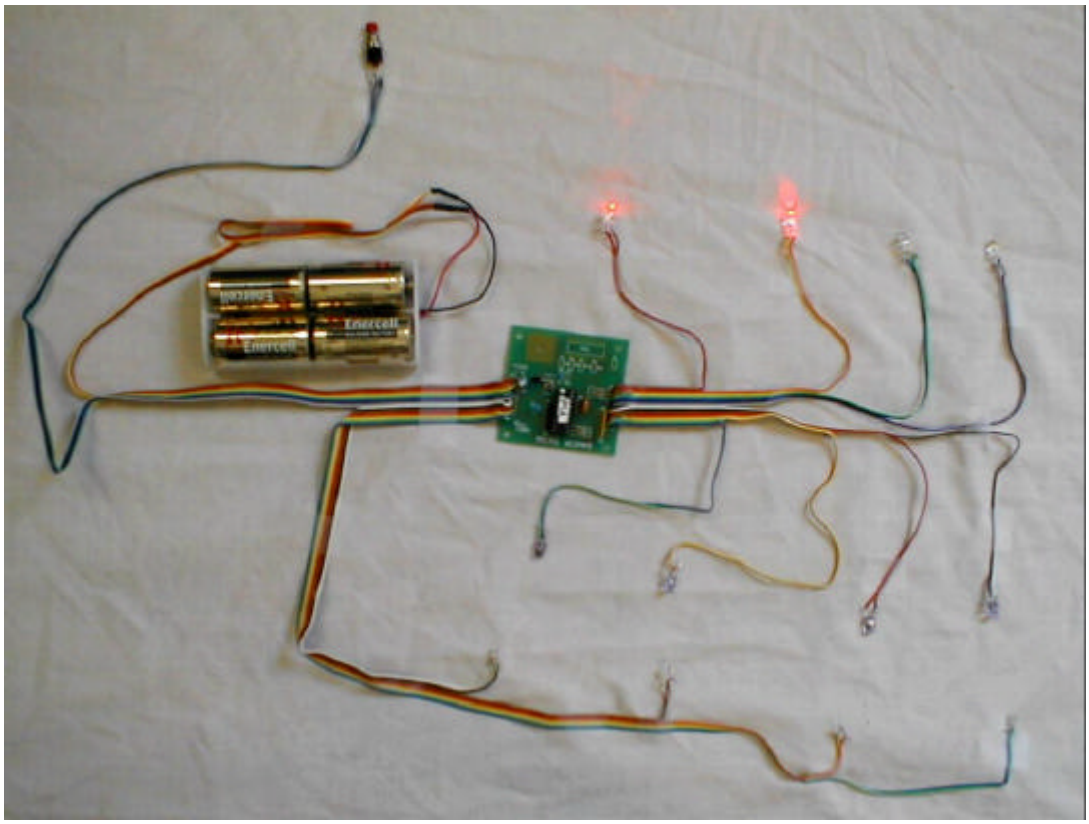
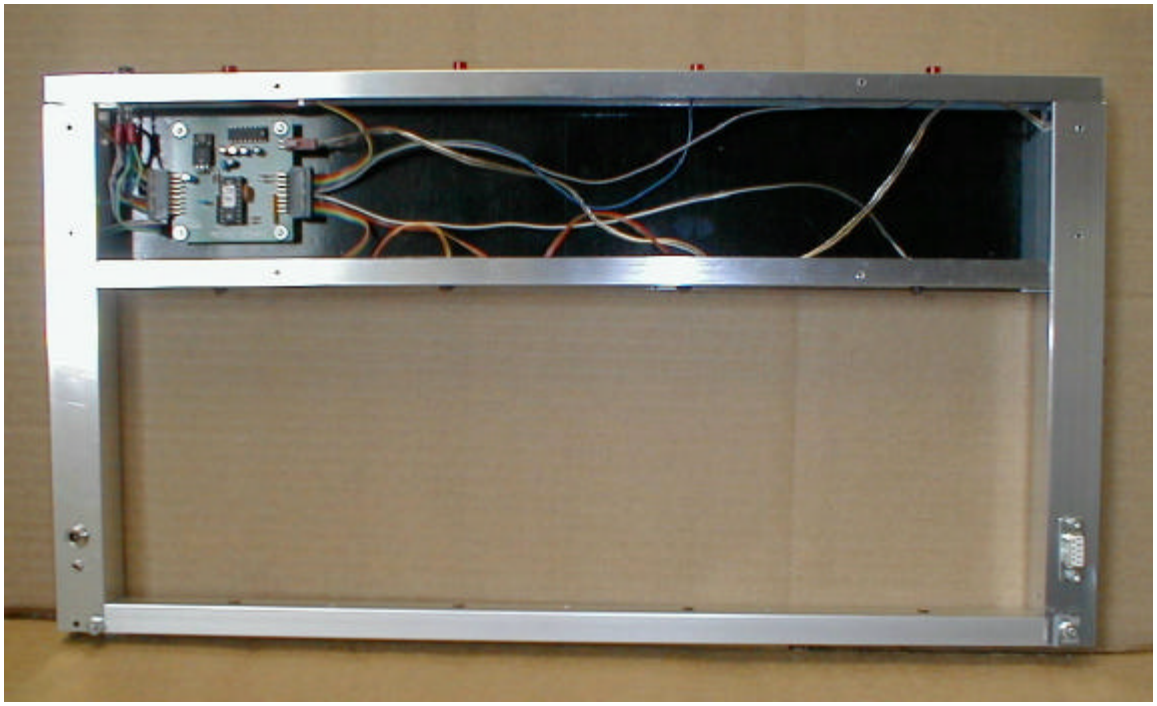
1.10
P1
C2
.1mf
22mf
R1
R2
R3 220
R4 220
res
C1
.1mf
68K
150K
R5 220
R6
94V-0
1201
MICRO WIZARD


Energizer
Energizer



This is the circuit board in the enclosure we use for our timers

The $40 P1 cheap kit with Serial Interface

(Important! Be sure you are grounded before handling the microcontroller chip. Static electricity can damage it!)

You can upgrade your P1 kit to the serial interface for an additional $15. The serial interface will permit your P1 to time races to one thousandth of a second and send the time to a computer or our remote time display unit (RTD). If you have the serial interface you can run race management software packages like Raceview, Grand Prix Race Manager, or DerbyMaster.

The additional parts you get with Serial interface

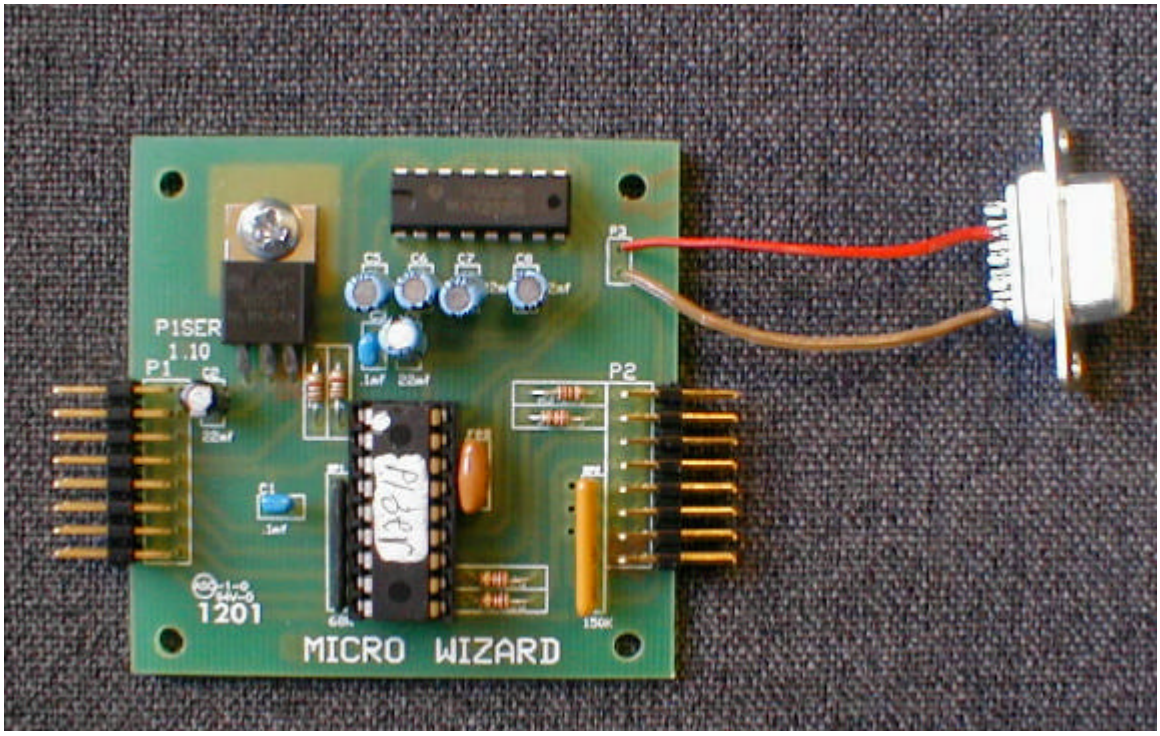
The P1 serial microcontroller
MAX232 interface chip
5-10mf caps
Female db-9 connector
High bright test LED

What is not included

Cable or wire
Disk or software (you can download some freeware at ftp.microwizard.com)
Hard copy of the directions
Hood for db-9 connector

Caution!

Most of the 10mf caps face the same direction except for C4, which is reversed. Check on the back of the board when putting in the 10mf caps. The square hole is the one for the positive (longer) lead.



This picture has a voltage regulator and headers, that you probably would not use when making yours.

Troubleshooting

To test the interface put the high bright LED into the db-9 socket. Connect the large positive side of the LED to pin 2 of the db-9 and connect the small negative side of the LED to pin 5 of the db-9. Now when you power-up the board the LED should be unlit. If the LED is lit then the LED may be plugged into the db-9 backwards or you may have some deeper problem. If the LED is off (like it should be) then trip each lane sensor while watching the LED. When the last sensor is tripped the LED will flash briefly and go out. The LED should flash once more when the start/reset switch is closed. If you get the LED to flash, then your serial interface is probably working. Plug the db-9 into a PC com port and run HyperTerminal program to display the times for your race. The data is sent out of our timer at 9600 baud, 8 data bits, 1 stop bit, no parity and no flow control. A HyperTerminal set-up file can be found on our FTP site.