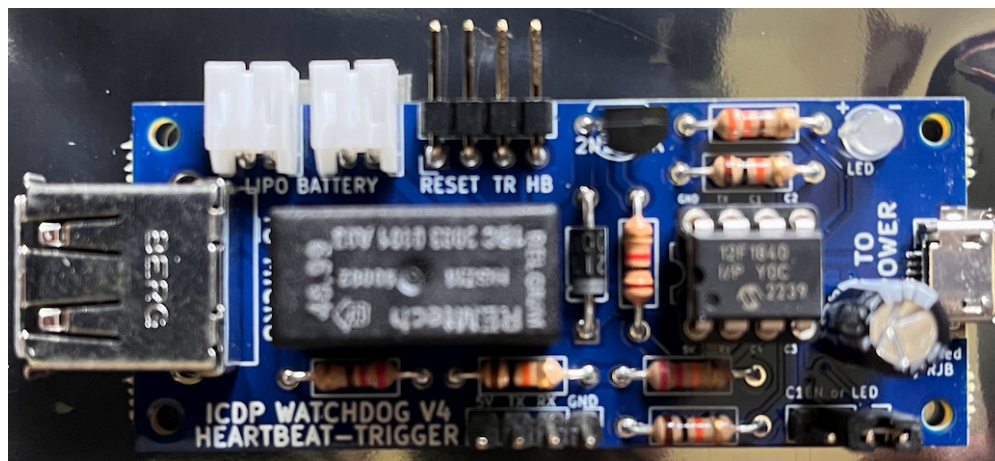
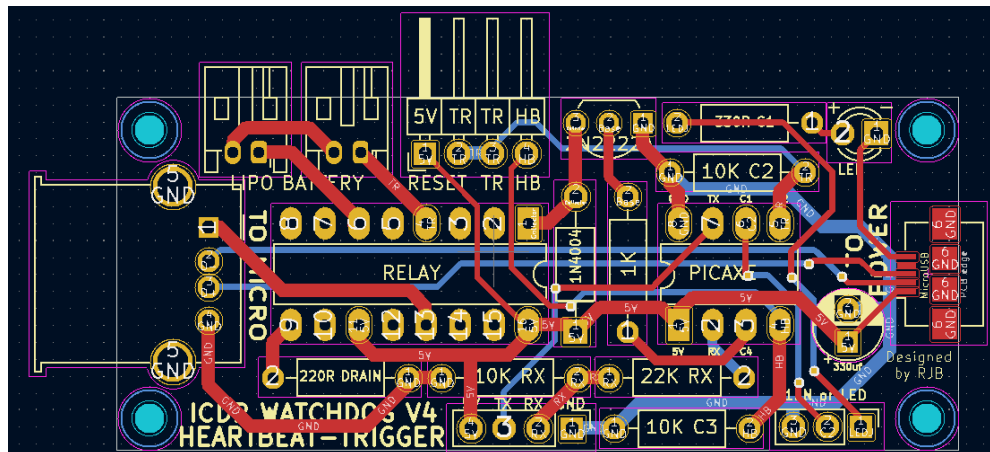


Watchdog Monitor



Board designed using KiCad. See: <https://www.kicad.org/>

When you're working with off the shelf products and public domain libraries, things don't always work the way you want them to. There are times when you can not code your way out of a lock up situation. Typically when you are making calls into someone else's library. Which is very complicated and does not lend itself to be modified. Or when making library calls that take longer than the micro processor's built-in watchdog timer (WDT) can be configured to wait. Doing cell data modem calls is a good example of this. There's also the case where the micro board did not provide you a way through software to hard reset the offending chip on the board like a cell modem. When this happens you need an external hardware solution that detects the failure, kills power and reboots your micro processor. This is where the Watchdog Monitor comes in. If your project is to be an unattended IoT device, in a remote location, that requires uptime; adding this little bit of hardware can make it happen.

Features:

- After 5m with no heartbeat from the micro processor, the relay is triggered.
- If the heartbeat pin is stuck high for 30s, the relay is triggered.
- If the trigger pin is toggled high, the relay is triggered.
- When relay triggered:
 - USB VCC from the connected micro processor is disconnected from the 5v source and connected to ground via 220 ohm (drain) resistor for 10 seconds.
 - Lipo battery continuity to the micro processor is also disconnected for 10 seconds.
- Pin C1 on the PICAXE can be jumpered to an LED and code can be programmed to provide LED flash codes. Perhaps showing what code is loaded.
- Pin C1 on the PICAXE can be programmed with an internal pull up resistor representing a default code behavior. If C1 jumpered to GND. Then a different behavior. Perhaps with the jumper the heartbeat is ignored when working with devices that go into a low power mode. Or perhaps adding the jumper changes the timers.
- PICAXE programming pins.
- Pins to add a momentary button for manual triggering.

KiCad

KiCad was used to layout the board. See: <https://www.kicad.org>

Generating Gerber Files in KiCAD for Board Manufacturing

<https://support.jlcpcb.com/article/194-how-to-generate-gerber-and-drill-files-in-kicad-6>

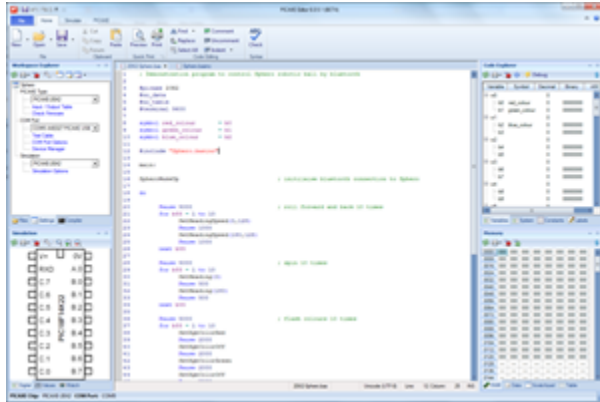
https://www.pcbway.com/helpcenter/technical_support/Generate_Gerber_file_from_Kicad.html

https://www.pcbway.com/helpcenter/technical_support/Generate_Position_File_in_Kicad.html

<https://www.lioncircuits.com/faq/pcb-assembly/how-to-export-Pick-and-Place-Files-using-KiCad>

PICAXE-08M2 Microcontroller Chip

PICAXE Programming Via PICAXE Editor 6

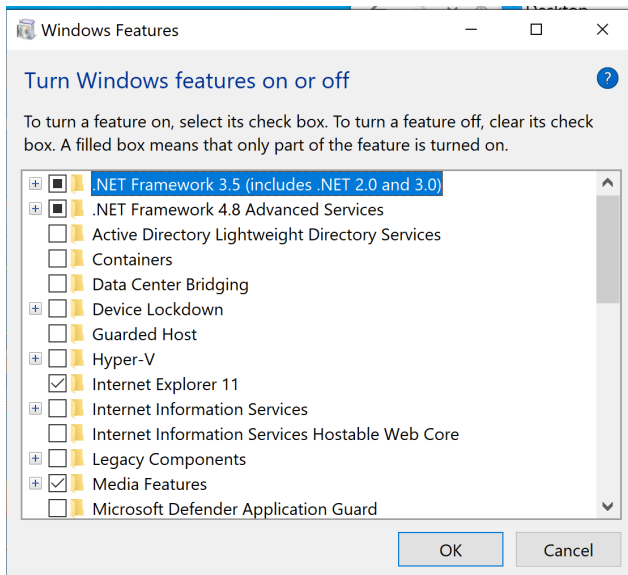
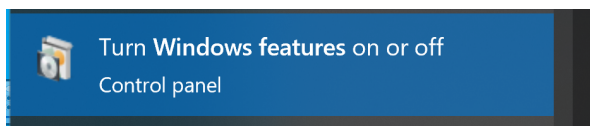


Download @ <https://picaxe.com/software/picaxe/picaxe-editor-6/>

Installing PICAXE Editor

If the installer reports that you need to first install .Net Framework 3.5.1

Windows 10 - In Search Window, type in "Windows Features" then enable Microsoft .Net Framework 3.5.1 in the list that appears



PICAXE Program For Trigger and Heartbeat Monitoring - LED jumper set

```
; PICAXE8M_HB_TR 20230520 RJB
```

```
;
```

```
setint OR %00001100,%00001100,C ; interrupt when pin4, C.3 or pin5 C2 goes high
```

```
let w0 = 0
```

```
let w1 = 0
```

```
high C.1 ; pin6 high
```

```
pause 500
```

```
low C.1
```

```
pause 200
```

```
high C.1 ; pin6 high
```

```
pause 500
```

```
low C.1
```

```
main: inc w0
```

```
if w0 >= 300 then relay ; 5 Minutes
```

```
pause 1000 ; 1 second
```

```
w1 = 0
```

```
goto main ; loop back to start
```

```
relay:
```

```
setint OR %00000000,%00000000,C ; de-activate interrupt
```

```
high C.4 ; pin3 high
```

```
pause 10000 ; 10 seconds (low power)
```

```
low C.4 ; pin3 low
```

```
w0 = 0 ; reset the 5 minute timer
```

```
setint OR %00001100,%00001100,C ; re-activate interrupt
```

```
goto main
```

```
interrupt: ; Interrupts disable upon entry
```

```
if w1 > 5000 then ; if C.3 set high for 30s then toggle c.4 to reset
```

```
high C.4 ; pin3 high
```

```
pause 10000 ; 10 seconds (low power)
```

```
low C.4 ; pin3 low
```

```
w1 = 0
```

```
else if pinC.2 = 1 then ; see if pin5 went high
```

```
high C.4 ; pin3 high
```

```
pause 10000 ; 10 seconds (low power)
```

```
low C.4 ; pin3 low
```

```
endif
```

```
w0 = 0 ; reset the 5 minute timer
```

```
inc w1
```

```
setint OR %00001100,%00001100,C ; re-activate interrupt
```

```
return
```

PICAXE Program For Trigger Monitoring Only - LED jumper set

```
; PICAXE8M_TR 20230520 RJB
```

```
;
```

```
high C.1 ; pin6 high
```

```
pause 1000
```

```
low C.1
```

```
setint OR %00000100,%00000100,C ; interrupt pin5 C2 goes high
```

```
main: pause 10000 ; 1 second
```

```
goto main ; loop back to start
```

```
interrupt: ; Interrupts disable upon entry
```

```
high C.4 ; pin3 high
```

```
pause 10000 ; 10 seconds (low power)
```

```
low C.4 ; pin3 low
```

```
setint OR %00000100,%00000100,C ; re-activate interrupt
```

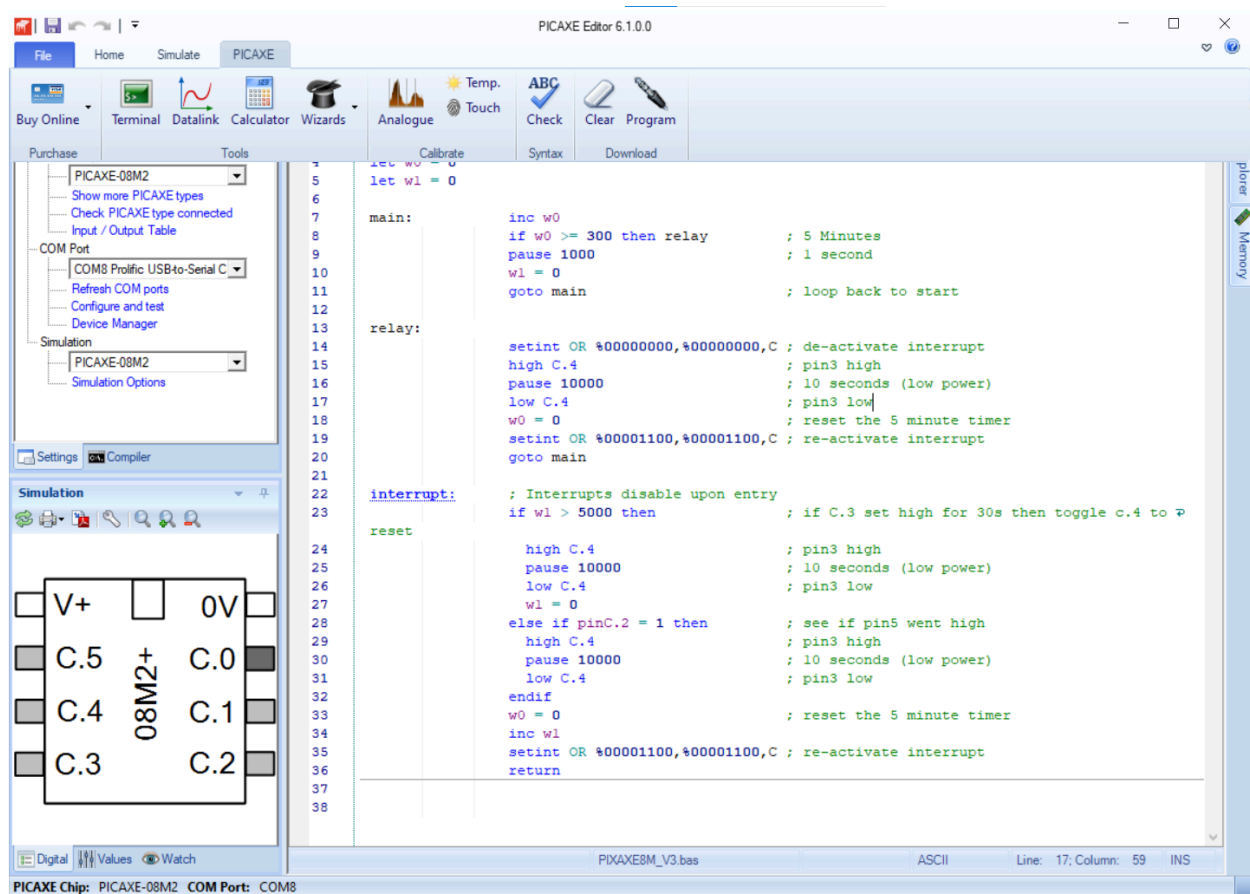
```
return
```

PICAXE Program For Trigger and Heartbeat Monitoring or Trigger Only - C1EN jumper set

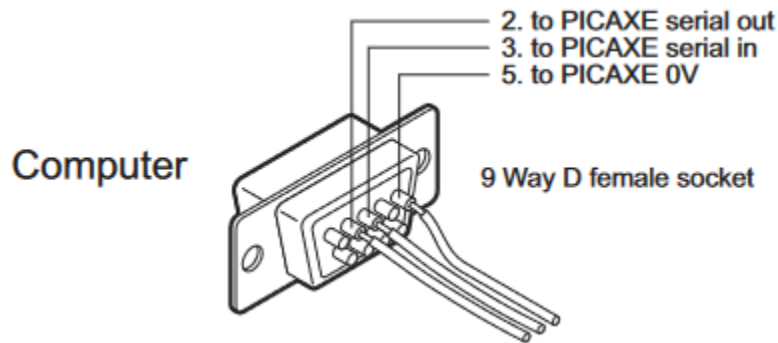
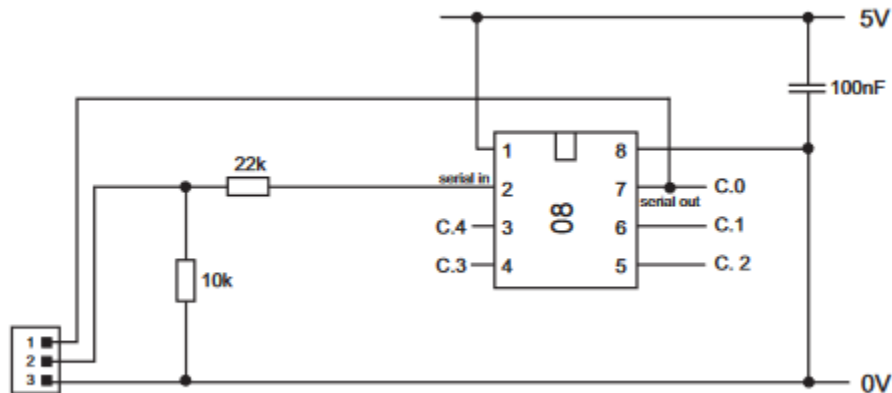
To be written

PICAXE Programming Steps

- Install PICAXE Editor software
- Open Editor
- File Open "program file".bas
- Connect power to Heartbeat Monitor board1
- Connect programming cable pins to Heartbeat Monitor board
- Plug in programming cable to computer
- Select PICAXE Tab at top
- Press Program



PICAXE 8M RS232 Program Wiring Example



PICAXE Serial In Pin (RX) and Required 22K and 10K Resistors

The minimum circuit in the manuals is the minimum circuit that will work for both programming and run time operation. Almost all users leave this 2 resistor circuit on every circuit they make. You will **not** have reliable operation unless the serin (RX) pin is tied low. So the minimum operating circuit is **not** just power.

The 22k resistor is the 'current limiting' resistor. The 10k resistor is the 'stop floating when cable not attached' resistor. That is, both have a completely separate purpose and cannot be combined.

PICAXE Programming Cable Parts List

1 usb to rs232 adapter cable (Male DB9)

<https://www.amazon.com/Adapter-Chipset%EF%BC%8CDB9-Serial-Converter-Windows/dp/B0759HSLP1/>

Driver if needed: <https://ftdichip.com/drivers/d2xx-drivers/>

<https://ftdichip.com/wp-content/uploads/2023/09/CDM-v2.12.36.4-WHQL-Certified.zip>



DB9 RX Pin2 to WatchDog TX

DB9 TX Pin3 to WatchDog RX

DB9 GND Pin5 to WatchDog GND