TinyTimer – Classic Edition
Assembly Instructions
Released by Nanohawk
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About Nanohawk: Nanohawk is the tradename of Swamp Ventures LLC, a Texas LLC. Founded by Brian Greul in 2012, Nanohawk is focused on cloud and embedded technologies. Nanohawk strives to develop and market kits that are affordable, hackable, useful, and most importantly do-able.

About TinyTimer Classic: Tiny Timer is a complex cycle timer. It is used to control one AC or DC device. It was designed to control a pump and can be adapted to other applications. The original design requirement is for to come on for 75 seconds, be off for 4.5 minutes. To indicate cycle status it is equipped with 2 LEDs. A Red LED indicates the wait state, A green indicates the operation of the primary relay. Each LED flashes once per second to indicate heartbeat while active. The LED is lit for 950 ms and extinguished for 50ms. This device uses an Atmega ATTiny85 microprocessor. This processor supports a limited set of Arduino IDE commands.

Support: Should you need assistance with operation or assembly please contact us at sales@nanohawk.com. Please provide as much detail as possible including pictures if appropriate.

Attributions:
I would like to thank the work of the Arduino team for the work and software that made this product possible. The IDE and code associated with the Arduino project make it easy to utilize the Atmel ATTiny85 chip.

Safety:
This product is intended to control DC and AC current. Electrical current can be dangerous and event fatal. Please consider enlisting the help of a qualified electrician when connecting AC loads. If you are not familiar with safe work practices, National Electric Codes in the United States, and local building codes please get help from someone who is familiar with these things. Above all, **NEVER** touch the circuit while AC power is connected. If you are controlling an AC load it is your responsibility to place this circuit inside an enclosure so that someone else cannot touch it. For more information please visit http://esfi.org to learn about Electrical Safety.

If you orient the circuit board with the USB connector in the lower left, the right hand side of the circuit board is where AC current flows when controlling an AC circuit. Please familiarize yourself with this portion of the board and avoid touching it while in operation or when AC power is connected.

If you are uncomfortable working around electricity you may return the product for a full refund excluding shipping costs. Please ship it postage paid to Nanohawk, PO Box 70033, Houston, TX

77270, United States of America. Enclose a brief note that you would like a refund for safety reasons. If you have purchased a kit, the kit must be unassembled in re-saleable condition. If the kit has been started or parts are missing a deduction may be applied in order to restore the kit to saleable condition.

Skills Required:

1. This product requires a limited understanding of electronics and the ability to make proper solder joints. Programming is required for this kit. An In System Programm (ISP) is required along with the appropriate cable. The ability to modify code is required to use this kit.

Warranty: Please see our website for current warranty information.
Http://www.nanohawk.com, under About.

Tools Recommended:

- **Small slot screwdriver for connecting terminals.**

For assembly:

- Soldering station or Iron
- A quality Electronics solder in a small gauge such as .020 inches. Kester makes fine solders. DO NOT use "electrical" or plumbing solder. It will destroy your kit.
- A pair of diagonal cutters or snips
- De-soldering wick
- A heat-safe work surface.
- A pen or pencil to mark off the steps as you complete them.
- A vise to hold the circuit during assembly, or an assistant.

Items required/recommended that are not included:

- USB power source such as a phone charger, laptop, or computer.
- USB A to USB B cable of sufficient length.
- Enclosure and cover.
- Mounting hardware for your enclosure.
- A drill and drill bit for the enclosure
- Wire to hook up the device you wish to control.
- An external SSR for heavy duty loads.
- An ISP and 6 pin cable.

Step 1 – Inventory

- In this step we will identify the various components and make sure they are all present prior to assembly.
- Please locate and check-off the following items:

Printed Circuit Board (PCB)	Relay – Tianbo HK3FF-DC12V-SHG or equivalent – qty 2
USB-B Connector – qty 1	2 row pin strip
Diode – qty 1	2 position terminal block – qty 1
Resistor, 1M 5% (brown, black, green, gold) qty 1	BC 517 transistor – qty 1

.01uf capacitor	ATTiny 85 Micro
.1uf ceramic capacitor (may be marked with 104)	Resistor 100 ohm 5% Qty 3 (brown black brown gold)
3mm LED – Green – Qty 1	3mm LED – Red – Qty 1 NOTE: This is a clear LED

Step 2 – Assembly

1. Locate the processor. It is a 8 pin DIP chip. It has a small dot marking pin 1. There is a small circle on the PCB marking pin 1. Line the two up and insert the chip into the PCB. You will probably need to gently bend the pins to fit the PCB. I recommend doing this carefully and gently. Hold the chip firmly and press the pins on one side against a solid surface such as a table. Apply gentle pressure to slightly move the pins. Check the fit and repeat as necessary. You should not try to do this all at once as it is easy to damage the pins on a chip.
2. Solder the chip to the PCB.
3. Locate the ISP header (2 rows of pins). Insert the short side into the PCB and hold it with your finger. This part is a bit tricky to solder. You can use the tip of your soldering iron to apply sideways pressure to a pin to keep it from falling. A helper is useful here. Be careful not to touch the pin with your finger that you are holding with the soldering iron or you will get burned! Once you have applied solder, but while the joint is still hot, use your free hand to press the pin header square onto the PCB. Then remove heat and wait a few seconds for it to harden in place. Finish soldering the rest of the connections being careful to not apply too much solder.
4. Install the reset switch next. Use care when inserting the legs to the PCB. It only fits in one orientation.
5. Install the 1M ohm (brown, black, green, gold) resistors next to the ATTiny CPU. In the center of the board marked R3. Solder and trim the excess leads.
6. Install all other resistors, which are 100 ohm resistors (brown green brown gold)
7. trim the leads on the resistors close to the board so that no excess are sticking out.
8. Install and solder the big capacitor. This is a high voltage component and I recommend getting it close to the board. It functions as a filter to keep AC spikes away from the relay when controlling a motor. It works in tandem with the 100 ohm resistor located near it.
9. Install the ceramic capacitor (marked 104) and solder the leads. Trim them when finished.
10. Install the diode.
11. Install the transistor. Take note of the flat side of the transistor that should line up with the flat side on the PCB marking. Both transistors share the same orientation. It will be necessary to gently bend the pins to get them in the holes. Pull the center pin out gently and then gently squeeze the two outer pins and it should fit right in. You can position the transistor to be about ¼ of an inch (5mm) from the board. Solder in place and trim the excess leads. Use care as the solder points are close together. NOTE: you may find it helpful to use an acid brush to sweep the clippings off the board. Sure beats getting scratched by the sharp leads.
12. Install the LED's and solder them in place. The longer lead on the LED goes to the + symbol on the board. The Red LED is on the right and the Green LED is on the left (farther from the

relay). I recommend bending the leads over after inserting them so they will stay put while you solder them. Trim the excess lead length when you finish soldering. The pads on the Red and Green are very close together, take care not to apply too much solder or you will short the LED's out. If you do apply too much solder, use de-solder wick to remove it.
13. Next install the USB-B Jack. I recommend soldering the 4 small pins first. When soldering the larger tabs use plenty of solder as this is what holds the jack to the PCB.
14. Congratulations! You have completed the soldering of your TinyTimer Classic.

Step 3 – Programming and Testing

- Connect your TinyTimer to an ISP module such as the one shown.
- Using the Arduino IDE burn the bootloader. If you get an error check the connection with the ISP cable it may be on backwards.
- Once the bootloader is burned you now have an Arduino compatible TinyTimer.
- Compile and upload the sketch.
- Unplug the TinyTimer from the ISP and connect a USB Cable. It should go into “run” mode immediately and follow the cycle you programmed.
- Use the Arduino IDE to modify the program if desired.