I would really be grateful if you start to build the Developing Timer, that you go to the Photrio thread and say hi. Also please post photos of your completed tester.

Please refer to Photrio for further build help & to let us know you are building the timer.
Build a B&W film developing timer & twiddler - Cheap, Easy & it Works | Photrio.com Photography Forums

GitHub repository where all documentation & code can be found. billbill100 (github.com)

ESP32 Developer Timer Hardware Build V1.1 25/02/2024

Building the Developer Timer should be relatively easy. Below are some hints & advise on the build.

Refer to the ESP32 Wiring Guide schematic documents, for connections. Note. Schematics show a bare board, rather than it sitting in the breakout board.

All of the boards can be purchased from eBay, Amazon or AliExpress, which is by far the cheapest. Details of the parts required are detailed in the Parts List document

All of the boards are pre-soldered, you will not have to solder the components yourself. Most boards will also the header pins pre-soldered.

There is a choice of two processor boards to use. These are detailed in the parts document. The Lolin board has the advantage of battery backup, but does require the heard pins to be soldered.

Using DuPont jumper wires, the boards can be connected together. You will need one packs of 10cm and one pack of 20cm Dupont wires to get the correct colour match.

Additionally, there are more Brown and Black wires used, so one pack of each, 20cm Brown & Black wires will be required.

There are many 3.3V (Brown)& GND (Black) power connections. These will not all fit into the breakout board screw-terminals. It will be necessary to connect them in groups with a choc-block or similar, then to the screw terminal. Alternately use the header pin specified in the parts document, although this will require soldering.

When fully built & tested, consider using a little hot-glue on the connectors, to stop them working loose.

ESP32 comes in either 30 or 38 pin boards. The parts list specifies the 38 pin nodeMCU32 and compatible 38 pin breakout board or the Lolin D32 board, which is 32 pin.

Ensure you pay particular attention to the polarity of the connections. The boards are clearly marked.
The breakout board legends are clearly marked for the nodeMCU32 processor board.

Caution if using the Lolin D32 board. This only has 32 pins. When fitting into the screw-terminal breakout board, ensure the front pins of the board align with the front pins of the breakout board. The rear three screw terminals on either side of the breakout board do not connect to anything. The legends on the breakout board do not correspond to the Lolin D32 pins,

The TFT is marked VDD (3.3V) and GND (0V). The tft board LED pin is also connected to 3.3V

The Encoder is marked 5V (connect this to 3V) and GND (0V)

Ensure the same Ground (0V) pins are used as shown in the schematic. Do not use the GND connection on the Node32, located between pin 19 and 21 or the bottom left GNS pin on the Lolin D32

To make the box

Ideally, the use of a milling machine with digital readout, makes it really easy to cut square holes in project boxes & align all the drill holes. I have done this many times, but at present having only access to basic tools, another method was used. Please note the photos below are of the first prototype and was made using just the most basic of hand tools I was able to source. Whilst not the most professional looking, it does prove that much can be achieve with very little. Please be very careful when using the knife as detailed below.

The front of the box was covered in masking tape and the screen cut-out and button holes were drawn onto the tape. Note that the screen is smaller than the board it is mounted to, so only cut the hole to fit the screen. Do not make it too tight at the bottom. There are ribbon cables that must not be crushed.

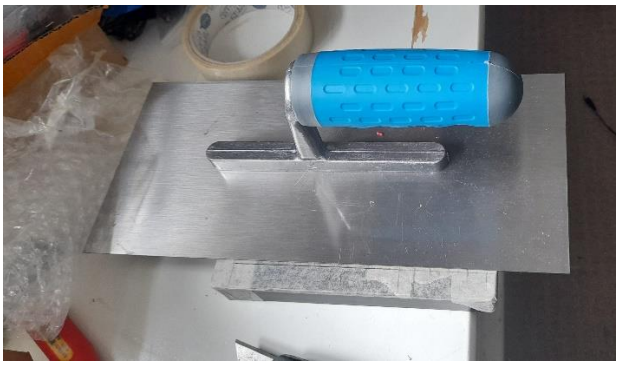
There is only just enough room for the screen and two rows of buttons. The cut-out for the screen should be made such that the top of the tft pcb is touching the top of the inside of the box, so it is mounted as high as possible.

On the prototype, the bottom row of button holes were drilled slightly too high, so the buttons touch. There is space to slightly lower the button holes.

Using a Stanley knife and a metal straight edge, the pencil line was now repeatedly scored. Being very careful not to slip & cut one's fingers or to cut past the pencil lines.

Ensure the box lid is clamped in a vice or similar and you use **extreme care** to always **keep fingers BEHIND** the blade, to avoid injury.

A new plasters trowel was used as the straight edge so one's fingers can be kept well away from the blade.



A series of overlapping holes were drilled inside the screen markings to remove the majority of the plastic.

Using a junior hacksaw, or just a hacksaw blade, cut diagonally into the four corners, keeping the blade at 90 degrees to the front of the box.

Turn the box over & using the saw marks as a reference, again score the inside of the box.

Using slip-joint pliers (as they fit into the opening) grip the lid at the score line and gently bend inwards. Do this all along the score line and repeat, each time bending a little more. Alternate this with scoring, which will get easier as the plastic bends. Eventually the plastic will snap away.

The stanley knife as shown below, can be used as a scraper by dragging the blade. It will smooth the rough edges and can be used to widen the hole if it is a bit tight for the screen to fit.
Make sure you are fully in control of the knife at all times to ensure it cannot slip & cause injury.

This of course, is only one method to make the cut-outs. One could use a jigsaw or fretsaw, for example.

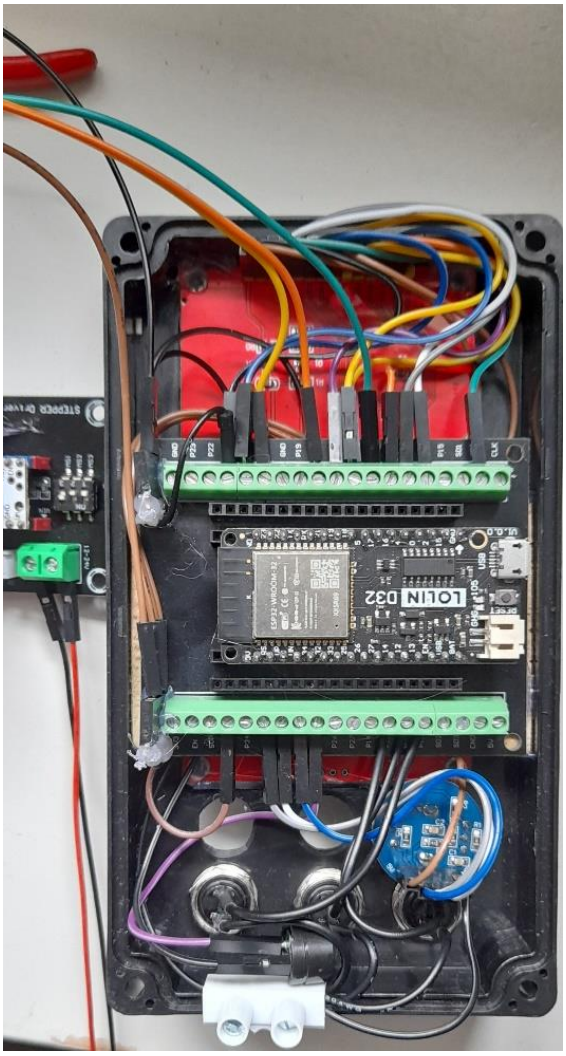
The inside of the box was keyed using emery cloth to give a better adhesion for hot-glue. The screen was placed into position, face down, on a clean flat surface & hot glue used to secure it in place. Ensure hot-glue does not get onto the screen. The screen could also be mounted using bolts & the fixing holes in the pcb

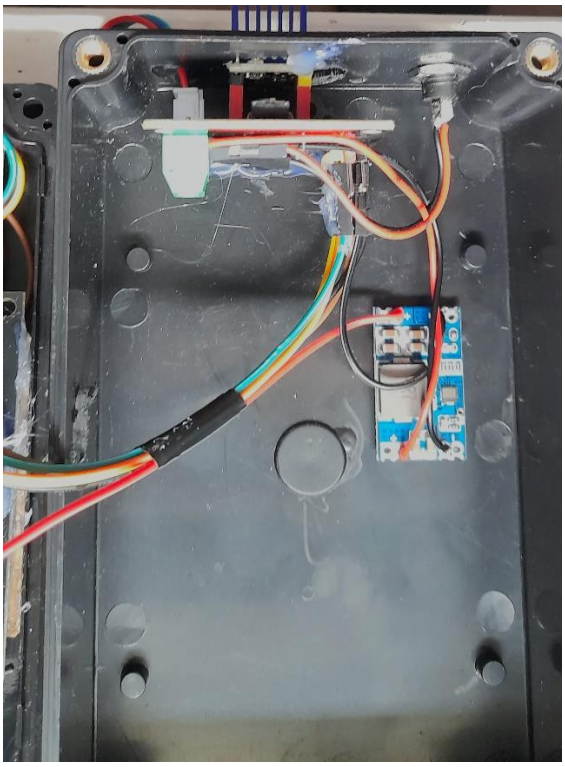
Note the screen pcb is mounted as high as possible, to allow room for the buttons.

Drill the holes for the encoder (6mm) and the buttons (12mm) using a brad point drill bit.
Note the bottom line of button holes should be drilled a few mm lower than shown here, to give a little more separation.

Wooden blocks were cut to fit either side of the screen and slightly higher, to make a mounting platform for the breakout board. These were hot-glued in place and the breakout board glued to the wooden blocks. The breakout board could also be mounted using M3 bolts & mounting holes on the breakout board.

Note the following photos are of the Developing Timer, which uses a slightly different processor board & also a voltage regulator fitted in the base of the box.





Stepper board hot-glued in position. M3 bolts will be used on the lower fixing holes for permanent mounting.
Note it really is a tight squeeze to fit the stepper motor into this size project box, but it can be done. An alternate is to use the next size project box (see link in parts list document).

Also shown is the 12V to 5V buck converter. As the stepper motor needs a 12C supply, using a buck converter to power the processor board, negates the need for a secondary USB power supply.

The finished box (minus two screws :o)

Template showing cut-out for screen & button positions.