--=|||[[[TOOL]]]|||=--

for PCB V1.2

Let's start building!
First of all get your desk ready and make sure you have the necessary tools:
- soldering iron
- soldering tin
- cutter (the ones like in the picture are the best but a small nail clipper will do the job too)

IMPORTANT!
Follow the next steps in the order it is written down.
After each step flip the board and clip off the wires.

Start soldering with the diodes
Diodes

D1/D2/D3/D4	BAT43 (blue with black stripe)
D5/D6	1N4001 (black with white stripe)

Make sure you solder them in the right direction! There is a black marker on one side which should correspond with the marker on the PCB like on the drawing.

Resistors 1 (mind that some resistors will be soldered later)

R1/R2	3K6 (orange – blue – red)

Capacitors 1
Start with the 7 yellow ones, these are marked with 104 (100nF):

C1/C2/C3/C4/C5	104 (100nF)
C6	330nF

(C7 and C8 will be soldered later)

Transistor
Q1 BC547
Mind the direction drawn on the PCB!

Voltage regulator
78L05
This is the black thing with 3 feet which looks like a transistor. Mind the direction drawn on the PCB!

Capacitors 2
C7/C8 10uF
Mind that these caps have two sides (a + and – side) so it is important to check the direction before you solder them! The – side is marked on the PCB with a small "–" and has a square pad.

Resistors 2 (standing resistors)

R3/R4	1K (brown – black – red)
R5/R6/R7/R8	10K (brown – black – orange)

DA converter
The DA converter is almost ready to fit on the module. Follow the next steps to get the DA converter right on your PCB
2 pin header
solder this header with the pins facing the same side as the SMD components. This will be for selecting the output range.
4 pin headers
These headers will be soldered on the back of the little PCB facing the side where is written "12BIT DA".
But before you solder them add the female headers to the 4 pins male headers. Make sure you place the FEMALE headers on the DA converter PCB and the MALE headers on the TOOL PCB. Than place the DA converter on it's place and solder only one joint on both sides. When all sits straight than solder the other joints as well.
The DA converter should be placed with the 2 pin output selector towards the arduino.

Power header
It should be placed on the back of the PCB.

Potentiometers, switches, LEDs and jack sockets
(Don't solder any of those yet!)
Place the potentiometers, switches, LEDs (mind direction) and jack sockets.
Now place the panel and tighten it with the nuts.
Solder the potentiometers, switches, LEDs and jack sockets (remove the DA converter to make it easier to solder the switches).
Remove the frontpanel again as it will make it easier to solder the arduino headers.

Arduino: The Arduino goes on the back with the USB connector heading in the direction of the power header. Place the headers you find in the package of the arduino on the arduino place the 2 female headers you find in your kit on top of them. Now place it all on the PCB and solder only one joint on both sides. Check if the arduino sits straight and now solder all the other joints as well.

Upload a code: The arduino is not programmed yet but uploading the code of your taste is very easy, just follow the steps on my website: www.ginkosynthese.com. It involves downloading a driver, which you can find on my website.
Place the powercable with the red line facing "-".

If you want to program your own codes:
The TOOL is called TOOL as I designed it as a small simple multipurpose module for generating CV signals. Therefor it has a 12bit DA converter on the back. The DA converter is an MCP4921 which is connected to the arduino with the following pin layout:
arduino pin 10 = SS (Slave select, pin 2 on MCP4921)
arduino pin 11= Data In (pin 4 on MCP4921)
arduino pin 13= clock (pin 3 on MCP4921)
output of the DAC (pin 8 on MCP4921) goes into an opamp as buffer and gives a wider CV range.
You can set the ouput range between 0/10V and -5V/+5V by the jumper on the DA converter PCB.

The trigger/gate input goes to pin:
CV input 1 goes to pin: A1
CV input 2 goes to pin: A2
Trigger/Gate input goes to pin: D4
Pushbutton 1 goes to pin: D2
Pushbutton 2 goes to pin: D9
Potentiometer 1 goes to pin: A1
Potentiometer 2 goes to pin: A2
LED 1 is fed from pin: D3
LED 2 is fed from pin: D5
The two CV input jacks are normalized to 5V if no jack is inserted.

The CV inputs are protected by clamping diodes to keep the incoming CV signals between 0V and 5V.

What can the TOOL be used for? I think it can be used for almost anything! Think of sequencers, LFO's, ADSR's, but of course as 12bit VCO's as well. The right pushbutton can be programmed as trigger but it would be more logic to use the left button for this. The right button is there to skip through parts of the code like for programming the next step in the sequencer or you can program AD without pressed the button and program SR while pushing the button. But as you are free to do whatever you want I think there are many other ways to use it.

Have FUN!!!!!!!!