

RYK VECTOR WAVE - DIY KIT BUILD GUIDE

Thanks very much for purchasing the Vector Wave kit !

Please be aware that although the kit appears quite simple, it is only recommended for experienced builders.
The main components are surface mounted quite densely around the solder points, the build requires skill and precise soldering to complete successfully.

To build the kit you will need the following:
[DO NOT attempt to build this kit without them]

- Flux pen, or liquid flux
- Two mini clamps
- Clean high quality 2/3mm tip solder iron [chisel type recommended]
- Accurate and stable 5.00V reference source to calibrate the module

CONTENTS OF KIT

User manual

1 x Vector Wave PCB

1 x Vector Wave 2mm aluminium panel

1 x Red Perspex window [in grey envelope]

1 x white plastic spacer strip

1 x USB micro cable

BAG B

4 x LED matrix units

BAG C

- 8 x black jack sockets (MONO)
- 1 x green jack socket (STEREO)
- 9 x RYK ORIGINAL blackjack nuts
- 1 x 12pin Box header (** it may be in a separate small bag)
- 1 x 10pin Box header (** it may be in a separate small bag)
- 4 x M3 black short metal screws [for module to rack]
- 4 x M3 black washers [for module to rack]
- 4 x M3 black long plastic screws [for PCB to panel]

BAG D

- 2 x blue push buttons
- 1 x grey push button
- 1 x red push button
- 4 x red 2mm LEDs
- 1 x DC Converter 3.3V, 1 x micro switch

BAG E

- 8 x rotary encoders
- 1 x joystick

BAG F

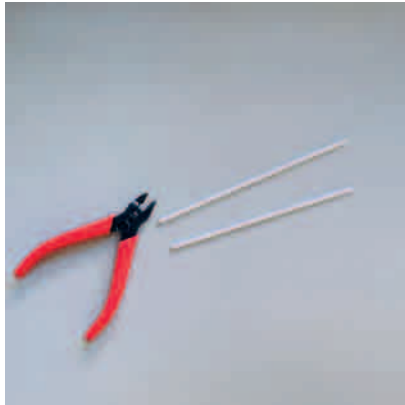
- 8 x black plastic knobs
- 8 x white plastic spacers [to be placed inside the knobs]
- 1 x joystick knob
- 1 x right angled jack adapter [useful for the MIDI input]

Unlabeled BAG

- 2 x BAGS of washers [type X,Y & Z]
- 1 x Joystick Washer

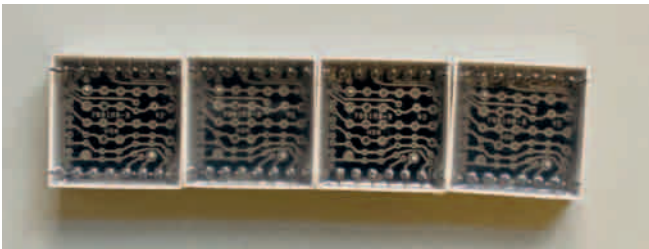


1. Cut the white plastic strips into half, so you have two equal length pieces



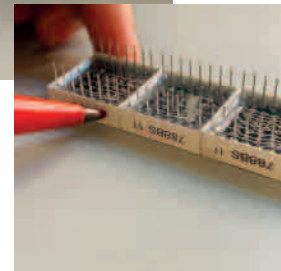
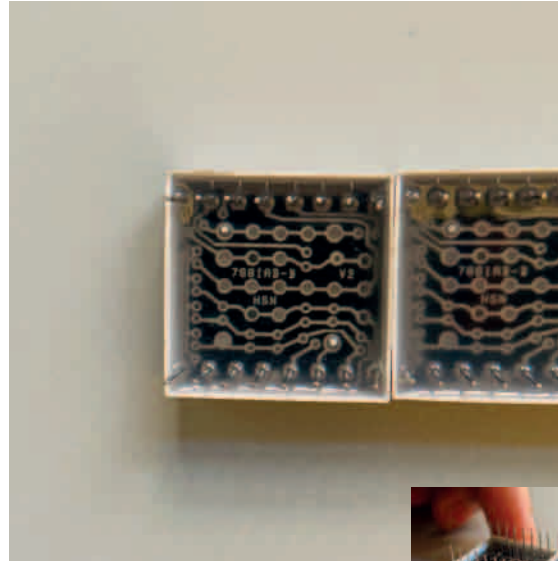
Take off the plastic protective sheets from LED matrix units, and check the pins on the LED matrix units are perpendicular and straight if not then very carefully align them

Next lay the LED matrix units upside down on a flat surface, with all the pins facing up.
Align them so the text on the white body is all on one side.



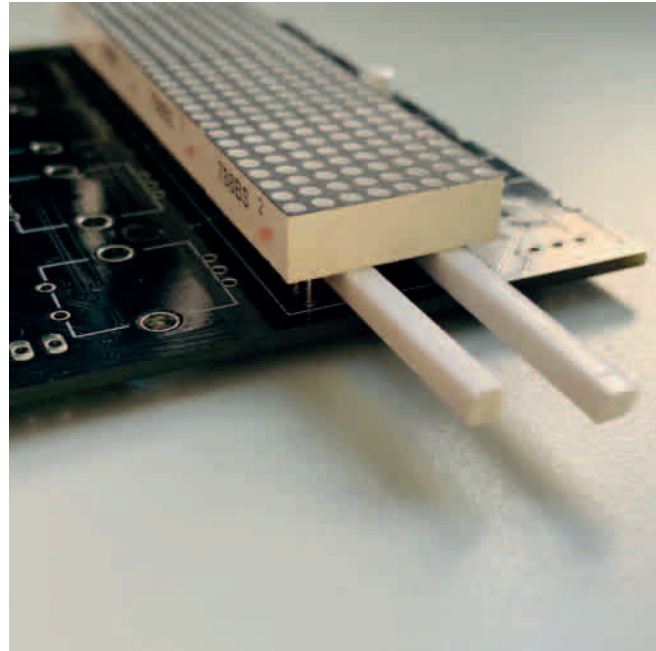
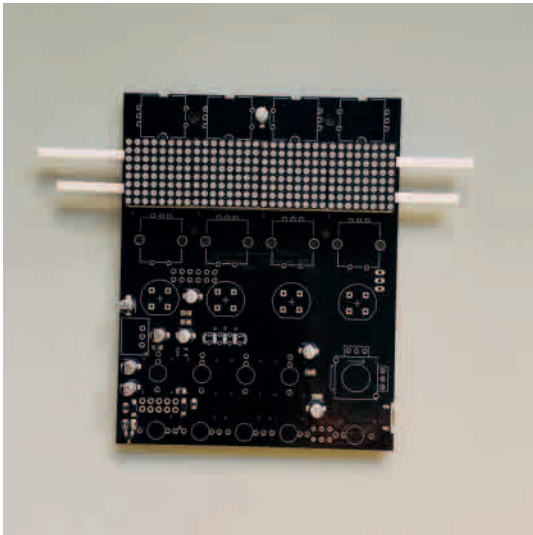
Study the back of the LED units, and check that the small text within the lacquer [eg "7881AB-B"] is the correct orientation. If one of them is upside down, then this unit needs to be rotated so the text reads correctly.

Using a red marker pen [or similar] mark the bottom edge of each unit identify the correct orientation.



Carefully insert the LED matrix units into place
It is easiest if you tilt them slightly, inserting the top and bottom row pins from one side first then allowing the LED matrix to insert more flatly. Make sure they are orientated so the red mark you have drawn on the edge of the units is facing the number '1's printed on the PCB, and the other edge of the LED matrix units is facing the towards the top edge of the PCB this is very important, you cannot take out the LED matrix units after soldering.

Now from one side gently insert the plastic strips under the LED matrix units, lifting them a little to allow the strips to pass underneath, the strips should run near the pins on either side of the LED matrix units, avoiding the SMD components underneath
Make sure all the pins are in the holes, and the units sit flush on top of the plastic spacer strips.



Take the red perspex window from the grey envelope, and peel the protective film from both sides, if necessary clean the edges of any gummy material left from the protective film.
Take out the front panel, you will notice it is very thin on the edges near the window opening for this reason be VERY careful not to bend the panel !
Place the panel face down on a smooth clean flat surface, insert the perspex window into the front panel from behind, taking great care not to bend the panel If the perspex is tight fit give it a tap with your knuckle.



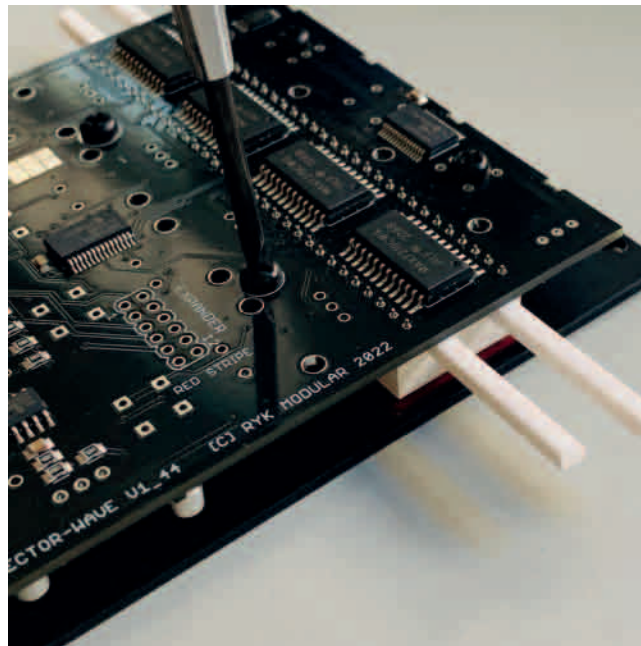
Place the panel and perspex window over the LED matrix units, to screw the PCB to the panel from behind.

Using the provided long plastic screws, very gently begin to screw the each screw a little bit, taking in turns each screw one by one on each corner until the panel is held against the perspex and LED matrix unit.

NB please use a small flat blade screw driver, not a cross/Philips type head.

Tighten the screws only enough to hold the panel against the perspex and the LED matrix units, but **DO NOT** over-tighten. **BE GENTLE! Do not bend the panel!**

Make sure the panel and PCB are parallel, and there is not a slope one side more than the other.



On the backside of the PCB, apply a flux pen along all the pins of the LED matrix units.

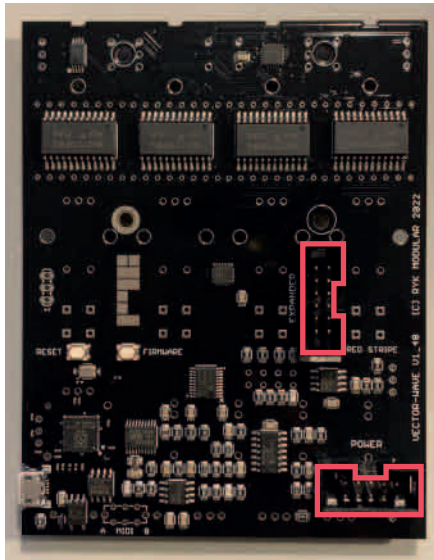
Carefully solder each pin, by heating the pad with the soldering iron first, before apply the solder direct to the pad [not the iron tip]

Once soldered, inspect the pins to make sure the solder has flowed correctly between pad and pins

Now unscrew and remove the panel from the PCB, and store it and the perspex window carefully to one side.

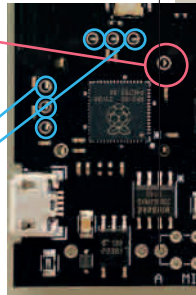


2. Insert the two Boxed headers onto the back of the PCB, you can hold them in place with some sponge (not included) whilst soldering from the topside of the PCB. Be careful not to heat too long, as the plastic of the headers can melt easily.



JOY
STICK
CORNER PIN
TO BE SOLDERED

JOY
STICK
6 PIN TO
SOLDER



3. Next take the DC converter [small black box with 3 legs] and place on the topside of the PCB, and solder from behind. Make sure it sits flush against the PCB, and is aligned within defined box shape on the PCB

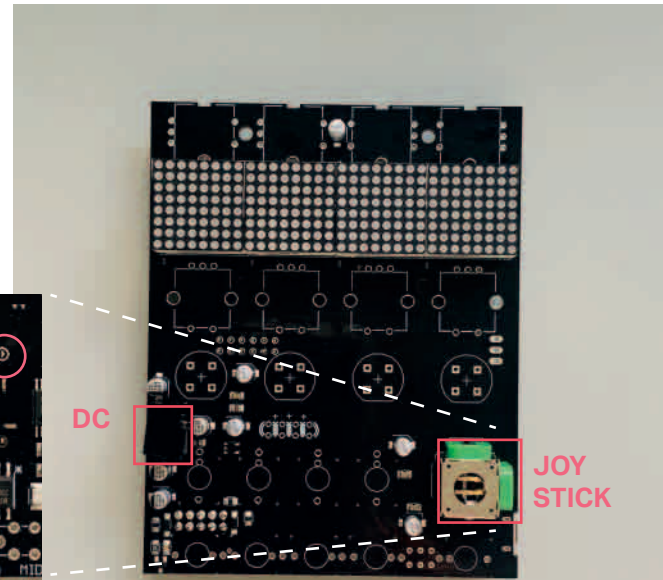
4. Insert the joystick unit onto the topside of the PCB, make sure it is flush with the PCB.

You can use some sponge [make a hole for the joystick lever] to push against the PCB.

Then carefully solder the two groups of 3pins.

Take great care not to touch any of the SMD components nearby to these pins.

Once again check the joystick unit is flush with the PCB, if ok then proceed to solder only ONE of the larger corner pins of the joystick unit



5. Insert the 8 encoder units into the PCB, push them firmly into place, making sure they are flush with the PCB.

Next insert the push button switches into the topside of PCB, make sure they are orientated so the flat edge is aligned with the outline drawing on the PCB

Insert the red LEDs into the topside of the PCB, making sure the long lead is aligned with the "+" symbol on the PCB

Then insert the 8 black jack sockets into the topside of the PCB, as shown, followed by the green jack socket

Next put the washers onto each encoder shaft.

There are 3 types of washers, 'X', 'Y' & 'Z'

'X' is the smallest diameter thick washer

'Y' is the larger diameter thick washer

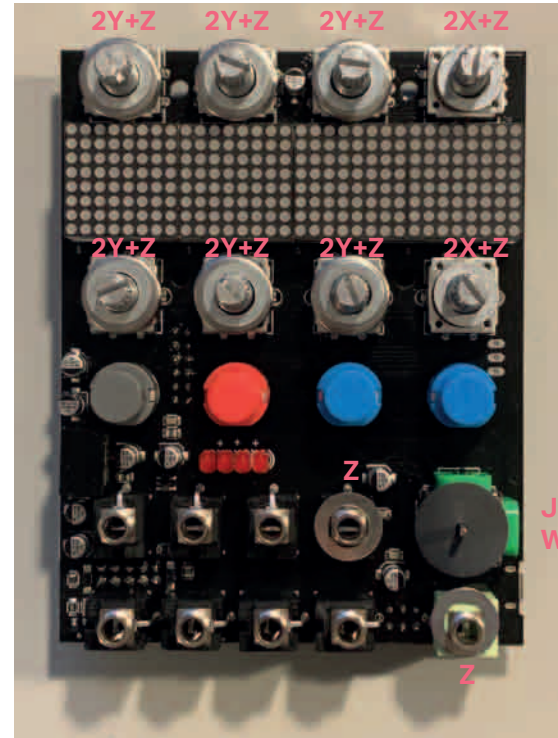
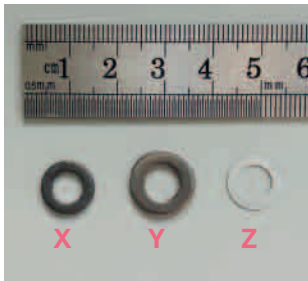
'Z' is the thinnest washer

On each of top right and bottom right encoders place 2 'X' washers and 1 'Z' washer

On all the other encoders place 2 'Y' washers and 1 'Z' washer.

Place 1 'Z' washer on Mono Jack (black) and Stereo Jack (green) next to the Joystick as shown. Place Black Joystick washer on Joystick.

Make sure the washers are all the way on and sit at the base of shaft

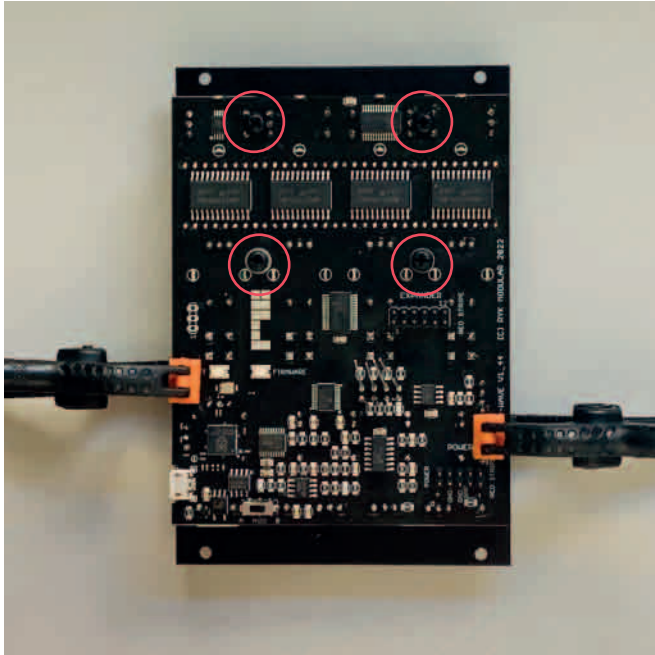


6. Place the panel without the perspex window, then using the provided long plastic screws, screw the PCB to the panel from behind. Tighten the screws enough to hold the panel tightly against the PCB, do not over tighten

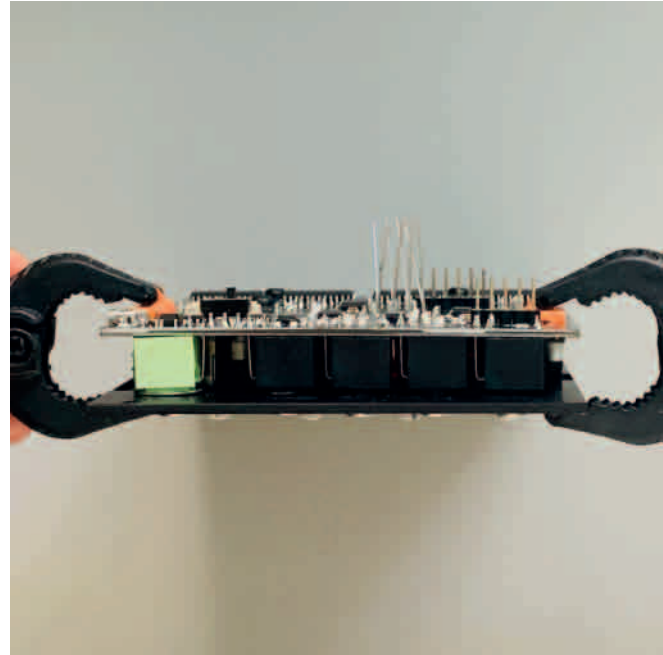
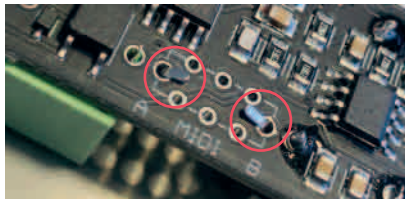
Check it is tight, by looking at the washers, they should be tightly in place, held by the panel.

Place two mini clips on either side of the panel, near the bottom end where the jack sockets are located. Check the panel is firmly holding the jacks in place.

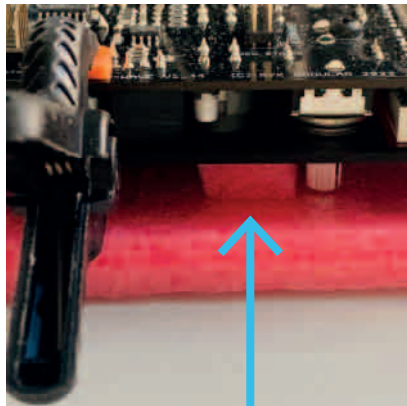
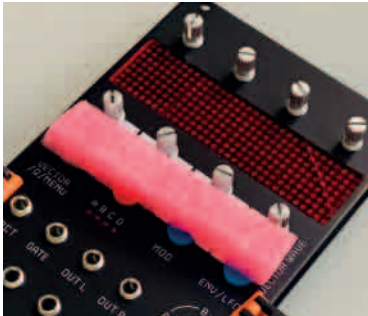




7. Please fold over the pins of the green and black jack on the back of the PCB where the 'MIDI' lettering is printed



8. Cut a strip of the some sponge (not included) wide enough to cover all the push button switches. Push flip the unit over, place the sponge stripe against the front of the push switches, then lay the unit on top of the remaining sheet of sponge. Make sure the layers of sponge are pushing the switches firmly against the PCB.



9. Solder the push button switches in whilst maintaining gently pressure on the PCB to keep the sponge pushing against the switches.

10. Then solder the pins of the encoders onto the PCB, but please note do not solder the larger body legs of the encoders. Do not solder the middle pins of the two encoders where the plastic screws on the PCB are touching them, solder these later after removing the screws.

Take your time heating the pads first with the iron, before applying the solder to the pad and pin.

If the solder does not flow well, try wiggling the pin a little bit whilst applying the iron to encourage the flow of solder.

11. Push the red LEDs through into the panel holes, make sure they are flush before soldering each one. When soldered, carefully snip the legs taking care not to damage the surrounding SMD components



12. Now solder all the jack sockets.

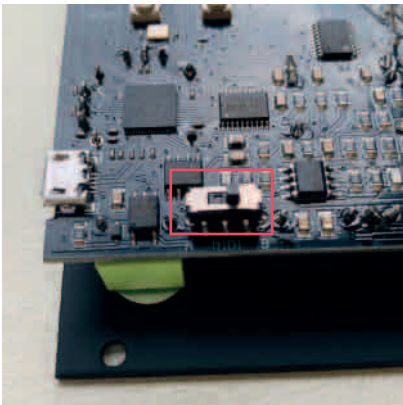
13. Next unscrew the two plastic screws next to the two encoder pins, allowing you to solder these remaining centre pins.

Inspect all the solder joints, take your time to make sure there is a good solder connection between pins and pads

Unscrew the other two remaining plastic screws. Before removing the panel, flip over the module, so that the panel is face up. Remove the panel and place to one side.

[NB be aware of the washers on the encoders which will fall off when you remove the panel with the module upside down]

14. Insert the micro switch onto the back of the PCB, it will sit slightly on top of the jack socket pins
Solder from the topside between the two jack sockets, taking care not to touch the plastic of the jack sockets.



15. If all ok, place the perspex window into the panel and put the panel back onto the PCB.
Screw the plastic screws back into the panel, and tighten just enough that the washers are snug

16. Next carefully open the bag 'F' of knobs, take care not to loose the plastic spacers (Some spacers might be inside already !)
Place one spacer, upright with the hole facing upwards inside each knob



Hold the module sideways, and push each knob onto the encoder shafts making sure the spacers do not fall or turn sideways

Take out the joystick knob, align the slot with the joystick lever, and push firmly onto the joystick.

Finally screw on RYK ORIGINAL Black Jack nuts for all 9 Jacks.

Thats it !!

Now for a cup of tea, before calibrating the module !

17 . Firmware and Calibration

There are two stages to finishing the module, first of all calibrating the joystick and ADCs, then installing the Vector Wave firmware.

First to calibrate the module you will need to install the calibration and preset loader firmware.

Connect the module to a Eurorack power supply with the 10pin IDC cable to the pin header marked POWER on the bottom corner of the module

Take care to make sure the cable stripe is aligned with the arrow and 'Stripe' text on the PCB.

Once connected power up the module, you will not see any flashing lights yet, as we need to install the calibration firmware.

Using the supplied USB cable, carefully connect the module to the micro end of the cable, and connect the other end directly to your computer [not via a USB Hub]

Once connected, on the module push and hold in the 'Firmware' button, whilst pressing once the 'Reset' button then release the 'Firmware' button.

You should see a USB Disc show up on your computer named "RPI-RP2", please copy or drag the "VWave_V1.25_Preset_and_Calibration_Kit.uf2" firmware file into the disk. If successful, the disk will 'eject' automatically, and the module will restart with the firmware.
If all is well the screen should show a display test, where all the pixels

light up row by row, and the A,B,C,D LEDs will also light
If you want to check this again, just push the 'Reset' button on the back of the PCB

The module is now in calibration mode

First rotate the lower left knob to select 'JOY CAL'

Push the lower right knob to start the Joystick calibration

Then continuously move the joystick around in a circle at the extreme edges of it's movement

When finished you should see four numbers display one after the other they should be something like 4080,4085,5,2 [+/- 10]

If these numbers are very different you should check the soldering of the joystick pins

Next you will need an accurate stable 5.000V reference source to calibrate the ADC inputs

The ADC calibration process goes through the five CV inputs [V/OCT , M1, M2, M3 & M4]

first calibrated to 0V, then 5V

Turn the bottom left knob to select 'ADC CAL'

First connect a jack cable to the V/OCT input, and touch the other end tip to the Gate input barrel [to connect the input to GND] keep this end of the jack touch GND for the whole 0V calibration procedure
Push the bottom right knob to start calibration, after each input option is displayed push the bottom right knob to calibrate the input, then you can unplug the jack ready for the next input before proceeding

When all the inputs have been calibrated for 0V, the display will indicate 5V

Connect the free end of the jack cable to your 5V reference supply
Then connect the other end to the V/OCT input

Push the bottom right knob to start the calibration procedure, and again after each input
When finished the display will indicate 'DONE'

Finally you can install the voice patches to the module
Turn the bottom left knob to select 'P-VOICE'
Push the bottom right knob to begin loading the voices, this takes a minute or so to complete
When finished the display will indicate 'DONE'

Finally you are now ready to install the Vector Wave firmware

As before, push and hold in the 'Firmware' button, whilst pressing once the 'Reset' button then release the 'Firmware' button

You should see a USB Disc show up on your computer named "RPI-RP2", please copy or drag the "VWave_V1.25.uf2" firmware file into the disk
If successful, the disk will 'eject' automatically, and the module will restart

Now the Vector Wave is ready to use, please read [some of !] the manual for instructions and tips on usage

Have Fun !!

