

Victor QRP Radio



DIFFICULTY LEVEL
EASY

Morse Key Assembly Manual

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1 Introduction

Thanks for your interest! Recently my son has developed some interest in Morse code and has indicated that he would like to practice Morse signaling and recording.

Now I want to be careful with my Morse key so I looked for alternatives. I have developed a kit to build a Morse key with standard materials for him to build and to practice with. When I showed it to a few other people, they indicated that they were also interested in it.

I designed the Morse key kit with the idea that my 8 year old son should easily be able to assemble it within an hour. Because it will be used by youngsters it should be quite robust, however. I looked at various options (for example wooden parts, laser cut (acrylic) parts and such) but found that in many cases the cost would rapidly rise or it would take a lot of time in the preparation phase. One time at work I was discussing the characteristics of a certain PCB material we are using for one of our products and whether the springiness might be an asset or a liability for a certain product. That's when it clicked and I decided to experiment with various PCB configurations.

The current design can easily be assembled within 30-60 minutes. The end result is a nice and professional looking product. The contact distance and the spring tension can be adjusted independently. It is quite robust and can withstand some serious abuse. On the back is a 3.5mm jack connector to which any type of cable and connector can be connected. It only weighs 105 grams so can easily be brought along or carried on a hike. In comparison: my Kent key weighs 665 grams and my Junker key weighs a whopping 1040 grams!

1.1 Acknowledgements

This kit could not have come together without the help of many people. I would like to thank to Lex Bolkesteijn PH2LB, Walter Ruetten DL6EBP, Ian Frith G4GIR and Luke Travis 2E0XXN for being beta testers and proofreading the assembly manual. This kit would not have reached the current level of maturity without your scrutiny, all your feedback and suggestions!

Thank you!

1.2 Disclaimer

The Morse key kit and the assembly manual have been compiled with the utmost care. However, the final quality of the kit heavily depends on the instructions being followed carefully.

You must accept that you and you alone are responsible for your safety and safety of others in any endeavour in which you engage. While the material on VictorQRP.com is provided in hopes that you build your kit, you are responsible for verifying its accuracy and applicability to your project. You are responsible for knowing your limitations of knowledge and experience. If you do any work with “main power” such as 120 or 240 VAC power wiring, you should consult a Licensed Electrician.

Please keep in mind that this Morse kit, like many other Morse keys, does have open contacts. It is therefore not recommended to switch anything except low DC voltages. Be careful when connecting to valve technology. To prevent RF burns do not switch higher power RF signals.

2 Parts List

Items	Description / purpose	Quantity
PCB-1	PCB Bottom plate 160 mm x 75 mm	1
PCB-2	Morse Tap 150 mm x 55 mm	1
Knob	39mm black knob	1
M4 x 10mm	Cheese head screw, to fix knob to PCB-2	1
M4 washer		1
M3 x 6mm	Cheese head screw, to fix PCB-2 to standoff	4
M3 x 15mm MF	15mm M3 male-female hexagonal stand-off,	5
M3 knurled nut	Position 5 th stand-off as tension adjust	1
M3 washer	Prevents damage to PCB silkscreen by knurled nut	1
M4 x 6mm	Cheese head to mount dome nut to PCB-1	1
M4 Dome Nut	Dome nut on PCB1 as contact point	1
M3 Tooth Washer	Serrated washer to PCB-1 on stand-off	4
M3 nut	Nut to lock stand-off	4
Rubber feet	Non-skid rubber feet at bottom of PCB-1	6
M4 Knurled Nut	Distance setting of the thumb screw	2
M4 x 20 Thumb screw	Flat Knurled Thumb Screw	1
3.5mm F jack stereo	3,5mm Stereo female jack (pre soldered on PCB)	1

3 Tools Needed

Only a handful of tools are needed for the assembly :

- Screw driver – Pozidrive # 1 (for M3)
- Screw driver – Pozidrive # 2 (for M4)
- Flat nosed pliers (to keep nut in position while tightening screws)
- Soldering iron (optional, see chapter 5 Usage and Adjustments)

There are many different transmitter and transmitter kits on the market with many different key connections. This Morse key features a dual pole screw terminal. The user needs to supply a cable between the Morse key and the actual transmitter or transceiver.

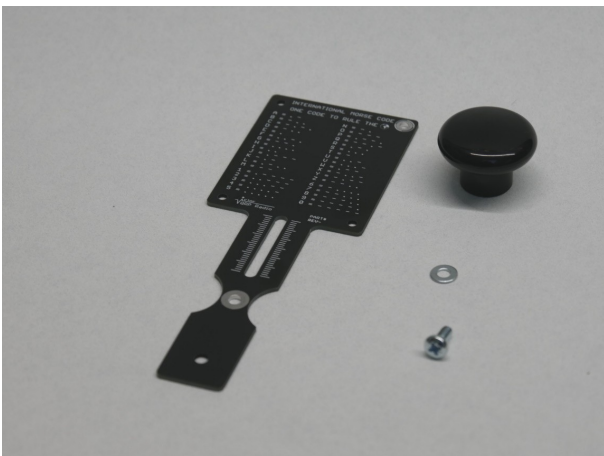
4 Assembly

4.1 Before Assembly

Check that the parts as listed are all present. If not, please contact me before proceeding with the assembly. Always work in a well lit and clean area. Use a flat box or a lid to keep all the parts together that have not yet been used, so that they cannot be swept off the table incidently. Work at a relaxed pace, being in a hurry is an excellent recipe for goofing up¹.

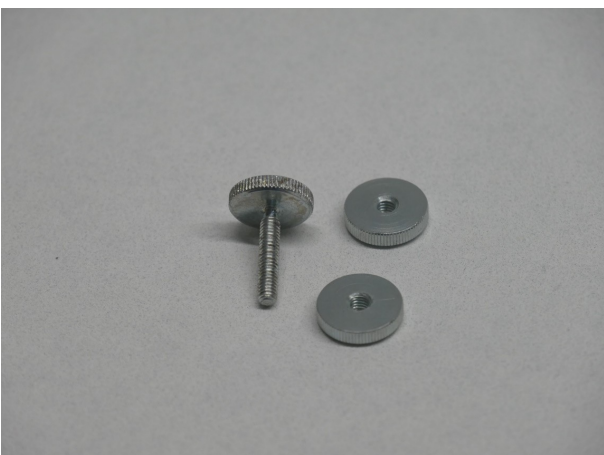
4.2 Mount Plastic Knob

Use the M4x10 cheese head screw and the M4 washer to mount the plastic knob on Morse tap PCB (PCB-2) . This is the top PCB with Morse code alphabet printed on the top side. The knob goes on the top side, the M4 screw is applied from the bottom side.



4.3 Mount Contact

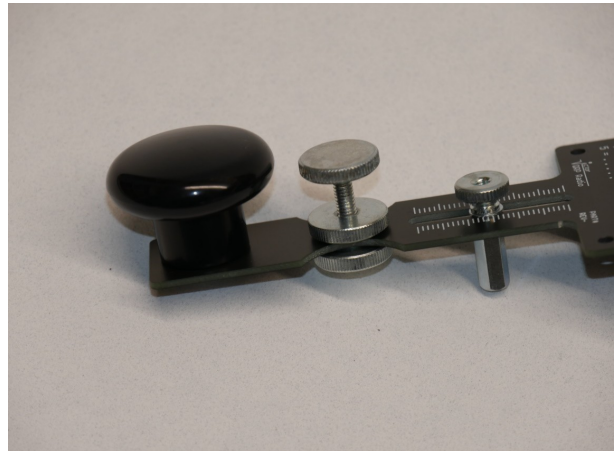
In this step the M4x20 thumbscrew and the M4 knurled nuts are needed. Screw one of the nuts circa 10mm on the screw. Stick the assembly through the plated 4mm hole in the PCB and lock this in place with the 2nd knurled nut. The protruding parts of the knurled nuts point towards the PCB.



¹ Don't ask me how I collected this tribal wisdom, it's too painful to tell ;-)

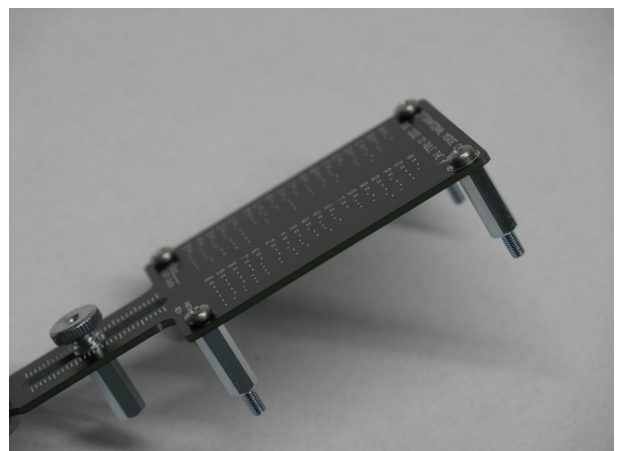
4.4 Tension Adjust Stand-off

Stick one of the 15mm male-female stand-offs through the slot milled in the PCB. Place the washer on top and use the M3 knurled nut to lock the stand-off in place. The exact position is not important, yet. It can be adjusted later.



4.5 Mount Stand-off

Mount the 4 remaining 15mm stand-offs on the corner of the Morse tap PCB with the M3 x 6 screws. Make sure the male part is protruding downwards.



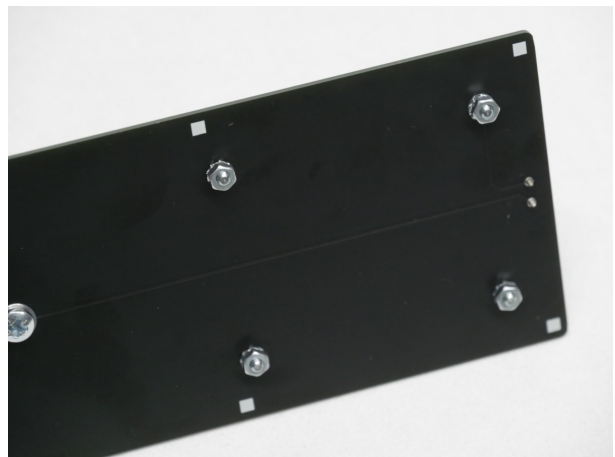
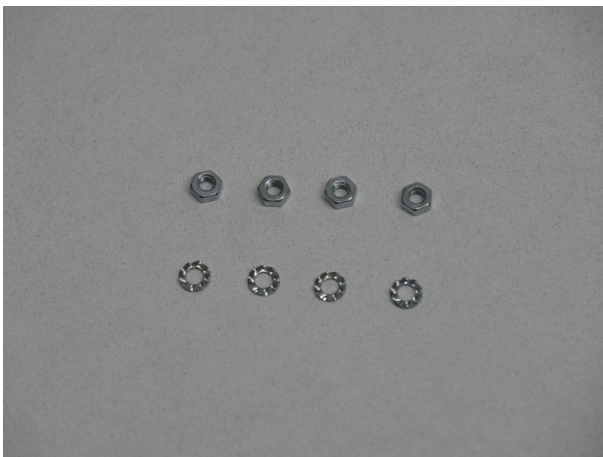
4.6 Mount Dome Nut

Use the M4 x 6mm cheese head screw to mount the dome nut on the top side of PCB-1.



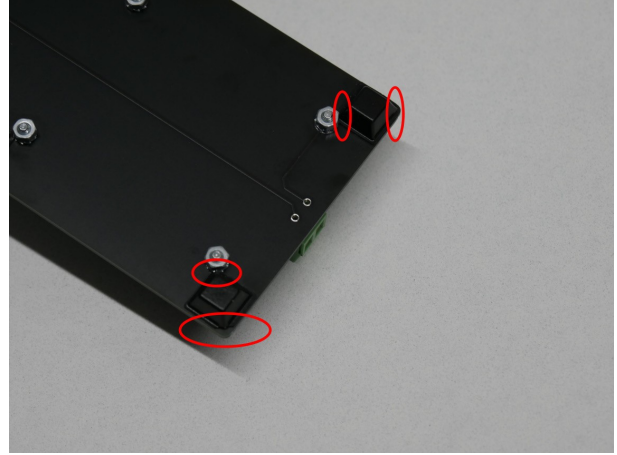
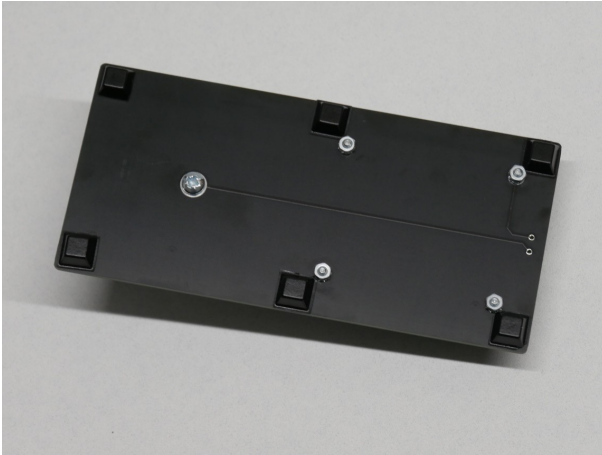
4.7 Sandwich PCBs Together

Stick the male ends of the 4 stand-offs on PCB-2 through the 4 holes in PCB-1 and use the 4 serrated washers and 4 M3 nuts to bolt it all together.



4.8 Rubber Feet

Stick the rubber feet to the bottom of PCB-1 on the positions indicated with the white squares. On the back-end of the PCB, near the connector, the space for the feet is a little tight. Before mounting the feet there, snip off a small piece of two opposite corners with a side cutter or pair of scissors (see photo). It should fit snugly now.



5 Usage and Adjustments

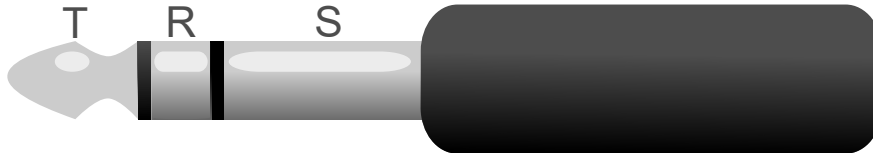
The tension of the lever and the contact distance can be changed independently. It is probably best to start with the tension adjust in the middle and a contact distance off around 1mm.

To increase the stiffness, move the tension adjust stand-off forward (in the direction of the plastic knob.) To decrease the stiffness, increase the length of the arm by moving the stand-off backwards in the direction of the connector. Try different settings to see what best suits you.

To change the contact distance, loosen the upper knurled nut a notch and move the thumb nut up and down to increase or decrease the contact distance. Then twist the upper knurled nut clockwise again to lock the bolt in position. If you have less experience with Morse it is probably best to have a larger distance, with increasing experience and confidence the contact distance can be decreased to your liking.

Solder the green screw terminal in place on the base PCB (PCB-1). On the top side of this PCB there is an electrical conductive mounting hole. The bottom side of this PCB is, where there are 6 white squares to indicate the position of the rubber feet (will be mounted in the last step).

To connect the Morse key to a Morse sounder or to a radio, two different options are available. A 3.5mm female jack connector has been pre soldered to the base PCB. By default the connection is to the tip (T) and the sleeve (S) of the jack.



If the rig is set-up to use a connection between tip (T) and ring (R), use a sharp knife (like a scalpel or snap-off knife) and sever the connection middle pad and the sleeve pad.

Use a soldering iron and some solder to create a connection between the centre pad and the ring pad.

If a jack connector is not available on the rig or Morse sounder, the two solder pads can be used to connect some wires to.

6 Learning Morse Code

Some people see it as a challenge, but for many people it is something they dread learning to absorb the Morse code.

However, the Morse Code is just another language. You once learned your mother's language with its own sounds and it is no different with Morse code! A toddler learns the language through constant contact and because he makes mistakes that are lovingly corrected. Also, parents do not start to communicate with a child at a high level, but with simple words and the vocabulary is gradually expanded.

There are many different ways to learn Morse code. The local amateur clubs often offer classroom training to learn how to record Morse code and there are often old-timers available to help you. Morse lessons are often broadcasted at certain times by the national amateur radio clubs.

Nowadays, there are very good Morse trainers to be found on the web. Two examples of very good Morse trainers are:

- Learn CW Online website <https://lcwo.net/>
- G4FON (sk) Morse trainer <https://www.g4fon.net/CW%20Trainer2.php> A very nice stand-alone program for learning the code. Works also on Linux using the wine framework.

Both trainers work according to the Koch method, i.e. the characters are sent at normal speed but the time between characters is longer. This is done so that you learn to recognize the sound of the character. Because the intercharacter time is longer, your brain has a little more time to recognize which character is being played. If you get a certain percentage right, you can increase the number of characters.

What is important for learning Morse code, and perhaps any language, is that you have the opportunity to practice it regularly. So don't start just before a deadline, but rather in a period when you know you can practice regularly, preferably daily.

Secondly, there are times when things don't go your way, when you seem to have forgotten everything and misunderstand every character. This is completely normal. Take a break and try again. If it really doesn't work out, end it for the day and pick up where you left off tomorrow.

Above all have fun and enjoy the challenge!

7 Notes

8 Version History

Revision	Changes
0	-
A	Acknowledgements Introduction Disclaimer Clarifications and corrected typos.
B	Added Learning Morse Code chapter Improved styling, corrected many typos Contact details.
C	Changed connector 3,5mm jack

9 About Victor QRP Radio

Victor QRP Radio is run by PA3COR. When I was about 10 years old I got bitten by the radio bug. I tried disassembling my RC model car. While the disassembly went smoothly. The reassembly went less so..... It got assembled alright but failed the work and this got me really intrigued. I could understand the mechanical part of the car more or less but all the metal cylinders with colour codes or blue plastic tubes were a mystery to me...

This got me started with a career in electronics. After high school, I went straight to university to study electronics and I have been lucky enough to become a professional EE engineer. I spend my office hours working analogue sensing circuits, embedded software and EMC testing. At night I am an avid radio amateur and love to tinker with all kind of circuits. Often releasing the magic smoke but above all still in wonder about the magical world of electronics and enjoying the process of learning ever more!

Now almost 40 years later I am lucky to have an 8 year old son who is also starting to get intrigued by all the stuff and wires on his dad's work bench. I've decided to combine my professional experience in electronics design and my desire to introduce my son in the world of radios and electronics.

The goal is to have kits that are easy to assemble, deliver an end product that is fun to use for a good price.

For inquiries and more information use : contact@VictorQRP.com

For technical support please use : TechSupport@VictorQRP.com

I also provide design services, if interested please use : design@VictorQRP.com

Enjoy using this kit!

73 de Cor PA3COR

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