

microTutor Build-A-Thon edition

The microTutor is a no nonsense back to basics old school Morse Tutor. It uses a modern micro controller chip that gives features that you would expect in much more expensive units.

Let's look at its features:-

Modes: 6

- 1:- Random Letters (In 5 figure groups)
- 2:- Random Numbers (In 5 figure groups)
- 3:- Random Prosigns
- 4:- Random Mix of Letters, Numbers, & Prosigns (5 figure groups)
- 5:- International Callsigns, In this mode the pitch and the speed change by approx. +/- 15% to add to the realism and to make things less tiring for longer sessions.
- 6:- Contest Mode, Speed and pitch changes as above but sends a simple contest over, callsign then 5NN and either a three or four digit serial number, the serial number may sometimes use 'Cut' numbers so you may hear 6092 or 6TN2 for example.

Controls:

Adjustable Volume

Adjustable Speed (approx. 8 to 30 WPM) Adjustable

Gap (approx. upto 4 seconds)

Adjustable Pitch via user setup options (can be changed whenever you wish)

External Connections:

Straight Key Input for use as a practice oscillator (3.5mm Mono plug on key needed)

Headphones out socket (3.5mm mono or stereo)



Using the microTutor

This is refreshingly simple to use, no menus!

Turn the Power/Volume control to start the tutor and that's it your away, adjust the gap and speed control to your preference and start improving your code speed. To change modes press and **hold** the mode push button for a second or so and you will hear a higher pitch Morse letter. L for Letters Mode, N for numbers mode, P for Prosigns, M for Mixed, C for Callsign mode, and CT for Contest Mode.

The on-board battery pack is just 2 standard AAA cells that will last a very long time.

To use the tutor as practice oscillator

To increase the tutors value it can also act as Practice Oscillator.

To use this feature plug your key into the rear connector (3.5mm Plug needed) , **hold the key down and turn on the tutor**. The microcontroller looks at the key input at power on and will detect the key now. It will automatically switch to oscillator mode.

The headphone socket needs a standard 3.5mm plug so that normal Walkman type headphones or earphones can be inserted.

Tips for improving your code speed.

It's very easy to fall into a common trap that can cause you problems with listening to real life Morse. Do not try to count Dits and Dah's to work out the letters. Start to learn the 'sound' of the letters from day one. Set the speed control to a realistic speed (I find setting the SPD control at the 12 O'clock position is about right to start with, about 12 - 14 WPM), adjust the GAP control to give you more thinking time. This way you will learn the characters at the right sound and although it may seem hard at first it will be easier when you listen on air (which is the point of learning the code isn't it)

Spend about 10 minutes a session listening to code, much more than this isn't helpful. Take a break between sessions and you will come back fresh and ready to learn.

Above all, enjoy it and enjoy using the microTutor. Good luck with learning Morse. 73 Paul MOB MN (Phoenix kits)

Building the microTutor

The microTutor is an easy to build project designed for both the beginner and the more experienced builder.

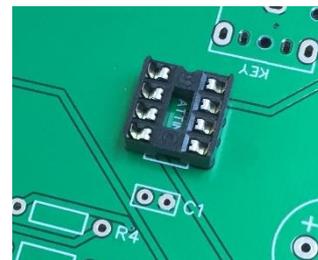
Check you all the parts needed are with your kit:-

- 1 x microTutor PCB
- 1 x AAA battery Holder
- 1 x 8 Pin Dip Socket Holder
- 1 x Mode PCB Push Switch
- 1 x PCB Mounting Sounder
- 1 x Red Power On LED
- 1 x Audio Amplifier Transistor (2N2222)
- 1 x microTutor Control Chip
- 1 x 0.1uf Capacitor (orange disk marked 104)
- 1 x Volume Control with built-in on/off switch
- 1 x Gap control (10K potentiometer)
- 1 x Speed control (10K potentiometer)
- 2 x 3.5mm PCB Jack Sockets
- 5 x 3K9 $\frac{1}{4}$ watt Resistor (1st two bands Orange, White)
- 1 x 1K $\frac{1}{4}$ watt Resistor (1st two bands Black, Brown)
- 3 x Control Knobs
- 4 x Stick on rubber feet

Step one

Fit the 8 pin IC socket

There is a small notch in the socket on one of the short edges, this notch should be towards the top of the board.



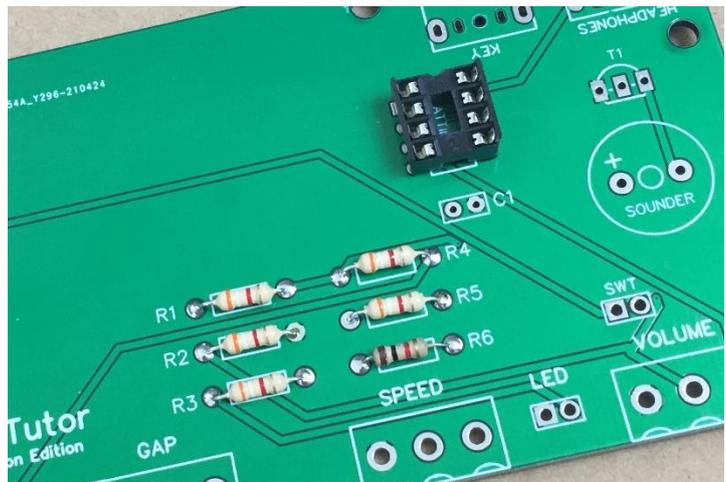
Step 2

Fitting the resistors

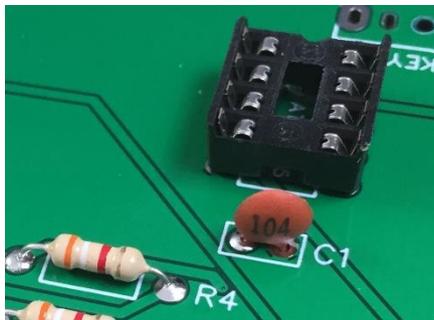
R1 to R5 are all the same value, 3K9, the colour bands on the resistor tell you the value, the first 2 bands are Orange and White. The resistors can be fitted either way round.

Next fit the last resistor R6, which is 1K (first two bands are Black and Brown).

Do a visual check, Resistors R1 to R5 should all look the same and only R6 should look different. Now keep the leads you have cut off, you will want some of them later!



Step 3



Fit the Capacitor C1

There is only one capacitor in this kit its value is 100nf, it is marked 104.

Step 4

Fit the two 3.5mm PCB sockets, they can only be fitted one way round and are both the same type.



Step 5

Fit the Transistor

There is just one transistor in this project, it is used to amplify the audio from the controller chip to drive the small on board sounder or external phones/speaker.

The transistor *MUST* be fitted the right way round. On the board the shape of the transistor is shown, carefully push the transistor down onto the board so its shape matches the image. Don't push the transistor right down on the board, you will break the legs off if you try! It should stand on the board with around 5mm of leg showing.



Step 6

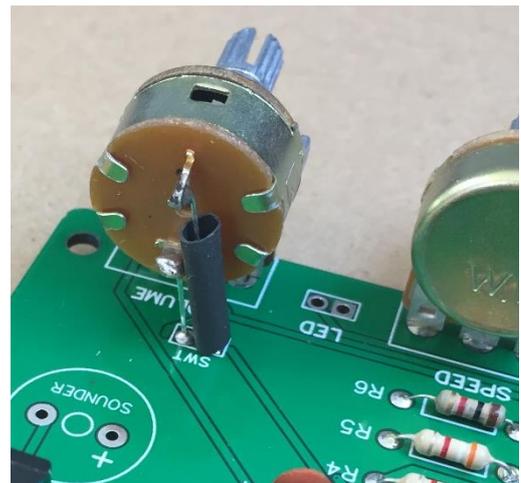
Now fit the speed, gap and volume controls,

The Gap and Speed controls are both the same but the volume control has an extra set of contacts on its rear, this is the on/off switch contacts. Make sure this special control is fitted in the position marked Volume on the PCB.

Step 7

Now we need to wire the switch contacts, find two nice off-cuts from the resistors. (Remember I told you to keep them)

Solder them as shown in the picture here, use a small piece of heatshrink that came with the kit to insulate one of the wires, no need to shrink this.



Step 8



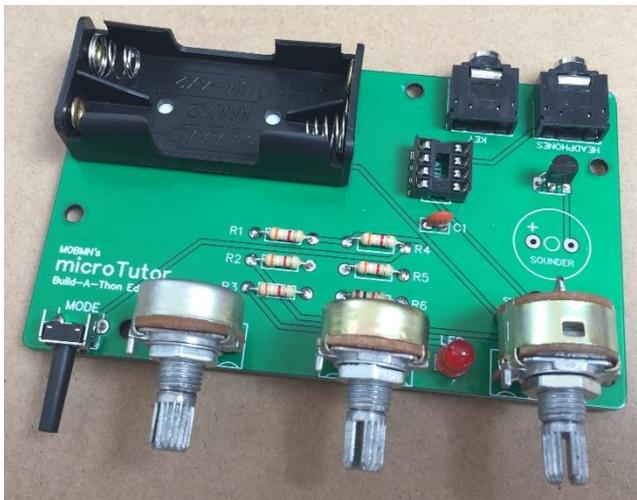
Now we will fit the power on LED, look carefully at the LED you will see it has one leg longer than the other, the long leg must go in the small round hole in the position marked LED on the board. (See picture)

Step 9

Now we need to fit the mode select switch, this will sit flush onto the PCB on the far left of the board. Your switch may not be so long as the one shown here.



Step 10



The battery holder needs to be fitted now, on the back of this you will find a double sided foam pad, remove the backing and CAREFULLY fit the holder. Now a word of warning, if the leads are long then they will need to be cut, these pins are tough, they need some heavy

duty cutters to cut the legs, I have an old pair of large cutters I use for this job. The legs when cut fly off at speed, be careful not to get hurt by these, protect your eyes (and those around you!) you should really wear eye protection when building kits but many of us don't, if you choose not to then take great care with this stage!

Stage 11

Now we are almost done, we need to fit the sounder, we have left this till last for a reason, there is a small magnet inside the sounder that attracts every bit of offcut with in miles! If you don't take care you will find that they get inside and you will never get them out. My advice is to put a small bit of tape over



the hole in the sounder to stop this happening. Look at the sounders top on the picture above, you will see a small '+' symbol (Between the 9 and the K), this must be nearest to the chip socket when fitted. Now heres a great little tip, the sounders best frequency response its peaking higher than what we would like for our Morse tutor, this reduced the volume from it at 600-800Hz. If you put the tape spoken about above over the sounders hole you will be surprised by the significate volume increase, not what you would expect. Whats happening is that by blocking the sound exit hole this way the back pressure changes the sounders frequency response and brings its peak output level much lower in frequency. I also believe that the tone quality sounds much better too. Give it a try and be surprised.

Step 12

That's it built! Plug the chip into the socket so the small dot on the chip is towards the top edge of the board. Pop two AAA batteries into the holder and turn on. If all good the red LED will come on and if you turn the gap control fully anti clockwise and the volume up you should hear Morse!

Setting up the Tutor

The Tutor is very easy to use but you may want to set the pitch to a different tone first, if so here's how to do that. You can do this anytime you wish.

Turn it off. Press and HOLD the mode switch while turning on the tutor. You will hear the tutor send the letter A, the pitch may not be to your liking. Now while still holding the mode switch in adjust the GAP control to adjust the pitch. When

you're happy release the mode switch and the tutor will save this pitch value into its memory for future use, you can change it again any time you like. It's a sign of the times but it's very easy for someone to just copy the code used in products like the microtutor and claim it's their own. So to identify this code as mind if you quickly press the Mode button again when you exit setup the tutor will send my callsign in Morse (MOBMN), if you hear that don't worry it's just to identify the owner of the code.

Morse Code

A	● ■■	N	■■ ●
B	■■ ●●●	O	■■ ■■ ■■
C	■■ ● ■■ ●	P	● ■■ ■■ ●
D	■■ ●●	Q	■■ ■■ ● ■■
E	●	R	● ■■ ●
F	●● ■■ ●	S	●●●
G	■■ ■■ ●	T	■■
H	●●●●	U	●● ■■
I	●●	V	●●● ■■
J	● ■■ ■■ ■■	W	● ■■ ■■
K	■■ ● ■■	X	■■ ●● ■■
L	● ■■ ●●	Y	■■ ● ■■ ■■
M	■■ ■■	Z	■■ ■■ ●●

Prosigns

(.)	● ■■ ● ■■ ● ■■
(/)	■■ ■■ ●● ■■ ■■
(?)	●● ■■ ■■ ●●
(/)	■■ ●● ■■ ●
(=)	■■ ●●● ■■
(AR)	● ■■ ● ■■ ●
(BK)	■■ ●●● ■■ ● ■■
(CT)	■■ ● ■■ ● ■■
(VA)	●●● ■■ ●●
(KN)	■■ ● ■■ ■■ ●

Numbers

1	● ■■ ■■ ■■ ■■
2	●● ■■ ■■ ■■
3	●●● ■■ ■■
4	●●●● ■■
5	●●●●●
6	■■ ●●●●
7	■■ ■■ ●●●
8	■■ ■■ ■■ ●●
9	■■ ■■ ■■ ■■ ●
0	■■ ■■ ■■ ■■ ■■