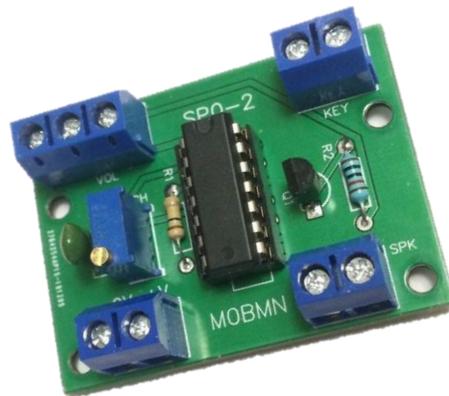


## Morse Practice Oscillator project.

Here is a simple code practice oscillator that works very well, is low cost and easy to build.

Most code practice oscillators use the good old NE555 chip to generate the tone, there is nothing wrong with that and done correctly they produce a decent tone, it does have a few drawbacks. It's difficult to produce a proper 50% duty cycle wave form and the typical method of altering the volume produces some shift in pitch as the volume is changed.

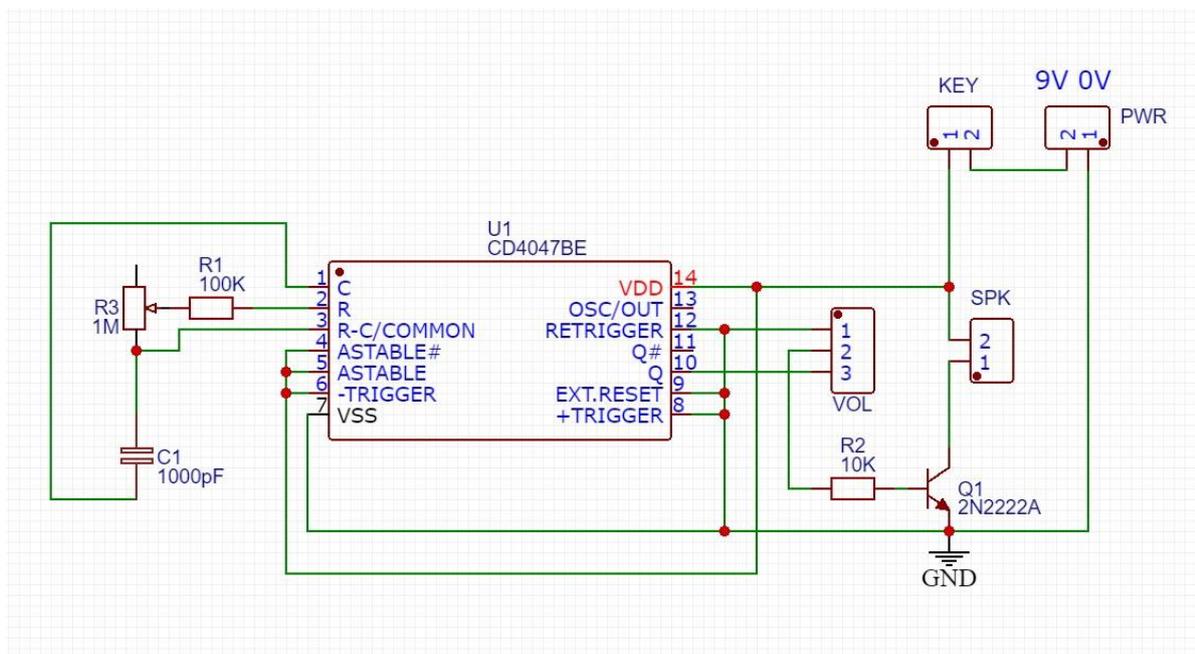


This oscillator is designed to overcome these problems and does so while keeping the cost low.

This circuit uses a 4047B multivibrator which produced a true 50/50 duty cycle at all its frequencies and does sound much better as a result, also it is not effected by freq shifts as the volume control is altered.

A number of commercial Code Practice Oscillators (CPO) use this circuit with slight changes to component values due to using less modern parts.

You should be able to build this in well under 1 hour even if you haven't built anything before. It's a good project for beginners or anyone doing the novice training scheme. let's have a look at the circuit



**Your first job is to check that you have all the parts**

### Part List

- PCB
- CD4047B IC
- 14 pin DIP Socket
- 10K Potentiometer c/w Knob
- 2N2222 (or 2N2222A)
- C1 1nf (1000pf) Capcitor (Marked 102)
- R1 10K ¼ watt Resistor  (This is different from circuit above)
- R2 10K ¼ watt Resistor
- R3 1M ohm trimmer Resistor
- 2 Inch (50mm) 8 ohm loudspeaker
- 3.5mm Key Socket
- 1 x 3 way PCB Terminal Block
- 3 x 2 way PCB Terminal Block
- 9v Battery Clip & Wire

Tick off each part as you check.

### Now to build your CPO.

The first job is to fit the 14 way socket, if you look carefully at the socket you will see a small notch at one end, this is the top of the socket and the notch should be arranged to be at the top of the PCB with the notch on the sockets outline marked on the board.

Make sure no legs of the socket are bent under when you fit this part.

Next fit the two resistors R1 and R2.

R1, R2 are both 10K resistor (BROWN, BLACK, ORANGE)

Note :- The circuit shows R1 as 100K, this was changed due to a few constructors mixing up the two resistors, with R1 now 10K the frequency range of the oscillator has been changed, it is now approx. 200Hz up to 20Khz. If you want a lower top frequency then you can change this value if you wish but with both R1 and R2 the same no one can mix them up, since I am using a 25 turn trimmer for frequency control it is still easy to set the pitch of the oscillator. You could use the oscillator for other uses too now.

Next fit C1.

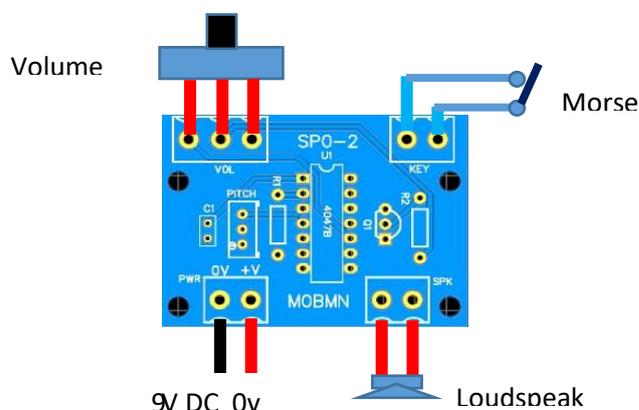
C1 is a tight fit so don't try to push it right down to the PCB, it will stand with its leads about 5mm off the board. It's the only capcitor in the kit so you cannot really go wrong.

Now we will fit the Trimmer, this is blue in colour with a small brass screw on the top. On the PCB outline for this a small white circle shows which end the screw should be.

Next fit the transistor. This **MUST** be fitted the correct way round. The layout on the silkscreen shows one side is flat. The transistor also has one flat side, this must be positioned to match the layout.

Push the transistor so about 5mm of lead is above the board and carefully solder in place.

If you wish you can now fit the terminal blocks or you can wire directly to the controls and power lead.



Practice oscillator Wiring details.

Once the wiring is complete plug the 4047B chip into its socket, make sure you fit this the correct way.

Look at the chip and you will see a small dot on the plastic near one pin. This dot tells us which is pin 1, this pin needs to be at the top of the board near the chip I.D. on the board (U1). Take care as the legs will be spread apart a little wide as supplied by the manufacturer

Now we just need to setup the oscillator.

With power applied and a key in the socket when you press the key down you should hear a tone. If not check the wiring and all the solder joints on the board. It's an easy to build project so should not be too hard to get working.

Once you have tone, adjust the volume to a comfortable level. Adjust the small brass screw to change the pitch of the oscillator. Most 'Hams' use tones of between 500 and 800Hz but you can use any tone you like.

That's it, you're done! Fit the oscillator into a box and get practicing.