A KEYER FOR THE HANDICAPPED HAM AND/OR MOBILE OPERATION

By Luiz Amaral
PY1LL/PY4LC

There are two problems in the CW (morse telegraphy) with no mutual relationship, but with a common solution:

1 – the ham in land mobile CW operation has to do it with the vehicle stopped and, many times, with the keyer on his thighs with extreme discomfort.

2 – the handicapped ham that, with problems in moving his hand, is impaired to transmit his code.

Apparently there is nothing in common between those two cases but both problems can be solved using the same system.

I had too much trouble and annoyance when trying CW land mobile operation and I found a solution. A little after, a handicapped German ham (I don't remember who he is) suggested that this would be the solution for him who loved CW, but a paralysis of his arms didn't let him to do it. I sent the schematics to him, but I don't know the results.

The idea was just to use the mouth sounds to generate the code. A microphone close to the mouth, but off the airflow that comes from it (These coupled to headphones are perfect), picks up the sound, that may be a whistle, or the sound 'A' (like of that in the word 'After'), for example is fine (the sounds 'U' and 'I' are not very suitable). A special frequency filtering system, sensible to period and level, 'cleans' the signal in order to be correctly detectable.

The block diagram of the system is presented in Figure 1. The sound coming from the operator mouth is amplified enough to be clipped, with only the periodic signal peaks being used. These are amplified with high gain and are transformed in rectangular periodic signals. The latter excite a monostable that generate real rectangular pulses with a width around 100μs that activate a retriggetrable monostable with width τ around 3ms and also are counted by a decimal counter that is self-blocked if its reaches the state '9'. The 'reset' input of the counter is activated by the monostable when the latter is active.

The sequence is:

The first rectangular pulse activates the monostable τ that resets the counter that counts the next pulses. If eventually the period of the signal is great than τ, the monostable τ comes back to its stable state and resets

the counter, preventing this to reach its '9' state, that being the system output, stays in its '0' state. If the input period is greater than τ, as the second monostable is a retriggerable one, this stays at its unstable state, letting the counter to go counting till it reaches its '9' state. And the output now is '1'. The output is monitored be a LES that lights accordingly to the morse code. A saída é monitorada por um LED que acende conforme os caracteres do código morse.

With this method, if the frequency is greater than $1/\tau$ and if there were less than 10 pulses, there will not be any output.

This process, besides forcing a minimum pulse frequency, it demands a minimum sequence of 10 pulses. So, very quick pulse trains as those of noise, or too much low input frequencies are discarded as not valid signals, and, therefore, don't generate any output. This corresponds to a filtering method that eliminates much of the interferences eventually pick-up by the microphone.

Normally a whistle in a normal volume makes the keyer to operate without much trouble. A little training time will be enough for the user to be used with the method.

Besides the whistles, sounds like 'da', 'do' and 'de' work fine, but sounds, for example, with the letter 'l', like 'la', 'le', etc are not very suitable. The consonants must be more explosive for better results.

I consider the results rather good, but it is possible that, with a longer field experience, we get more subsidies to develop a better filtering process.

In Figure 2 it is showed the electric diagram of the keyer. The supply is 12V (or even more) to be possible the CW operation in a land vehicle

ATENTION: The output circuit uses, in my case, an NPN transistor that works fine in the most of modern transceivers. If your radio needs a special control system, different from the presented here, you will have to modify it accordingly your needs. The use of a not suitable system can damage the keyer and/or the radio.
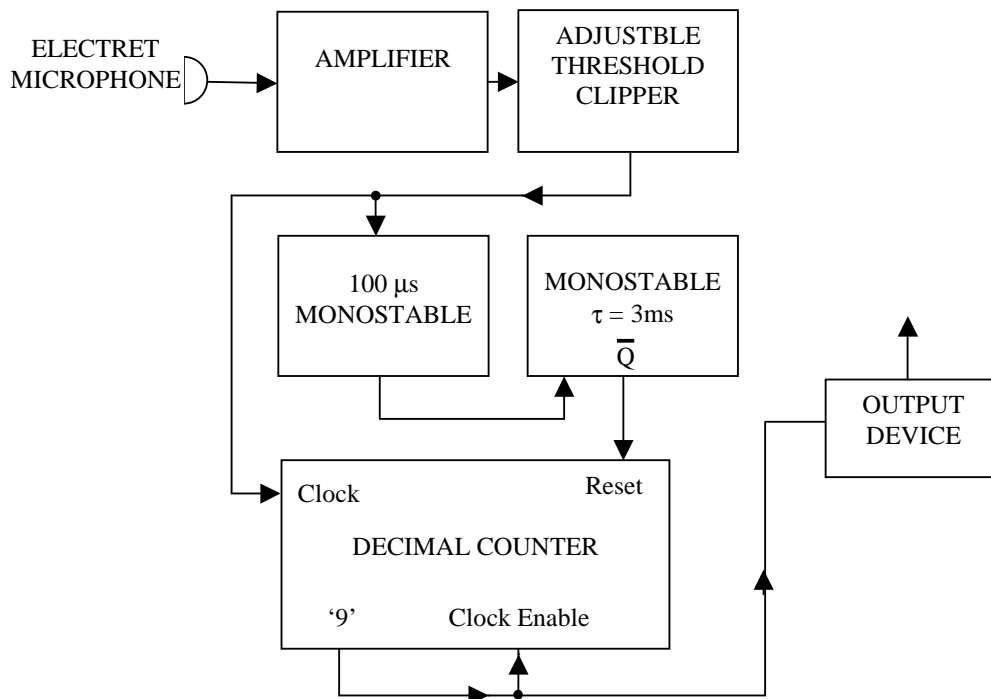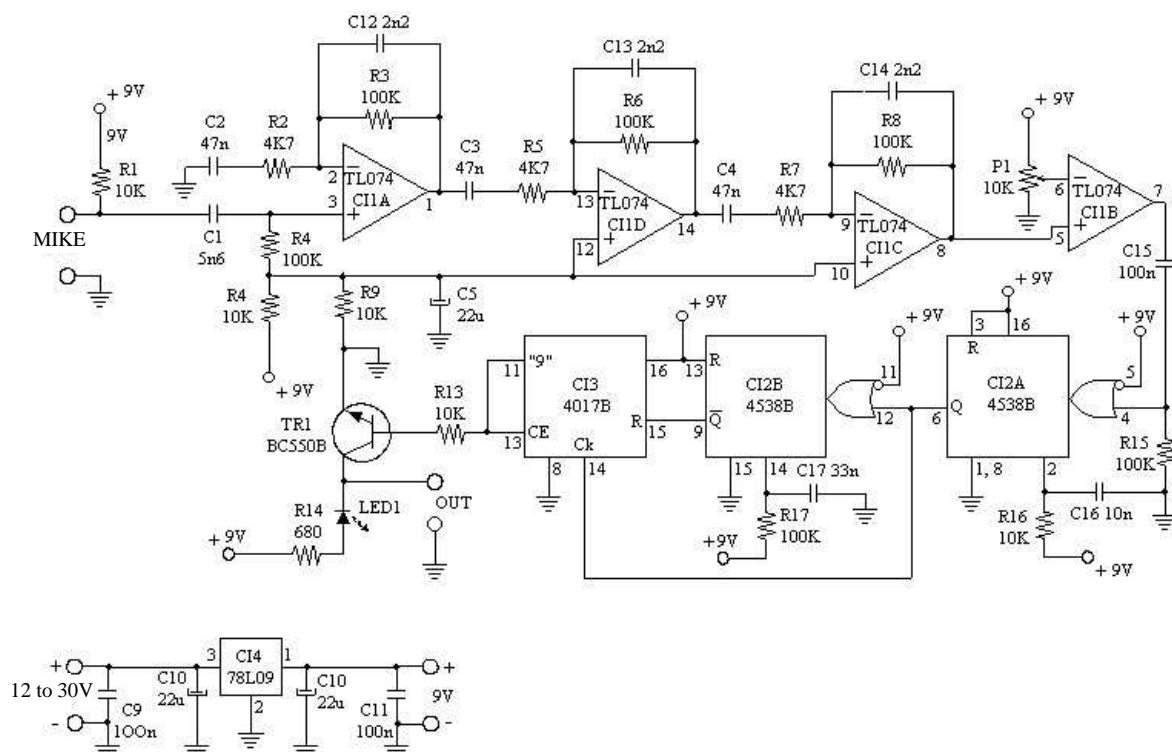
By Luiz Amaral
PY1LL/PY4LC

Figure 1

ELECTRET MICROPHONE

AMPLIFIER

ADJUSTBLE THRESHOLD CLIPPER

100 µs MONOSTABLE

MONOSTABLE
$\tau = 3ms$
$\overline{Q}$

OUTPUT DEVICE

DECIMAL COUNTER

Clock

Reset

'9'   Clock Enable

Figure 1

Figure 2

+ 9V
9V
R1 10K
MIKE

C2 47n
R2 4K7
C12 2n2
R3 100K

C1 5n6
R4 100K
R4 10K
R9 10K

2
3
TL074 CI1A
1

C3 47n
R5 4K7
C13 2n2
R6 100K

13
TL074 CI1D
14
12

C4 47n
R7 4K7
C14 2n2
R8 100K

9
TL074 CI1C
8
10

+ 9V
P1 10K

6
TL074 CI1B
7
5

C15 100n

C5 22u

R13 10K
TR1 BC550B

11 "9" CI3 4017B
13 CE   Ck
8   14

16 13 R
CI2B 4538B
15 9 $\overline{Q}$
15 14 C17 33n
R17 100K
+9V

11
12
6

3 16
R
CI2A 4538B
Q
1, 8 2

+ 9V

5
4
R15 100K

R16 10K
C16 10n

+ 9V

R14 680
LED1
OUT
+ 9V

+
12 to 30V
-
C9 100n
C10 22u
3 CI4 78L09 1
2
C10 22u
C11 100n
+
9V
-

Figure 2

**By Luiz Amaral
PY1LL/PY4LC**