CW "K" pip tone unit

By G8MNY   (Updated Jan 10)
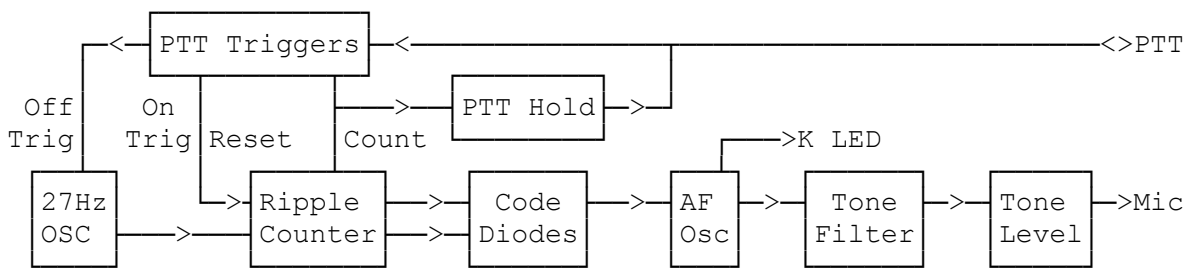(8 Bit ASCII graphics use code page 437 or 850, Terminal Font)

This is an add on for anyone who wants an optional automatic CW "K" PIP tone
after each over. This used to be popular for short SSB overs under QSB/QRM
conditions like during contests, as it stops doubling etc. & in my experiance
actually speeds up the contact with less contest oriantated stations.

Other Morse letters are possible, but not exceeding 9 time slots that this
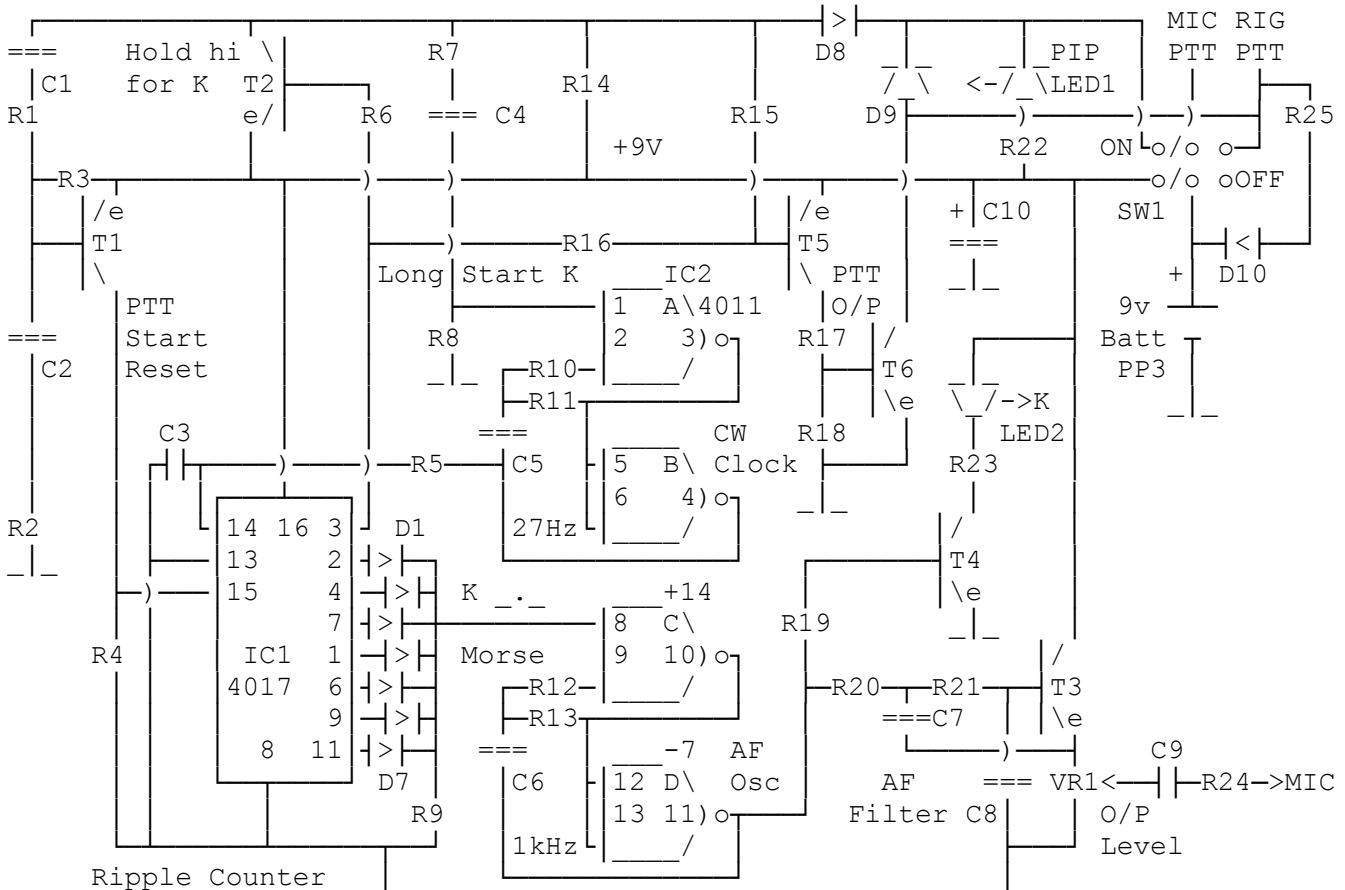circuit gives, see REPEATERS below.

It has an internal PP3 battery to run the unit while on Tx, which is very
lightly trickle charged from the PTT line on Rx to maintain the battery.

SCHEMAIIC

```
        ┌──<─┤ PTT Triggers ├──<───────────────────────────────<>PTT
        │    └──────────────┘
 Off│   On │          │    ┌────>─┤ PTT Hold ├─>─┐
 Trig│  Trig│ Reset    │Count └──────────┘        │
                                                      ┌────>K LED
 ┌────┐       │         │     ┌────┐          ┌───┐  │   ┌──────┐      ┌──────┐
 │27Hz│──────>│─┤Ripple │──>─┤Code│──>──┤ AF │─>─┤ Tone │─>─┤ Tone │──>Mic
 │OSC │       │ │Counter│──>─┤Diodes├──>  │ Osc│    │Filter│     │Level │
 └────┘         └───────┘     └────┘      └────┘    └──────┘      └──────┘
```

Features include an LED showing PIP tone is armed (lit during Tx overs) & a "K"
LED showing the K leaving.

CIRCUIT

```
                                                      ┌─>├
=== Hold hi \              R7              D8   _┌_    _┌PIP    MIC RIG
│C1   for K  T2     │       │     R14           / \  <-/_\LED1 PTT PTT
R1        e/   │ R6 ═══ C4   │    R15    D9├─────)─────)──)──   │
│─R3─────────)─────)─── │   +9V   │   R22   ON └o/o o─┤ R25
 │ /e              │        │         │      +│C10    o/o oOFF
 │ T1              )──R16──────T5    ═══       SW1
 │ \          Long │Start K  \ PTT  _┌_      │<│ D10
===  │             │  1 A\4011 │O/P  +  9v    │
│C2   PTT  R8     2   3)o  R17 │  Batt
│     Start  _┌_ ┌R10─│___/   │ T6   \_/─>K  PP3
      Reset     ┌R11          │ \e   │ LED2   _┌_
       C3    ═══      CW R18   R23
 ┌┤├──)─────)─R5──┤C5  │5 B\ Clock │    │
 │ 14 16 3 │ D1   27Hz│6  4)o        │ /
 │ 13   2├├>  K _._ │___/           T4
 │ 15   4├├>├ Morse  8 C\   R19     \e
R2│    7├├>├─R12│___/         _┌_
_┌_ IC1 1├├>├─R13│9 10)o ─R20┬R21─│T3
│  4017 6├├>├ ═══ │___/       ═══C7 \e
   9├├>├ C6 │12 D\ AF   ─)──  │  /
R4  8 11├├>├1kHz│13 11)o Filter C8 ═══ VR1<─┤├─R24─>MIC
        D7  │___/  AF            │ O/P  Level
       R9                        _┌_
Ripple Counter  _┌_          _┌_
```

COMPONENTS

C1,2,4,7,9. 10n   R1,2,3,5,6,10,11,12,13,15,16. 390kÛ
C3. 10p   R7,17,18,25. 10kÛ
C5. 47n   R8. 1MÛ
C6. 1n2   R4,9,14,19,20,21. 47kÛ
C8. 4n7   R22,23. 470Û
C10. 10uF   R24. 100kÛ
D1-10 1N4148   VR1. 10kÛ
IC1 4017 Cmos Ripple   LED1 Red
IC2 4011 4x Cmos Nand   LED2 Yellow
T1,2,5. Small signal PNP   SW1 Double pole C/O
T3,4,6. Small signal NPN

HOW IT WORKS

The On/Off switch, switches power & also re-routes the PTT line via steering
diode D9 (in case the battery is flat). A light trickle charge for the battery
via R27 & D10 is taken off the PTT line when on Rx whether the unit is switched
on or off & is low enough current to be suitable for most dry cells.

When Mic PTT is low the LED1 lights via R22 & briefly pulses on T1 via C1 & R1
with C2 & R2 providing a power up pulse, T1 resets the ripple counter IC1 ready
for the 1st CW clock pulse. The Mic PTT low also turns on PTT drivers T5 via
R15 which turns on T6 via R17/18 to repeat the PTT condition to the Rig.

On release of the Mic PTT a long +ve pulse is feed into Gate A of IC2 via R7,
C7 & discharged by R8. This enables the oscillator IC2 Gate A & B. With C5 &
R10, R11 it oscillates around 27Hz which forms the "dot time" for the CW.

The CW CLOCK is filtered (kept clean on power up etc) with R5 & C3 to feed the
ripple counter IC1. The "Q0" pin 3 output line is low from 0-10 count & is used
to drive T5 via R16 for PTT as with the Mic while the "K" Pips are generated, &
it also drives T2 via R6 to maintain the long CW CLOCK gate ON pulse.

Ripple outputs "Q1" to "Q9" Pins 2 4 7 = dash, 10 = gap, 1 = dot, 5 = gap,
6 9 11 = dash, are diode gated D1-D7 & R9 to make up the timings for the "K".

The +ve CW signals control the AF oscillator in the same way as the CW CLOCK.
The AF oscillator is made from IC2 Gate C & D, & with the C6 & R12/13, it
oscillates around 1kHz.

The square wave AF output from IC2D drives T4 via R19 to light the LED2 via R23
to indicate "K" is going out, & also feeds the AF to the Butterworth filter
R20/21 & C7/8 to T3 emitter follower, to shape the tone to a near sine wave.
T3 is only biased on by the mean DC level of the TTL output when present. T3
feeds the output level setting pot VR1 which in turn feeds the K tones to the
Mic AF line via a DC blocking Cap C9 & a high value attenuator R24.
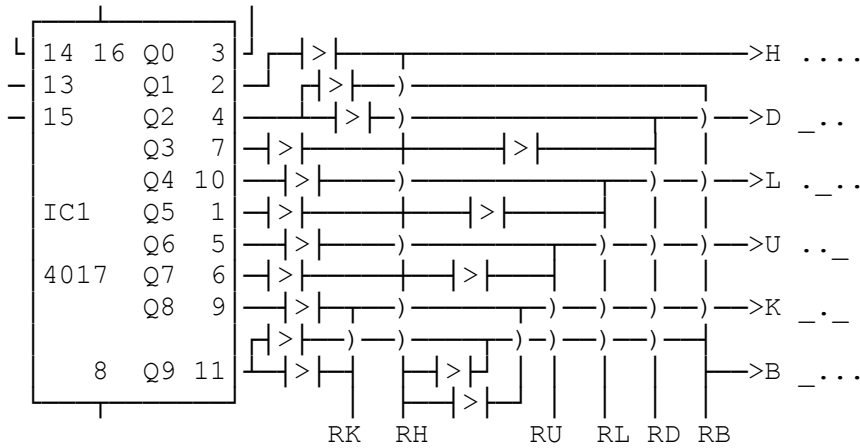
IN USE

This is not needed on FM as the squelch tail tells the end of overs quite well.
But for weak fading SSB signals or under heavy QRM it gives a very clear &
unambiguous end of the over, that like all CW can be easily heard compaired to
a voice ending.

REPEATERS
Lots more letters are possible for repeaters etc. without going into the
complexity of computers & Pics etc. here with just a few more diodes & a pull
down R per letter. But don't use more that 2 diodes in series to get a letter!

Possible letters are... A,B,C,D,E,F,G,H,I,K,L,M,N,R,S,T,U,V,W,5.

Letters that are NOT possible are.. J,O,P,Q,X,Y,Z,1,2,3,4,6,7,8,9,0

```
   L┌─────────────┐   ┐
    │14 16 Q0   3 │───┘  ┌─|>├──────────────────────────────>H ....
   ─┤13       Q1  2 │───────┐ ┌─|>├──)─────────────────────┐
   ─┤15       Q2  4 │──────────┐ ┌─|>├──)──────────────)──>D _..
    │         Q3  7 │──┤>├──────┤────────┤─|>├──────────┐ │
    │         Q4 10 │──┤>├──────)────────────────)──)──>L ._..
    │IC1      Q5  1 │──┤>├──────┤───┤─|>├──────┐ │  │
    │         Q6  5 │──┤>├──────)───────────)──)──)──>U .._
    │4017     Q7  6 │──┤>├──────┤───┤─|>├──┐ │  │  │
    │         Q8  9 │──┤>├──────)──┬──)──)──)──)──>K _._
    │               │──┤>├──)──)──┤──)──)──)──)──)─
    │  8      Q9 11 │──┘  ├─|>├──┤  ┌─|>├─┤ │  │  │  ├──>B _...
    └─────────────┘        │   └─|>├─┤
                          RK  RH      RU  RL RD RB
```

A multi way logic selector etc, to select the letter before the AF osc to
give... No modulation = no CW, K = OK, B = On Battery Power. L= Low Mod,
H = High Mod, U = Freq Up, D = Freq Down, all depending on Modulation & FM
Discriminator DC output etc..

Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP