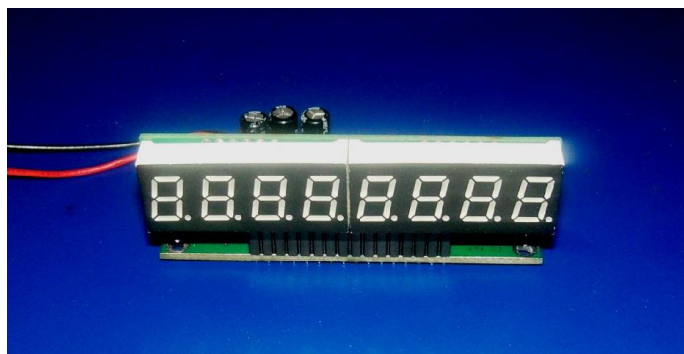# *Frequency Counter for CB-Radios*

General connection:

Depending on the radio used, there are 3 versions of this counter.
Please note this before installing. The jumpers are fount on the backside of the
board, JP3 is the nearest to the 6pin programming header.

IF 7.8 and **VCO above the real frequency** (President Grant old, Adams,
Washington, Palomar, WKS a. similar): No jumper (JP1, JP2) closed.
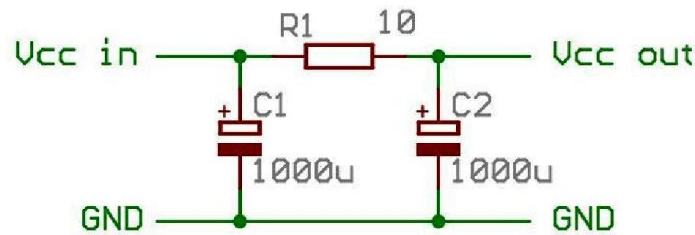JP3 jumps to 1.5k offset instead of 2.5k.

IF 10.695 and **VCO below the real frequency** (President Grant classic, Jackson1,
Superstar 3900 and similar). Both JP1 and JP2 closed.

IF 9.785 and **VCO below the real frequency** (TS-340, Royce 639, 642). JP1 closed,
JP2 open. JP3 has no function.

IF 10.695 and **VCO above the real frequency** (Jackson II, Grundig). JP1 open, JP2
closed. JP3 jumps to cybernet variant with 0/3k offsets.

The **power supply** of the counter can be connected to a voltage of 11-14V with a current of about 500mA. If there is some noise from the multiplexer, use the following schematic to fix this:

```
                    R1    10
Vcc in ─────────────[    ]───────────── Vcc out
              │                  │
            + │ C1             + │ C2
              ▬                  ▬
             1000u              1000u
              │                  │
GND ──────────┴──────────────────┴────── GND
```
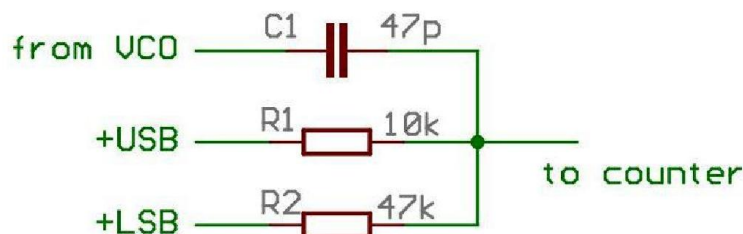
The **input of the counter** will be connected to the VCO of the radio and can therefore show the frequency in RX- and in TX-mode.
The readout of the counter is corrected by software, so it shows the real frequency and not the frequency of the VCO. Use **RG174** or similar to connect to the VCO.

The 3 pins on the counter are printed with "Gnd", "+12V" and "In".

As there is a **frequency offset in USB and LSB** of 1.5 / 2.5 or 3 kHz depending on the radio, 2 resistors must be connected to the input to correct the readout in these modes.
The voltages for +USB and +LSB can be found on the mode-switch, but be sure to choose the one which is available in RX- and in TX-mode. It should be about 8-9V.

```
              C1      47p
from VCO ─────┤├──────────┐
                          │
          R1     10k      │
+USB ─────[    ]──────────┤────── to counter
                          │
          R2     47k      │
+LSB ─────[    ]──────────┘
```

If the VCO is higher than the real frequency, you will have to interchange the values of these resistors (picture shown for VCOs below the real)
In Cybernet radios, only use the +LSB line and a 10k resistor. In the Cybernet configuration, the offset automatically is 3 kHz.

The **connection to the VCO** should be done to the buffered output of the VCO:

President Adams, Palomar, STAG, WKS and similar: TP8
President Grant (old), Washington, McKinley and similar: TP1
President Grant (new), Jackson, Superstar 3900 and similar: TP3
Cybernet: T2, where C12 and C14 are already connected.

The values of R1 and R2 are important, the value of C1 can be changed if necessary (somewhere between 33p and 100p).

Radio Alignment:

First of all, set the counter to the offset used (1.5k or 2.5k depending to your radio). Use the **jumper J3 on the counter** for this.

When the counter is connected, put the radio in **AM-mode, RX**, and set the clarifier to the middle. The counter should already show the correct frequency.
If necessary, adjust the trimmer on the counter first (although this is pre-adjusted!) and/or the AM cap/coil of the reference oscillator in the radio. Refer to the manual of your radio to do this.

Now put the radio in **USB-mode**. If the offset goes to the wrong direction, interchange the connections of +USB and +LSB and check for the correct offset. Adjust the USB cap/coil of the reference oscillator in the radio.

Now put the radio in **LSB-mode** and adjust the LSB cap/coil of the reference oscillator in the radio.

Now put the radio in **TX-mode** and adjust the Trimmer for TX-frequency in the radio.

After all, the BFO must be set to 7800 (or 10695, 9785…) +- offset in the radio to correct the real output frequency.