

Software description Version 5.7

Revision 14.12.2004

Features

- Auto Detection of DCF77 (chapter 1)
- Auto Detection of 1Hz, 50Hz or 60Hz clock pulse input mode (chapter 1)
- LED or neon bulb indicators (chapter 2 and 3)
- Automatic dimming function (chapter 4)
- 12 / 24 hr mode (chapter 5)
- dimming via push button (chapter 6)
- Possibility to drive any available Nixie tubes (chapter 7)

1. DCF77

This software version will work in any pcb version like 1.03, 1.04, 1.06 and 1.08.

If you want the new DCF77 feature on any other pcb versions than 1.08 then you need to add a pull up resistor like R33 (10k-33k) since this is not on the old boards. The processor has internally weak pull up on pin 27 so that if nothing is connected to pin 27 DCF77 will be disabled.

At power up the version 57 is shown in the HR nixies. 57:--:--. All other tubes are turned off, if available. The version is blinked 20 times and that takes about 14 sec. If a low pulse is detected on PIN 27 the clock will go into DCF MODE and stay in this mode until the next power up test. Most DCF receivers need from 8-10 sec to wake up after power up, so that is why this delay is has been implemented.

If PIN 27 is kept HI while version number is blinked (no DCF77 receiver connected), the clock goes into mains frequency counter mode for exactly 1 sec. It measures the input frequency on PIN6 and after that it displays the result in the MINUTES field. (57:50:00 for the 50HZ input signal) The HR still shows the software version. It can set the clock pulse divider to 1 or 50 or 60 but nothing else. The counter accepts a tolerance of +-5Hz, but normally it will show 49 or 50 or 51 if the mains frequency is 50.

The 20 blinks at power up can be skipped if SET is pressed, the frequency counter must be executed, but the result display delay is also skipped if SET is pressed while powering up to make access to the Nixie tube setup easy and fast.

2. The 3 LED outputs in DCF77 mode:

D30 is the dual colour LED. It works as a signal quality meter. It is very fast reacting every second. It indicates how close the pulses are to the correct pulse width. A correct pulse width is 100ms or 200ms. Green blinks if the pulses are correct pulse +- 10ms. Orange will blink if correct pulse time +-20ms. Red blinks if correct pulse width +- 30ms. If the pulses are more than 40ms away from correct time the signal will be marked as bad. That means it is actually possible (in theory) to set the clock to correct time if only red blinks.

Due to this fast reacting quality signal meter it has never been so easy and so much fun receiving correct DCF77 signals. If a bad DCF signal is received for 24 hours or more, the red LED D31 will change state every second. This is to warn the user that the clock might be off time a few sec or maybe more depending of how many days / weeks this have been going on. The warning is off again if good DCF is received.

Also the Nixie display will be turned off at 4:00 in the morning and back again at 5:00 only IF bad DCF77 is received for 24hr or more. This is to help users with maybe noise problems or weak radio signals during the day when most computers and TV-sets are on.

If D30 is blinking green and the D31 changes state almost every minute you have nothing to worry about and your clock will be super accurate.

3. The 3 LED outputs in 1/50 and 60Hz mode

External outputs PIN4 and PIN5 of the PIC16F876 are outputs to drive blinking colons with. There are 0,5Hz and 1 Hz outputs so you can choose the blinking speed you prefer. You need to add one more NPN transistor like Q4 and a neon bulb. If you prefer an LED led just connect a 470 ohm resistor to pin 4 or pin 5. It is all up to you. Pin 6 is an indicator to show am and pm.

4. Auto dimming function

The clock can now autodimm the tubes in relation to the light in the room using an extra LDR and a resistor. Using this feature is up to the customer. Parts for auto Dimm function are not included in the kit.

Life time of a Nixie tube is defined by the light output multiplied by the hours it is lit.

Since we use muxing in all our kits, light output is in general lower compared to non-multiplexed Nixie clocks, so the lifetime is in general 2-3 times longer in our kits. This can now be 10-15 times longer if you add the LDR resistor feature.

If the LDR feature is in use, the push button DIMM function is disabled.

5. 12-24 hour selection

Hold down the UP/DIMM button for 3 sec to change from 12 hr to 24 hr mode and back. The EPROM will keep the setting for 12 or 24 hours mode even if the clock has been powered off.

6. Dimming

The UP/DIMM button changes the 4 dimm levels when clock is in normal mode. Remember that the dimming is disabled if LDR feature has been activated.

7. The number of tubes mode settings

This software is able to drive nearly all available Nixie tubes.

You can build 2, 4 or 6 digit clocks.

To change tube operating mode, hold down the SET button, then power up.

To change the mode, press the up-down button.

When you have the correct mode, release the SET button and this mode will be saved until you choose a different mode.

The 5 different tubes modes are indicated like this in the setup mode:

Mode 1: is six tubes 2x3 multiplexed mode normal Nixie tubes (default mode)

Mode 2: is four tubes 2x2 multiplexed mode using normal Nixie tubes

Mode 3: is four tubes using dual anode tubes 1x4 multiplexed mode

Mode 4: is two tube non multiplexed mode using normal Nixie tubes

Mode 5: for two B7971 or ZM1350 special alphanumeric tubes multiplex 1x32

When correct mode is chosen, then the tubes will show 12 or 12:34 or 12:34:56 depending on how many tubes you use in your clock.