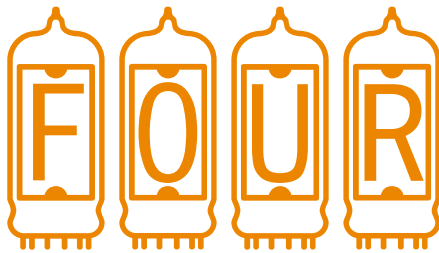


Clock &



letter word display

Smartsocket driver V1.0

for B7179 nixies and other segmented displays

May 2008

User guide

What is this document?

This document relates to a combination of PIC microcontroller and serial EEPROM which has been designed to work with the Smartsockets devised by Chris Barron to drive Burroughs B7179 jumbo nixietubes and other segmented displays. For more information on Smartsockets, visit the Yahoo group at <http://groups.yahoo.com/group/smartsockets/>.

What is the Smartsocket driver?

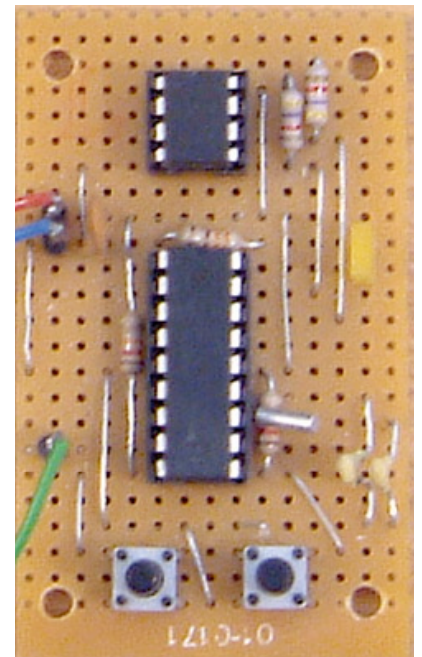
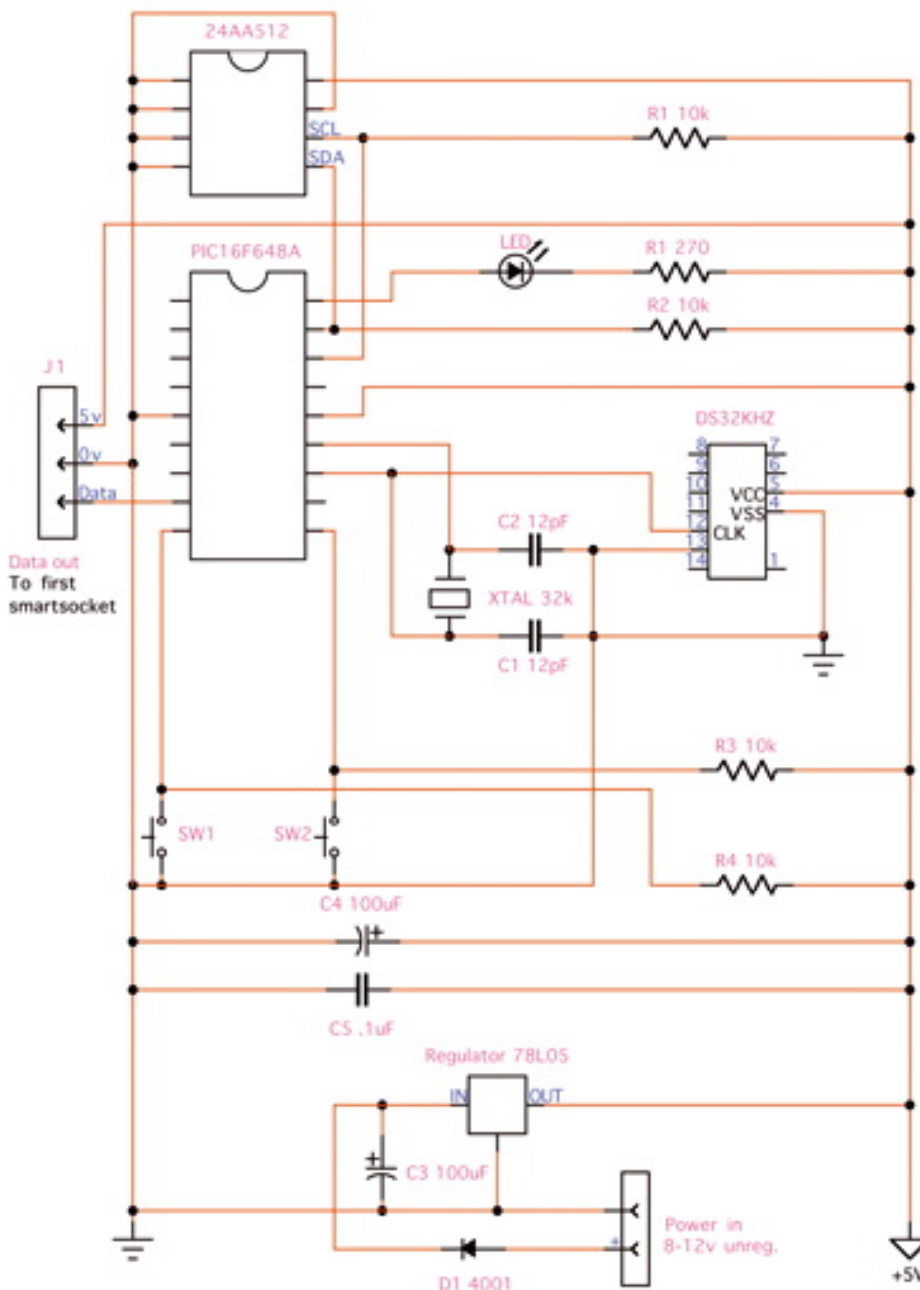
The driver is a combination of Microchip PIC microcontroller - an 18 pin 16F648a which contains the clock timing, clock editing and various modes of operation - and a Maxim I2C serial EEPROM, which contains a library of 5,644 English, or readable in English, words. These are from the most complete list I can find, which was compiled by Pete Hand. Pete's list of four letter words are taken from the official Scrabble TWL (US) and SOWPODS (International) tournament word lists, with a few proper names (eg IPOD), abbreviations (eg DEPT) and common acronyms (eg RIAA) added.

The circuit

Constructing the circuit board is simple. I used "Vero" stripboard to create a compact layout.

A Dallas DS32KHZ chip can be used instead of the crystal and caps, for greater timing accuracy, however the PIC can be adjusted to compensate for slow or fast running clocks using a 32k watch crystal.

My board below shows the crystal option.



What can it do?

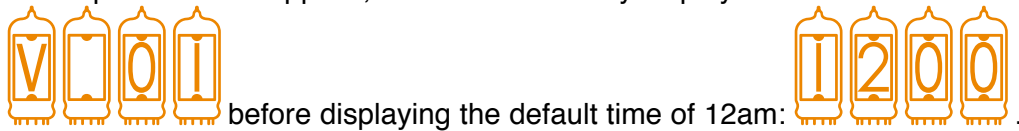
The PIC runs using its own internal 4 meg oscillator. Clock timing is derived from a 32k timing reference on the PICs timer1 oscillator pins. A half second pulse is output on pin 18. This may be used to drive a colon or with an LED to indicate that the clock is running, without any tubes needing to be connected.

Features:

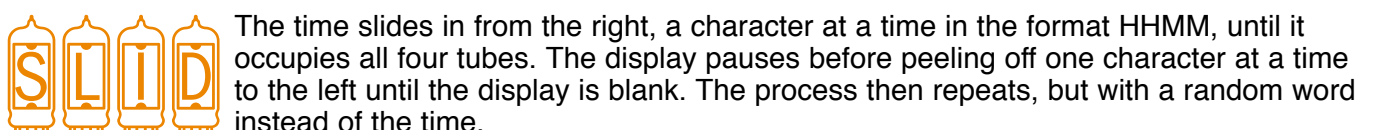
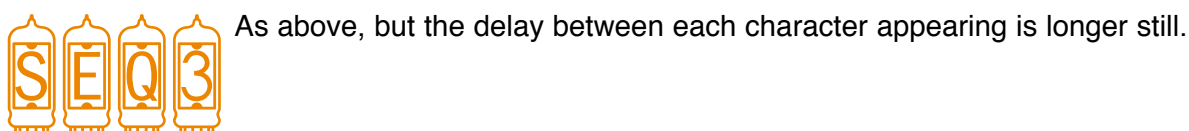
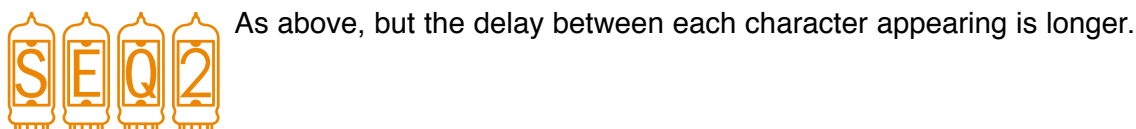
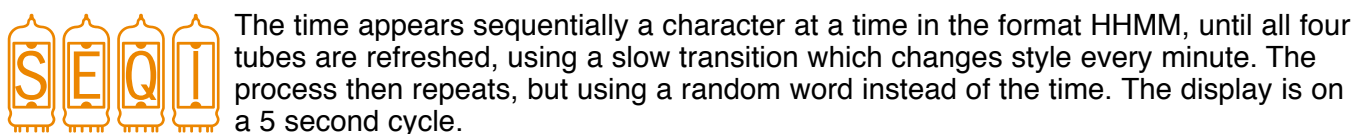
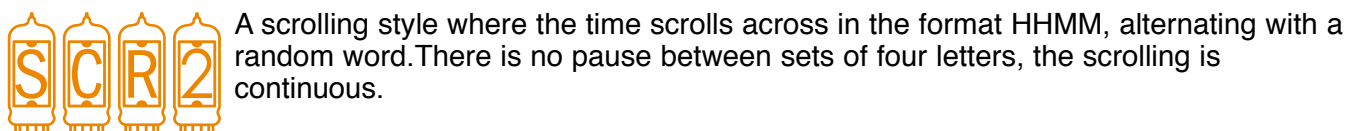
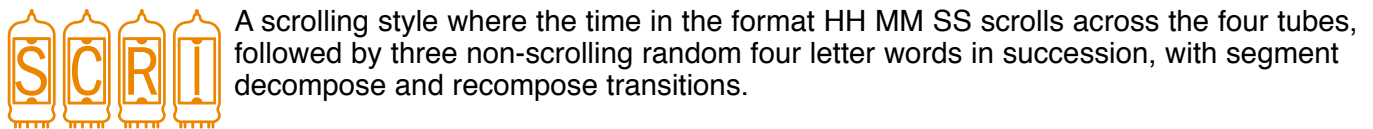
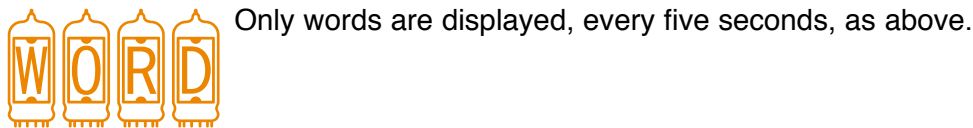
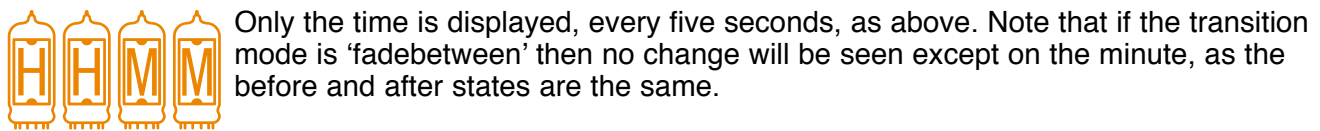
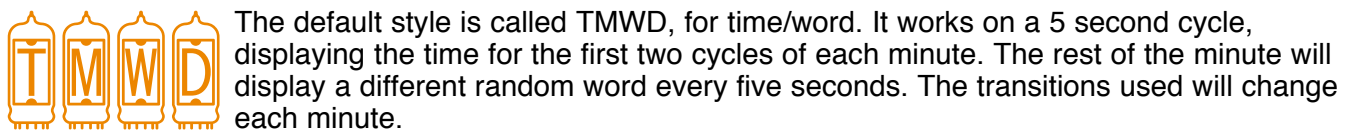
The software contains a number of operating modes. Most of these will display words and time in some way, although a word only mode is included.

Modes and editing are accessed through the two switches, which I will call Mode and Increment.

When power is first applied, the clock will briefly display the version number...



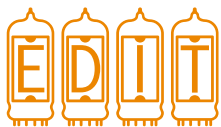
Pressing the Increment switch during normal clock use will cycle through the various styles available:



Adjusting the clock

Pressing the Mode button and holding it down will take you to the editing adjustments.

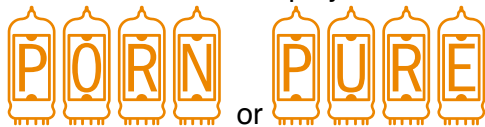
Edit



Edit will be displayed until your finger releases the button.

Profanity

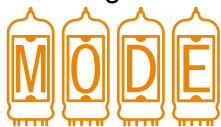
The tubes will now display either:



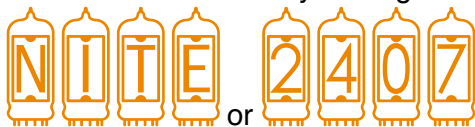
. If PURE is selected then the more offensive four letter words will never be displayed. Each press of the Increment button will alternate between the two. The setting will be stored in the PIC's EEPROM and will be retained even if power is interrupted.

Night mode

Pressing the Mode button again will display:



until your finger releases the button. The display will then show either:



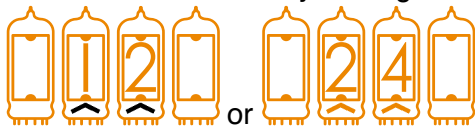
. If NITE is selected, the clock will not show any characters between the hours of 10pm and 8am, in any mode. The colon output will continue to operate, as verification that the clock is still working. The setting will be stored in the PIC's EEPROM and will be retained even if power is interrupted.

12 or 24 hour working

Pressing the Mode button again will display:



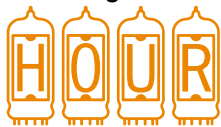
until your finger releases the button. The display will then show either:



. Choose whether you prefer a 12 hour or 24 hour clock. The setting will be stored in the PIC's EEPROM and will be retained even if power is interrupted.

Adjusting hours

Pressing the Mode button again will display:



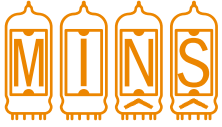
until your finger releases the button when it will show the time.



. The cursors will be lit under the hours to indicate that it is these you will be editing. The hours editing is always done in 24 hour mode, even if you selected 12 hour working, so that NITE mode will work correctly.

Adjusting minutes

Pressing the Mode button again will display:



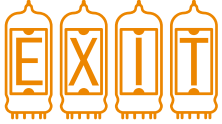
until your finger releases the button when it will show the time.



. The cursors will be lit under the minutes to indicate that it is these you will be editing.

Exit editing

Pressing the Mode button again will display:

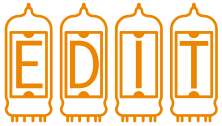


until your finger releases the button when normal operation is resumed. At this point seconds are reset to zero, offering a way to set the seconds reasonably accurately.

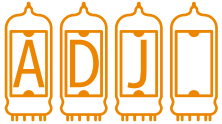
During any edit function the clock will revert to normal operation if left unattended for a while.

Adjusting the overall timing

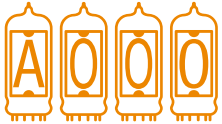
The clock may be adjusted in software up to 16 seconds a day, either faster or slower. To enter adjustment mode press the Mode button while in normal operation.



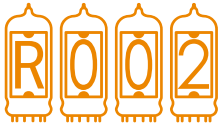
appears, but continue to hold the button down for about 10 seconds until it displays:



. When your finger releases the button the display shows the current adjustment.



. An A will be displayed if the timing is set to zero or is advanced, that is it is running faster than the default, or an R if the clock is retarded or slower than the default.



for instance. Press either button to advance or retard the clock. Each step represents half a second a day. To exit this adjustment, simply leave it for a few seconds and normal clock operation will be resumed. Your setting will be stored in EEPROM.