

# SixTube\_Simple v1.0 Manual

Cliff Hatch  
11<sup>th</sup> September 2022



## Introduction

SixTube\_Simple is a program for 6-digit Arduino Nano SN74141/DS3231 based clocks from [RLB Designs](#). It is based on original code by Robin Birtles and Chris Gerekos.

It provides time and date functions only, and was designed to be easy to operate. The procedure for setting the clock is very simple.

The following options are provided as compile-time settings (instead of run-time settings implemented by means of complicated sequences of button presses). See the commented code in `sixtube_simple.ino` for further details.

- **FADE**           Fading or instantaneous display changes.
- **FSKIP**         Adjustable rate of fade.
- **HOUR12**       12 or 24 hour clock.
- **AUTO\_BST**     Automatic switching between GMT and BST.
- **PERDATE**     Periodic display of the date in time mode.
- **CLEAN**        Adjustable display time during the cathode cleaning cycle.

## Setting the Clock

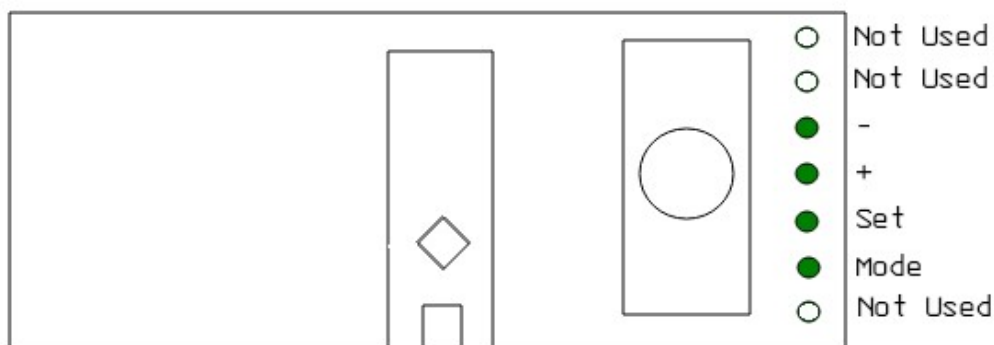
The program is operated using only 4 buttons, <mode>, <set>, <+> and <->, see Figure 1.

- <mode> toggles between TIME and DATE modes.
- <set> toggles between DISPLAY and SET modes when pressed for 0.7 seconds or longer. In SET mode, one of the three pairs of Nixie tubes displaying hours, minutes etc. blinks on and off to indicate that it may be adjusted with the <+> and <-> buttons. Short presses (less than 0.7 seconds) on <set> select the next pair in rotation. When setup is complete, a final long press on <set> toggles back to display mode.

In order to set the time accurately you must set the seconds last. This is because pressing <+> or <-> to adjust any field resets the second mark. For example if 10 seconds is currently displayed, and has been displayed for 0.5 seconds, and at this moment you adjust the hours, a full second will elapse before the seconds increment to 11 - and the 10 will have been displayed for a total of 1.5 seconds. Hence adjusting any of the other fields tends to retard the seconds.

Even if the program has been compiled with the 12 hour clock option, SET mode always uses the 24 hour format. The 24 hour time must be set correctly to ensure that the date increments at midnight, not midday.

Provided you remember that a long press on <set> is required to get started, everything else is fairly intuitive. The intention is that it should not be necessary to refer to the manual routinely to set the clock.



*Figure 1, Buttons*

The TIME/DATE and SET/DISPLAY modes are selected independently, so the clock can display:

- Time in DISPLAY mode.
- Date in DISPLAY mode.
- Time in SET mode.
- Date in SET mode.

## Cathode Cleaning Cycle

This cycle is triggered at 05, 15, 25 etc. minutes past the hour and runs for a few seconds, lighting all the numbers in turn. It helps to reduce cathode poisoning.

Normal scanning is suspended while the cycle runs, so all buttons are unresponsive for this short period.

The cycle does not run in SET mode, so will not interfere with setup.

# Compiling, Loading and Running

To compile and load the program, you need to install the [Arduino IDE](#) on your computer.

Check that you have access to required libraries.

- <Tools>, <Manage Libraries>
- Make sure you have real time clock library, RTCLib, installed.

Connect your clock to the PC with a USB cable, and establish communication.

- <Tools>, <Board>, <Arduino AVR Boards>, <Arduino Nano>
- <Tools>, <Processor>, <ATmega328P (Old Bootloader)>
- <Tools>, <Port>, <dev/ttyUSB0>
  - The USB port dev/ttyUSB0, or something similar, should appear automatically in the list when you plug in the cable.

Open sixtube\_simple.ino:

- <File>, <Open>, <sixtube\_simple.ino>

Edit the definitions at the start of the program if you wish to change the compile-time options.

Compile and Load:

- <Sketch>, <Upload>

The clock should start running automatically.

If the DS3231 real time clock's battery failed since the last run, the clock will be reset to 14:00:00 on the date the program was compiled