Adding a DS3231 Real Time Clock to the Raspberry Pi 3

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https://trick77.com/adding-ds3231-real-time-clock-raspberry-pi-3/

Since the Raspberry Pi 3 doesn't come with a battery-powered real time clock, it will only show the correct time once it has Internet connectivity (thanks to the NTP daemon). If the Raspberry Pi 3 is not connected to the Internet, you might want to add a hardware clock to set the current date. Here's how to add a DS3231 real time clock GPIO module to the Raspberry Pi 3 in Raspbian Jessy Lite:

1. Get a DS3231 real time clock module and install it on the GPIO header of the Raspberry Pi 3 on pin 1
2. Add the following line at the end of /boot/config.txt in Raspbian Jessy:

   ```
   dtoverlay=i2c-rtc,ds3231
   ```

3. We don't need fake-hwclock anymore:

   ```
   apt-get purge fake-hwclock
   ```

4. Check/set the current system time and write the system time to the RTC module using:

   ```
   hwclock -w
   ```

5. Set the correct time zone using:

   ```
   dpkg-reconfigure tzdata
   ```

6. Edit /etc/rc.local and add the hwclock command **above** the line that says "exit 0":

   ```
   /sbin/hwclock -s
   ```

7. The /etc/init.d/hwclock.sh shell scripts tends to corrupt this RTC clock module. In my case, the RTC clock was set to 2066/01/01 after every reboot. To prevent this from happening, edit /etc/default/hwclock and set HWCLOCKACCESS to no:

   ```
   HWCLOCKACCESS=no
   ```

8. Reboot
9. Done! Raspbian will now set the time from the RTC clock during boot even if there is no Internet connectivity available.
10. If RTC corruption is still happening, you may have to get rid of the NTP daemon as well using:

```
11.  apt-get purge ntp
   apt-get install ntpdate
```

12. After the NTP daemon has been removed, you can still sync the system clock using `ntpdate-debian` which you might add to `/etc/rc.local` as well (after the hwclock command though) – just in case there is an Internet connection available during boot. And/or add it to `/etc/cron.daily` for example.

Raspbian Jessy Lite will detect the DS3231 real time clock module automatically (as a DS1307 module but nevermind), there's no need to whitelist or blacklist any I2C modules. There's no need to run the i2cdetect command from the i2c-tools package. Once the clock module is detected, this line should be visible using dmesg:

```
# dmesg | grep rtc
[    6.640799] rtc-ds1307 1-0068: rtc core: registered ds3231 as rtc0
```

Check `/proc/driver/rtc` for more data on the RTC:

```
# cat /proc/driver/rtc
rtc_time : 19:26:18
rtc_date : 2016-03-25
alrm_time : 00:00:00
alrm_date : 1970-01-01
alarm_IRQ : no
alrm_pending : no
update IRQ enabled : no
periodic IRQ enabled : no
periodic IRQ frequency : 1
max user IRQ frequency : 64
24hr : yes
```