



PI-SPI-DIN Series

Real Time Clock

The PI-SPI-DIN-RTC-RS485 Module has a Real Time Clock (RTC) module built into the main board. The RTC is the Microchip MCP7940 and is battery backed with a CR2032 battery.

The base address of the MCP7940 is 0x68.

In a shell window, make sure the RTC is present by typing in the command:

```
i2cdetect -y 1
```

```
pi@raspberrypi:~$ i2cdetect -y 1
   0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- 6f
70: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
pi@raspberrypi:~$
```

STEP 1.

You'll need to enable I2C and the I2C RTC support by adding these lines to your `/boot/config.txt` file.

```
sudo nano /boot/config.txt
```

add these two lines to the bottom of the file:

```
# Enable i2c real-time clock
dtoverlay=i2c-rtc,mcp7940x
```

Save the file and reboot. When you reboot, the kernel should see that i2c device and load the `rtc-ds1305` driver automatically (which also supports `mcp794xx`). Log in and run

```
sudo i2cdetect -y 1
```

to see the UU show up where 0x68 should be.

```
pi@raspberrypi:~$ i2cdetect -y 1
   0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- UU
70: -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
pi@raspberrypi:~$
```



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STEP 2.

Disable the "fake hwclock" which interferes with the 'real' hwclock. In a shell window, run the following two commands: (The RPi comes standard with the "fake hwclock" enabled)

```
sudo apt-get -y remove fake-hwclock
sudo update-rc.d -f fake-hwclock remove
```

In a shell window, run :

```
sudo nano /lib/udev/hwclock-set
```

and comment out these three lines:

```
#if [ -e /run/systemd/system ] ; then
# exit 0
#fi
```

```
GNU nano 2.2.6      File: /lib/udev/hwclock-set      Modified
#!/bin/sh
# Reset the System Clock to UTC if the hardware clock from which it
# was copied by the kernel was in localtime.

dev=$1

#if [ -e /run/systemd/system ] ; then
# exit 0
#fi

if [ -e /run/udev/hwclock-set ]; then
exit 0
fi

if [ -f /etc/default/rcS ]; then
. /etc/default/rcS
fi

# These defaults are user-overridable in /etc/default/hwclock
[ Read 37 lines ]
^G Get Help  ^O WriteOut  ^R Read File ^Y Prev Page ^K Cut Text   ^C Cur Pos
^X Exit      ^J Justify   ^W Where Is  ^V Next Page ^U UnCut Text ^T To Spell
```

Exit and Save.

STEP 3.

Sync time from the Pi to the RTC. When you first plug in the RTC module, it's going to have the wrong time because it has to be set once. You can always read the time directly from the RTC with:

```
sudo hwclock -D -r
```

Plug in Ethernet or WiFi to let the Pi sync the right time from the Internet. This may take a few minutes for the syncing to be complete. Make sure the correct time is displayed before proceeding. Once that's done, run:

```
sudo hwclock -w
```

to write the time to the RTC.



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You can enter:

```
sudo hwclock -r
```

to read the time.

NOTE: The RTC date and time is stored as UTC time. (Universal Time Code)

The Real Time Clock is now active and can be tested by disconnecting the RPi from the Internet connection either by disconnecting the Ethernet cable and/or disabling the WiFi connection.

Before removing power from the RPi, make sure the CR2032 battery is installed in the PI-SPI-DIN-RTC-RS485 module.

Remove power, wait a few minutes and reconnect power, making sure there is no internet connection. Check the time by entering:

```
sudo hwclock -r
```

The time can always be reset by connecting the RPi to the internet via the Ethernet cable and/or Wifi and repeating STEP 3 above.

