How to program CDCE913/925 chip for DFOs

This guide is for programming the Texas Instruments CDCE913/925 PLL chip used DFOs for the Mega Drive, Playstation and Saturn with a Raspberry Pi. This corrects the sync frequency with a DFO (Dual Frequency Oscillator) to match 60Hz on PAL consoles when using region modded PAL/NTSC consoles. This is my collection of files to make the process much easier to do.

Credit goes to ikorb. Original thread here.

DFO PCB's

There are three types of DFO's. Each one are suited for different consoles:

- DFO 5V DIL14 - Mega Drive, Amiga
- DFO 5V SMD - Playstation, NEO GEO MV-1C
- DFO 3.3V SMD - SNES

When you know what DFO you need, program it with the correct HEX-files (timing files). More on this later.

Configuration

Before you start, you should have a Raspberry Pi running Raspbian or similar. Either connected through SSH (recommended) or directly, we need to make sure `ARM I2C interface` is enabled, by typing:

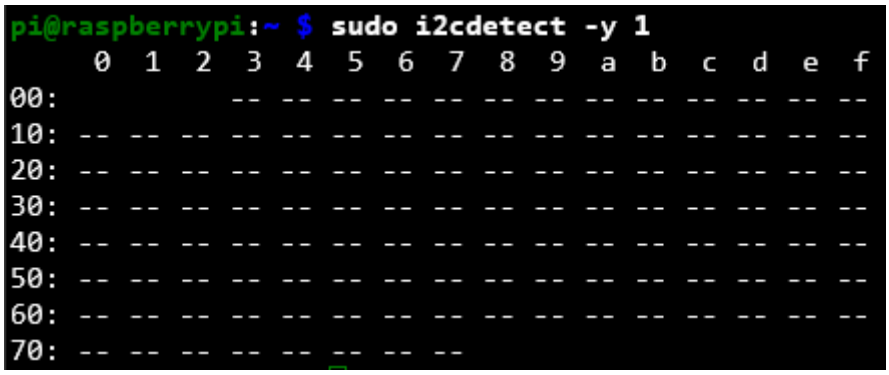
```
sudo raspi-config
```

Navigate to `Interface Options > I2C > Yes` to enable `ARM I2C interface` .

Now check if it's working:

```
sudo i2cdetect -y 1
```

You should see something like this:



Great! Now you're all set for the next step.

Connections

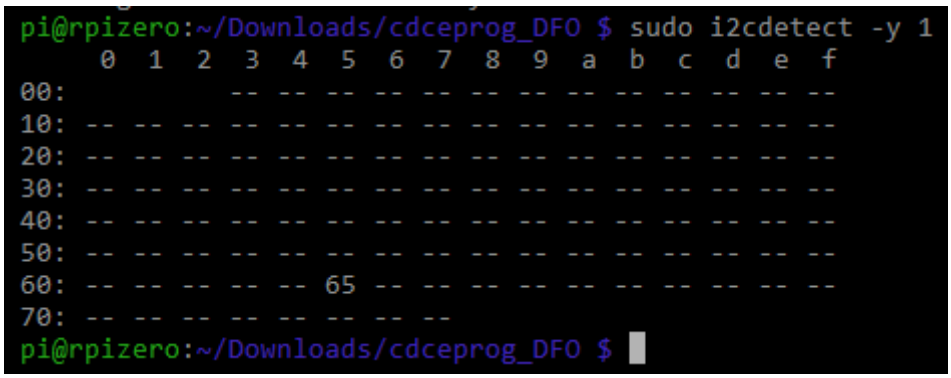
To connect the DFO to the Raspberry Pi, check the nice overview of the GPIO connector here. The programming pins on the DFO must be connected as follows:

- DFO `SDA` to RasPi pin 3
- DFO `SCL` to RasPi pin 5
- DFO `GND` to RasPi pin 6
- DFO `3.3V` or `5V` to RasPi pin 1 or 2 (depends on the DFO board).

When the connection is done, check if you can communicate again with the clock generator chip on the DFO using:

```
sudo i2cdetect -y 1
```

You should see a lot of dashes (like the previous picture) but in all those dashes there should be a number saying 65 (or any number) like this:



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If so, your good to go. If not, check your connections.

Programming

Let's start by downloading the Python script (this does the programming) and the HEX-files for Mega Drive/Playstation or Saturn.

Type the following:

```
cd Downloads
curl -o cdceprog.py put-correct-link-here
curl -o MD_PSX.HEX put-correct-link-here
curl -o SAT.HEX put-correct-link-here
```

Now, if your programming a DFO for the Mega Drive or Playstation, use `MD_PSX.HEX`. The Saturn, use `SAT.HEX`.

In this guide we're using the `MD_PSX.HEX`, so type:

```
sudo python cdceprog.py MD_PSX.HEX
```

You should see a text that says:

```
Found data for a CDCE 913 chip.
Waiting until EEPROM write cycle finishes...
```

Congratulations!

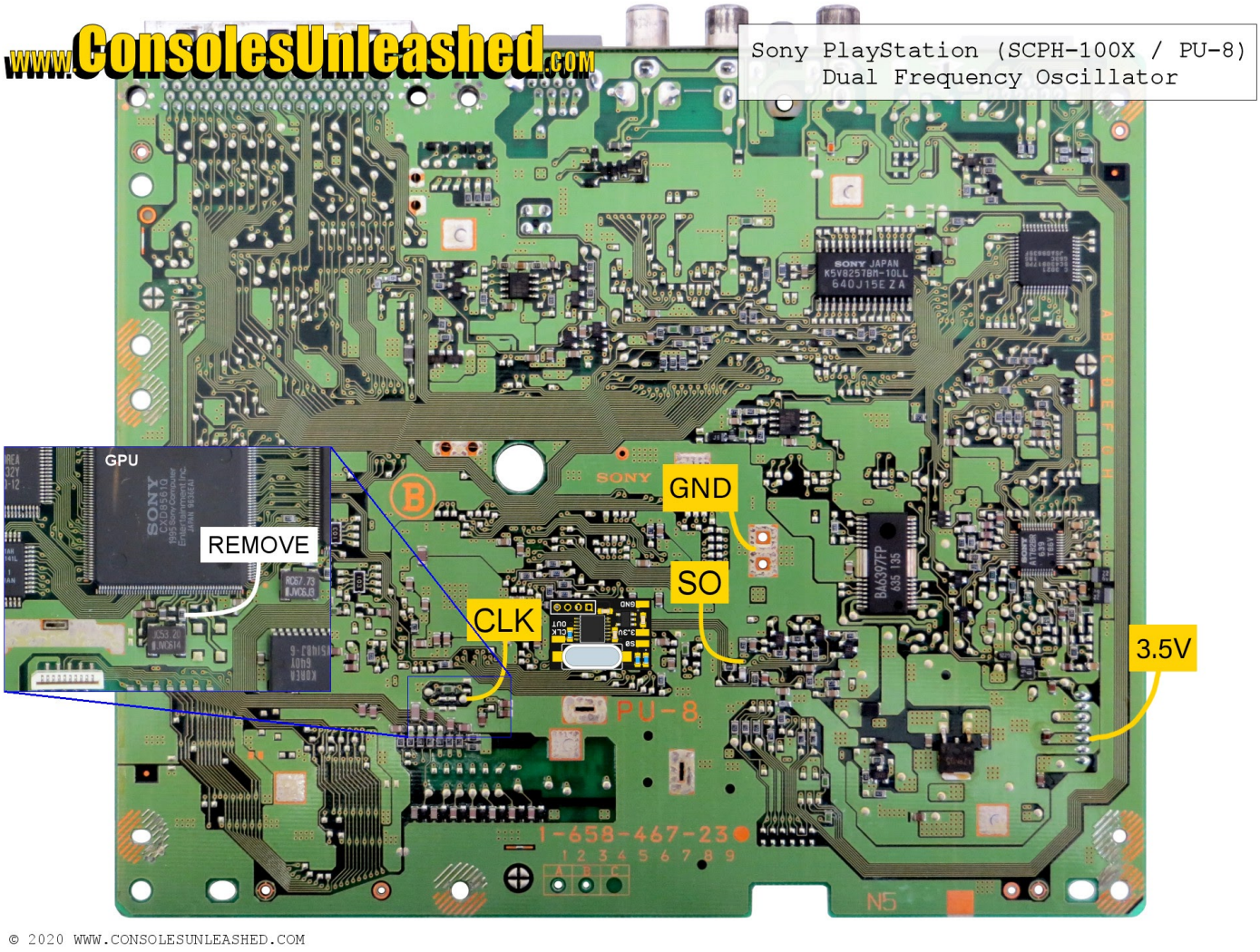
Your DFO is now programmed.

Installation

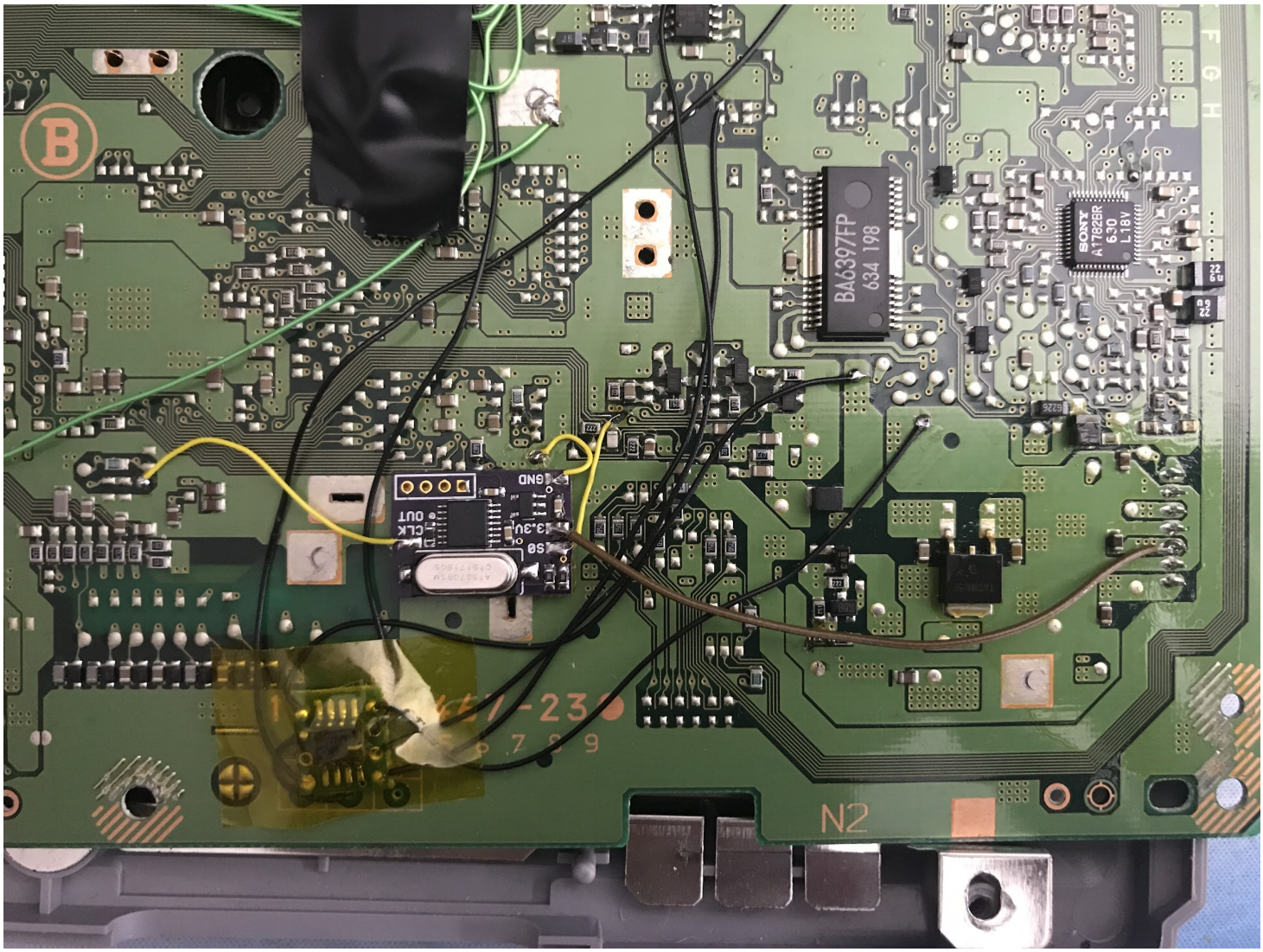
Connect the DFO pins to the corresponding points on your specific motherboard version.

- Installation guide for Playstation
- Installation guide for Mega Drive

Playstation Playstation SCPH-100X PU-8:



Example of installed DFO in a Playstation.


B
BA6397FP
634 198
SONY
A17622ER
6-30
L18V
GND
OUT
CLK
3.3V
SD
N2