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William Quade

A blog to document my projects

PS1 dual frequency oscillator (DFO) installation guide

A very common issue with PS1 consoles after being modded to be region free is that out of region games are displayed in black and white when using composite video. This happens because the PS1 has only a single frequency oscillator built in. Using a dual frequency oscillator (or DFO) can resolve this issue.

> ***As of right now this guide is still a work in progress. I'll be selling these in the near future and wanted to get a head start on the guide.***

Guide structure

This guide is structured into several pages. It's organized like this primarily so that comments can be more organized and useful for readers.

This page covers dual frequency oscillators for the PS1. It includes general information about the DFOs, and then links off to installation guides for each console model.

If you want more information about PlayStation 1 mods in general check out this guide.

PS1 dual frequency oscillator (DFO) installation diagrams

Below is a list of all PlayStation 1 motherboard versions, along with the console model numbers associated with them. You can get a good idea of what board you have by looking at the model number underneath your system (something like SCPH-7501).

To actually know what board you have you'll most likely have to open up your console and look for the board version printed somewhere on the board (something like PU-22 or PM-41).

Once you know what board you have you can click on the board model and you'll be sent to a page with the installation diagram.

- PU-7
    - All SCPH-1000's
    - Some early SCPH-1001, and SCPH-1002's
    - Some early SCPH-3000's
    - Some early SCPH 3500's
- PU-8
    - Most SCPH-1001, and SCPH-1002's
    - Most SCPH-3000's
    - Most SCPH-3500's
    - All SCPH-5000's
- PU-16
    - All SCPH-5903's
- PU-18
    - All SCPH-5001's
    - All SCPH-5500, SCPH-5501, SCPH-5502, and SCPH-5503's
    - All SCPH-5552's
    - Some early SCPH-7000, SCPH-7001, SCPH-7002, and SCPH-7003's
    - Some early SCPH-7501's
- PU-20
    - Most SCPH-7000, SCPH-7001, SCPH-7002, and SCPH-7003's

- PU-22
    - All SCPH-7500's
    - Most SCPH-7501's
    - All SCPH-7502, and SCPH-7503's
    - Some early SCPH-9000, SCPH-9001, SCPH-9002, and SCPH-9003's
- PU-23
    - Most SCPH-9000, SCPH-9001, SCPH-9002, and SCPH-9003's
- PM-41
    - Earlier SCPH-100, SCPH-101, SCPH-102, and SCPH-103's
- PM-41 (2)
    - Later SCPH-100, SCPH-101, SCPH-102, and SCPH-103's

PS1 console regions

In order to better understand the rest of this guide it may be useful to know what region your system is. It's really easy to figure it out, just look at the sticker on the bottom of your system. It should have a model number (like SCPH-7501), the last digit is the region code of your system (1 in my example).

The possible region codes are:

- 0 – Japan: Japanese language, NTSC-J region, NTSC video, 100V power input.
- 1 – USA/Canada/Mexico: English language, NTSC-U/C region, NTSC video, 110V power input.
- 2 – Europe/Australia: English language, PAL region, PAL video, 220/240V power input.
- 3 – Asia: English language, NTSC-J region, NTSC video, 110-240V

power input.

The key thing to notice in the list above is that there is either NTSC video or PAL video. That video output is really what matters here. Installing a dual frequency oscillator allows you to properly output both NTSC and PAL video from your console. Normally your console will only properly display one video signal (NTSC on NTSC systems, or PAL on PAL systems).

Why a dual frequency oscillator is needed?

The PlayStation 1 consoles were sold for two different video signal specifications, PAL, and NTSC. Each had a different standard video output (288p at 50Hz for PAL, 240p at 60Hz for NTSC).

When you load up a game for the opposite video standard on your console it will end up displaying something that isn't quite right. I'm talking about playing PAL games on an NTSC system, or playing NTSC games on a PAL system.

If you are using composite video or S-Video you'll get a black and white image. If you are using RGB cables you should get an image that's in color, but the timing will be a little off which can cause issues with certain games. It's also possible to have other weird issues depending on the particular TV you are using.

So for the best experience when playing opposite region games it's a good idea to look into installing a dual frequency oscillator. With a dual frequency oscillator opposite region games will be displayed in color and correctly.

What is a dual frequency oscillator?

A dual frequency oscillator is a small electronic circuit that has a programmable oscillator onboard. This oscillator can switch between two oscillator clock frequencies based on the level of an input signal.

In the context of the PlayStation 1 (and older video game consoles as a

whole) it can allow a system two switch between the clock frequencies needed for PAL and NTSC game video output automatically.

Dual frequency oscillators have been around for a while, but haven't seemed to really catch on like modchips have. They seem to be much more common in Europe than in the United States.

Where can I learn more?

There is a lot of useful information about dual frequency oscillators available from other sources. So if you want to learn more here are some useful websites to check out.

- NFG forums DFO forum thread – Covers how to make and program DFO's for various consoles.
- Circuit-Board DFO forum thread (German) – A similar forum thread in German, but has some additional useful information.

Where to buy DFO's for the PS1

I sell preprogrammed DFO's for the PlayStation 1 on my store. The shipping is calculated by weight so if you buy more than one chip at a time you'll be able to save some money.

- PS1 DFO board