Ultimate Playstation 2 Repair Guide

January 2004 Edition

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Please read the following disclaimer **VERY CAREFULLY** and do not proceed unless you think you are capable of these repairs.

Caution! **If you have any warranty left, always claim a warranty repair instead of doing any work yourself. If you open your PS2, you will break the warranty seal and the warranty will be VOID!**

<u>Disclaimer</u>: This guide is **NOT GUARANTEED** to fix your PS2 as faulty parts do occur. However, in many instances this guide will allow you to restore your PS2 to its former glory. <u>BE WARNED</u> though, improper use of this guide can render your PS2 virtually useless, or at best, destroy more voltage critical components. Proceed at your own risk. I take no responsibility for damage caused by improper use or accidental damage to any parts of your PS2 while you have it open.

Also please note that lethal voltages of 110/230 V will be present on the board when it is powered up so please remove power from the machine **BEFORE** opening it. Take care not to touch any live parts of the board. Preferably, touch nothing, which you are not specifically told to touch and, even then, only for as short a time as possible handle the boards very carefully, and by the corners of the board only, to avoid chance of damage to the delicate components.

Lastly but by no means least, static electricity can damage various parts of the board. Please ground yourself (by touching an earthed metal point such as a water pipe) at regular intervals to prevent electrostatic discharge (ESD) from building up in your body and damaging the board. Alternatively; invest a few pounds in an electrostatic wristband to keep you earthed throughout the whole procedure.

Also, please note: Laser Radiation from CD players CAN blind you. Under no circumstances, should you look directly into the laser eye, even if the power is not on, just in case.

<u>Diagnostic Mode</u>

This is the easiest thing you can do in any attempt to fix your PS2. While it hardly ever works, it only takes a minute or two, and should initially be tried before you take apart your machine.

1) You must be in the "main menu" screen of the PS2 console, the first screen that comes up when you start with no disc in.
2) Press the "triangle button"
3) Select "Console" from the top using the up directional buttons and press the "Triangle" button
4) Select "On" using the up and down directional buttons and press the "X" button
5) Insert a disc. The console automatically starts the diagnosis.

How to tell the Version Number of your PS2

**This info should be used for guidelines only. There are obvious similarities in the models sold in all countries, however models do change a little from country to country.**

This is the easiest version to check, turn your playstation over and if it has 10 screws on the back (the screws are covered by plastic caps) as shown in the picture below, then you have a Version 1, 2 or 3. If you have 8 then you more than likely have either a Version 4, 5, 7 or 9.
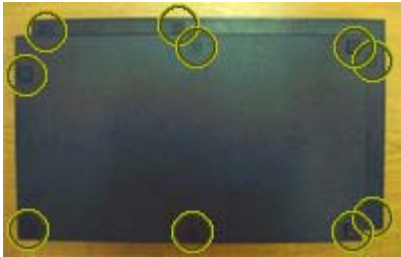
You can further verify this by looking at the Model Number and Serial Numbers which are on the label above the expansion port.
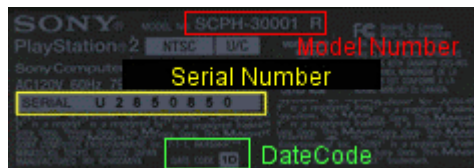
10 Screws at base of PS2 Version 1, 2 and 3
USA SCPH 30001 Version 1 = Serial Number begins with U1
USA SCPH 30001 Version 2 = Serial Number begins with U0
USA SCPH 30001 Version 3 = Serial Number begins with U1 Date Code 1A
USA SCPH 30001 Version 3 = Serial Number begins with U2 Date Code 0D

8 Screws at base of PS2 Version 4, 5 and Electrical warning stamped on the bottom.
USA SCPH 30001 Version 4 = Serial Number begins with U0
USA SCPH 30001 Version 4 = Serial Number begins with U1
USA SCPH 30001 Version 4 = Serial Number begins with U2
USA SCPH 30001 Version 4 = Serial Number begins with U3
USA SCPH 30001 Version 4 = Serial Number begins with U4
USA SCPH 30001 Version 4 = Serial Number begins with U5
USA SCPH 35001 Version 4 = GT3 Edition


3900X PS2 (39001, 39002 ...) - New Version 7 PS2:
All the PS2 model SCPH 3900X is the New Version 7 PS2 where X can be any number like 1, 2, 3 etc..

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Example: SCPH 39001 is the USA Version 7 PS2, SCPH 39002 is the Australian PS2 Version 7

NOTE: **The 30001R can be Version 4, Version 5 or Version 6. You check the Expansion Bay of your PS2 and see if there is a screw in the Expansion Bay. If there is a screw in the Expansion Bay similar to the one indicated by the Red Arrow in the following picture, then your PS2 is Version 5 or Version 6. Otherwise, it is a Version 4.**

To further identify whether you have a Version 5 or Version 6 PS2, you have to open up your PS2 and check the main board of your PS2. The difference between Version 5 and Version 6 PS2 30001R model is shown in the following image.
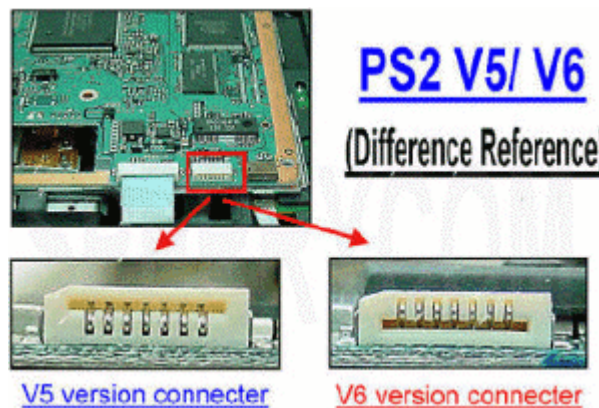
Bios Number Identification:

The only way to identify the BIOS number of your PS2 is to open up your PS2 machine and have a look at the motherboard; there will be a black chip with writing like the example below. In this case, the BIOS number is "**020**", from the second line of the chip **"D   110   020 16M".**

Date Code Identification:

To identify the Date Code of your PS2, you only have to read the label in the back of your PS2 and refer to the picture below:
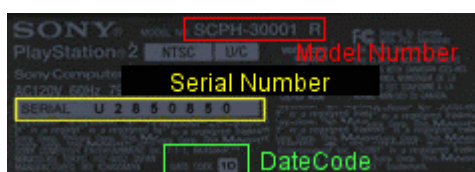
PS2 Power Supply Repairs

A very common failure, which seems to crop up on some of the earlier PS2 models, is where the power supply fails for whatever reason. When switched on there is no life and often, the internal fuses (or sometimes the fuse in the power lead) blow.

Very often, the fault lies with a very simple component on the power board. The usual component is a diode, of which there are four similar ones. Often though, the same diode fails each time. This is the third of the largish diodes, arrowed in the following picture.

Be very careful when working on the power board as it contains dangerously high voltages even when not connected to the mains. This is because capacitors can remain charged for some number of hours or days. Take all normal precautions before working in this area. In addition, handle the board as little as possible

Check the diodes with a continuity meter. If it shorts then it has blown and should be replaced with a 1 Amp diode. You should also test the two board fuses for continuity as one (or both) of these can be blown by the over current. You may also have to replace the main fuse in the power lead as this can go at the same time.

Disk Read Errors (DRE)

When you get the dreaded Disk Read Error, it normally occurs for one of two reasons. Either dust has built up on the lens of the laser mechanism, or the operating voltage of the laser has drifted off slightly due to heat and age. Of course, occasionally there are actual failures of components, which cause this, but these are the main two reasons.

Tools required by this guide are (not all are required for all parts however):

1) A normal sizes star (Phillips) screwdriver.
2) A very small Phillips screwdriver.
3) A small, flat screwdriver.
4) Some isopropanol alcohol (IPA)
5) A few cotton buds
6) A little mechanical grease. (I've used Vaseline before)
7) A can of compressed air.
8) An oscilloscope.

Cleaning the laser lens

1) Remove any CDs from the unit and unplug all leads and memory cards. Turn the unit upside down and use the small, flat screwdriver to pop out all the little plastic and rubber screw covers.

2) Take your normal sized Phillips screwdriver and unscrew all the screws.

3) Try to write down where each part comes from (including the screws as they have to be returned to the same location at the end. Stick them in a tub to keep them safe.

4) Turn the unit back up the right way, holding it all together. Place on the work surface and gently ease the case open. You may have to tilt the lid slightly towards the front, and slide out to avoid the cd tray. BE CAREFUL not to damage the eject/power button ribbon cable, as these are very fragile.

5) Remove the four tiny screws from the cd drawer top, being very careful not to cause any damage.
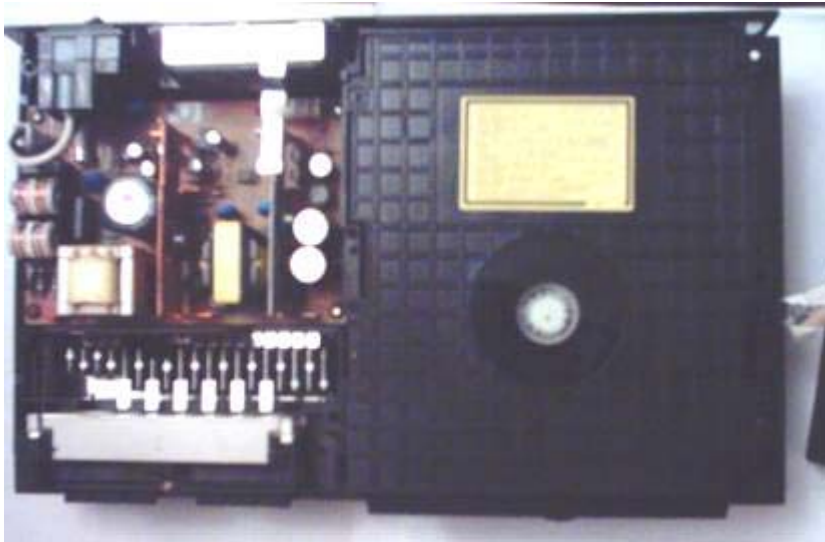
6) Gently lift off the lens casing and you will see the slide tray underneath.

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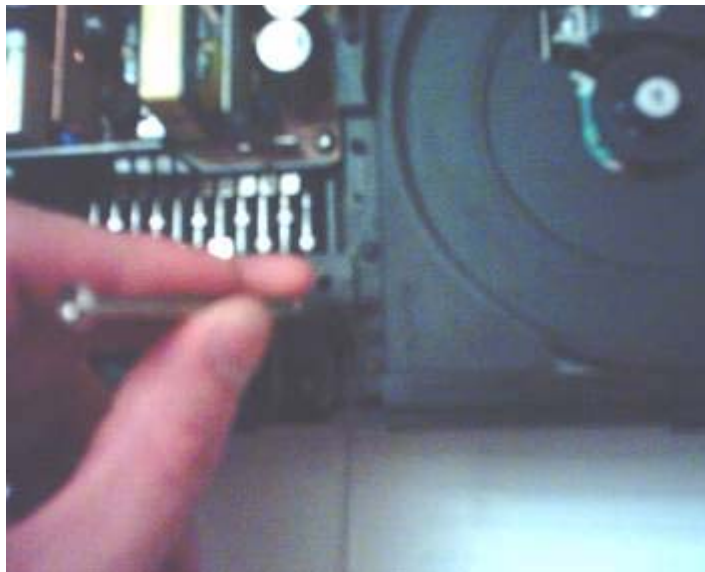7) To remove the slide tray you have to remove the two small screws, which are on the left hand side of the tray.

8) Gently pull the tray away from the rest of the unit by carefully sliding it all the way to the front until it has cleared the lip on the right of the tray. Look for any damage or wear, as this could be a cause of the unit malfunctioning. If you have compressed air give a few little squirts to any places, where you see dust, but you must be careful not to damage the laser lens.

9) Take a cotton bud and careful place some of the alcohol on it (but not so much that it is dripping everywhere). This alcohol is the same (or similar) to the small bottle of alcohol which is in audio and video cassette cleaning kits. This is probably the best way to locate a source. Locate the lens (the circular glass part) and very gently rub the cotton bud around the lens in circular motions for about 30 seconds, being very gentle. Once done, flip the cotton bud over and dry the lens with the other end for about 10 seconds.

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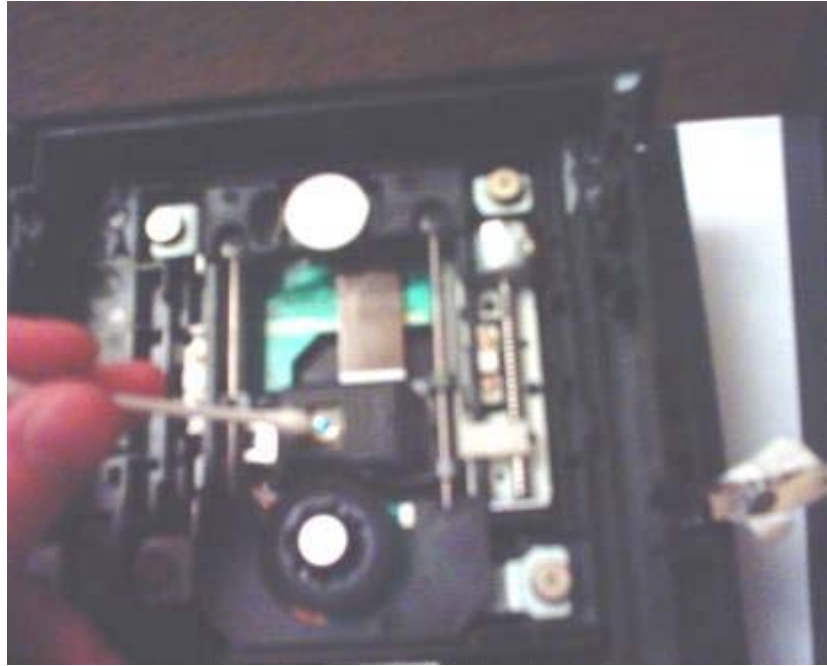
10) The laser part slides on rods to reach different rings of the cd. These can become clogged up with dirt and dust, making movement difficult. So, take a clean cotton bud and clean the slide rods thoroughly, making sure you get to all parts and give a good clean.

11) The spin rod controls the movement of the laser and is greased to allow smooth frictionless movement. Clean the surface of the spin rod. If you have some grease to replace with then remove all the dusty grease (or as much as you can) and then apply some fresh grease. If you have no grease to replace with then just remove any excess dirt but try to leave a little grease, as it is required for the mechanism to work.

12) Clean the little cogs too so that all possible avenues are covered.

13) You have now completed the cleaning process. This often cures read errors and should always be attempted first. Reverse the dismantling process and put the machine back together, making sure you DON'T TRAP the eject / power button ribbon cable, as this can cause serious problems for you if it happens.

14) Power on the unit and try to load both a CD and a DVD game. If all works fine then **CONGRATULATIONS** on completing the guide successfully. If however there is no change then you should proceed to the next step - Adjusting the Disk Mechanism.

Adjusting the disc mechanism

Follow steps 1-6 above again to get the PS2 unit dismantled.

After the cover is off the disk tray, you will need to plug the unit back in, (The unit needs to be hooked up to a TV as well to test it while you have it open. You should have a DVD movie, a game disk with a silver or gold back and one with a purple back in order to fine-tune the system to play all three). It will be necessary to have the unit powered up to perform the repair. Press the eject button so that the tray slides forward exposing the undercarriage. At the back of the unit, you should see a small white, geared wheel about the size of a quarter. This little wheel can cause many of your problems.

This wheel changes the angle in which the disk is held. You will notice that there is a small metal tab, which is holding the wheel in place. Take a permanent pen and mark the point on the wheel that meets the tab. That way you will always know the original position that the wheel was in. Now that the original position has been marked, feel free to spin the wheel for a few full rotations in order to see how it changes the angle. It will only alter the angle a few degrees before it goes back to zero, after it reaches the maximum angle it will go back to flat after each full rotation. Once you have played with it to see how it works, put the wheel back to the original position that you have marked. Then advance the wheel about 1/8 of a turn and place the disk tray cover back on top of the disk tray. (You will not need to screw the tray cover back down in order to test the machine; you will only need to hold down the cover with your fingers while trying to load/test a disk).

Now place a DVD in the tray and press the eject/close button in order to close the tray and load the DVD (hold down the cover as explained above). Wait to see if the DVD loads, you may have to use the browser in order to load each disk you test. If the DVD loads, eject it and load a silver backed disk, if that loads try a purple backed disk. If all three loaded successfully, congratulations you are finished. If not, remove the tray cover, eject the disk and advance the wheel another 1/8 turn and repeat the process. It just a matter of finding an angle that will facilitate the operation of all three types of disks. Once you have found the proper angle and the system is operating to its full potential, put it back together and start playing games again. I also do not recommend placing the PS2 on its side once you have fixed it. Although Sony says, they recommend it in the owner manual, there have since seen internal Sony documents retracting the statement and attributing many malfunctions to storing and operating the unit on its side. Keep it flat at all times!!

If your unit is still not working then you will have to adjust the laser voltage. This stage is the most deadly to the PS2 laser if not done correctly. If you are not confident in your repair abilities then please don't proceed with this as you may end up making matters worse.

Adjusting The Voltage

Read these instructions all the way through, and make sure you understand all the steps before doing anything!

1) Remove the metal shield covering the circuit board (the shiny one). With the front of the PS2 facing toward you, it is on the right. There is only one screw holding it in place, it has an arrow pointing toward it.

2) Remove the expansion bay plate (the dull one with holes). With the front of the PS2 facing toward you, it will be on your left. Once again, there is only one screw holding it in place with an arrow pointing toward it.
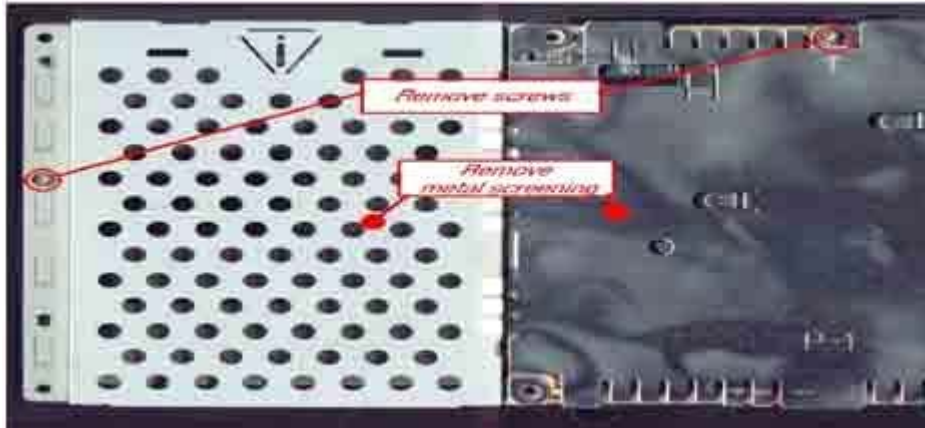
3) Lift out the expansion bay housing which is attached to the circuit board by a short ribbon cable. Under this are the laser control screws.

4) The laser control screws are on a small amber circuit board slightly recessed in the plastic case. You will be adjusting one or both of the two small silver screws with a black screw in between them. With the front of the PS2 facing you, the silver screw on the LEFT controls the voltage for the CD reading. The silver screw on the RIGHT controls the voltage for the DVD reading. I suggest putting a small dot, with a permanent pen, in the 12 o'clock position of each screw to help with the adjusting process...

5) Stand the PS2 on its side (vertically, memory cards at bottom, power button at top) at a slight angle. You will not be able to stand it at this angle unless you do it on carpet floor. Having a friend hold it in position might be better. Make sure that the expansion bay housing does not touch the circuit board, as you will be turning it on, and you do not want the metal housing to short out the board. Let it hang down, away from the board.

6) With the PS2 plugged in (power and video), turn on the PS2. You are ready to adjust the voltage for the laser. Only adjust the screw for the type of disc you are having problems loading. If you are having problems with both, do them one at a time. Remember, now that the unit is on its side that the CD voltage control screw is now above the DVD control screw.

If it is at all possible then please use a non-metallic screwdriver, as static electricity can ruin this portion of your PS2 (a £50+ part!)...

7) Turning the screw clockwise increases the voltage, counter-clockwise decreases the voltage. **Because you risk of blowing the laser if you give it too much voltage, always start by decreasing voltage.** In my experience, you generally have to add voltage, but for safety, I suggest you reduce voltage first. Using a small screwdriver (non-magnetic & non-metallic if possible) turn the appropriate screw counter-clockwise two degrees. Load in the

CD and wait, if you still get a disc read error move the screw another two degrees. Repeat the process...
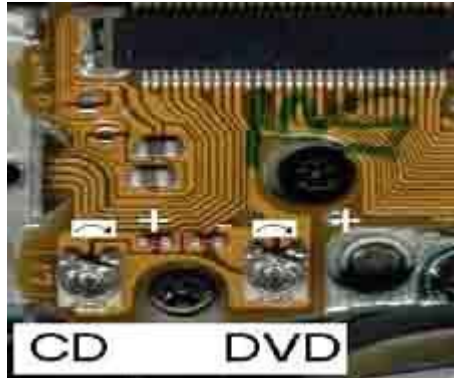
If you still get disc read errors after about 20 degrees of rotation, put the screw back to the 12 o'clock position and start moving the screw clockwise two degrees at a time.

It may take a while, but you will most likely find the sweet spot where your discs begin to read again. I have personally never had to move the screw more than 30 degrees; although I have heard, as much as 180 degrees is sometimes required for a modified PS2 to play backup CDRs.

8) Try a few different trouble discs before re-assembly to make sure you do not need more fine adjustment. As well, hold the PS2 elevated in the horizontal position and make sure it reads while in this position. I have found that slightly more voltage (2-6 degrees) is required to run discs in the horizontal position than the vertical position.

9) Turn off the PS2 and re-assemble it. If this has worked then you should keep it in either horizontal position from now on, contrary to what Sony tells you. If not then your last try is to get hold of an oscilloscope (you can buy one off eBay for £10-15).

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Laser calibration using an oscilloscope

Most laser calibration guides, like the previous one, for the PS2 are all about adjusting the laser potentiometers "blindly" or using a multimeter to measure the resistance of the potentiometers. However, the reason you use variable potentiometers is that every PS2 need individual adjustment, so you cannot just use one reference value. What you need is an oscilloscope and/or a laser power meter to measure what is going on when you turn the pots. It is always best to measure on a brand new well working PS2 to get some reference values to use when you are calibrating a bad laser.

If you have a laser power meter, you just have to put the photo-detector directly above the laser lens and look at the readout. If you are using an oscilloscope, you have to know where to find the RF/Eye Pattern measure points.

Laser potentiometers on the PS2 locations are as follows:
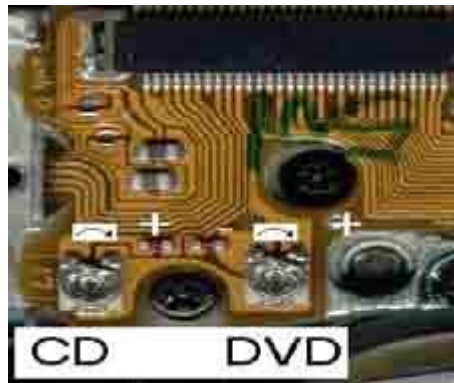
This is a picture from the underside of the PS2 Laser. The pots are marked on the picture. Turn clockwise to increase power and counter clockwise to decrease power. Do not turn these wildly, or you might kill your laser by using too much power, or just be unable to get back to a working setting. Now, get your scope and connect it to the proper test point. You also need to find a good ground connection, if you do not know how you should not be reading this any further. Even if we have not scanned your exact PS2 model, you should be able to find the test point as your board is probably very similar to one of the following pictures:

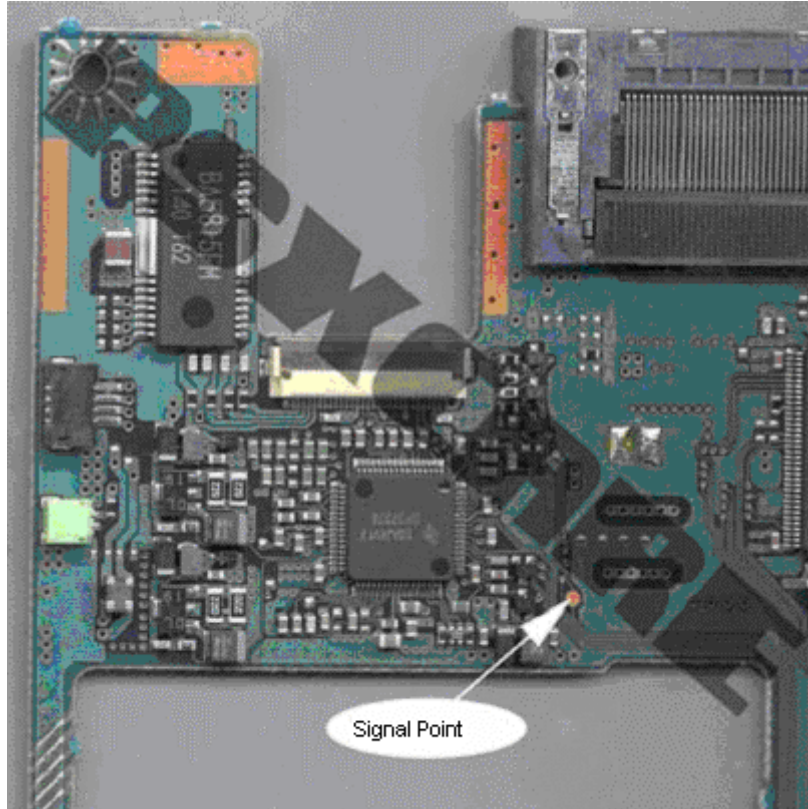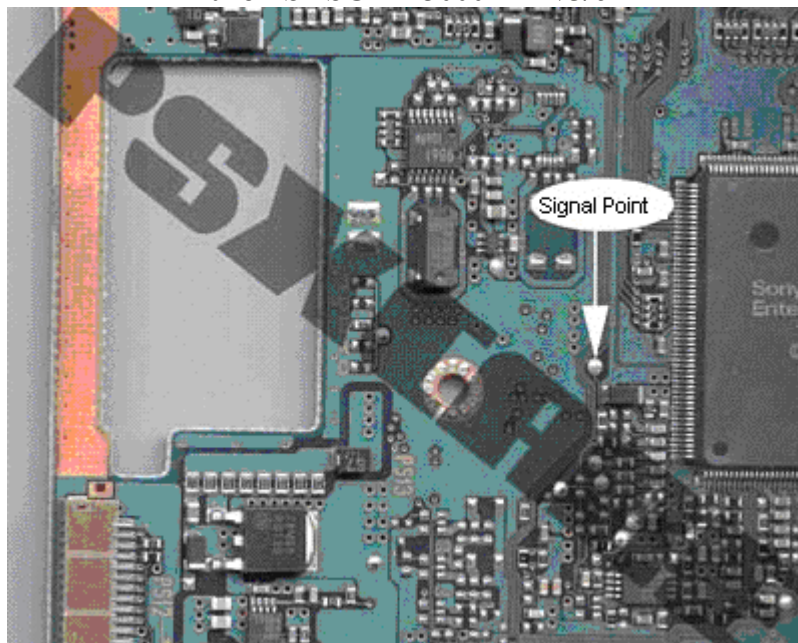**Japan PS2 SCPH-10000**
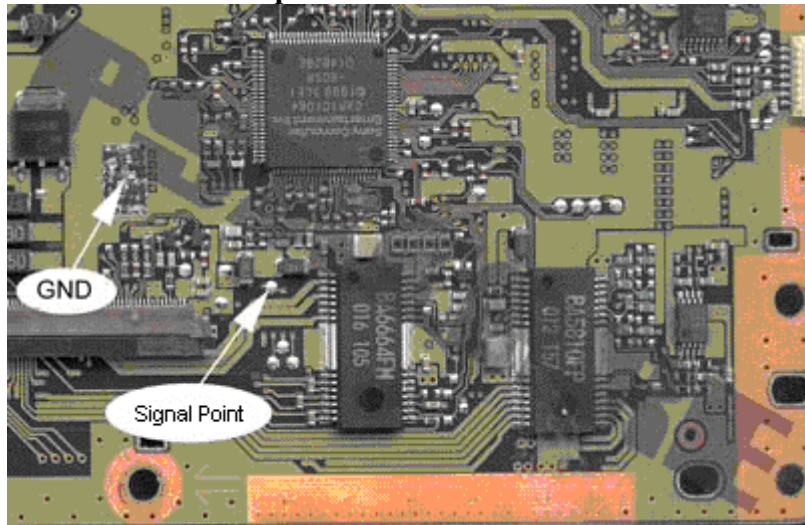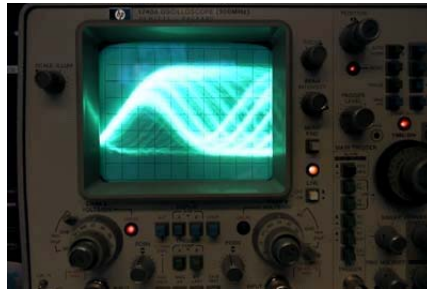

Euro PS2 SCPH-30004 "v3"

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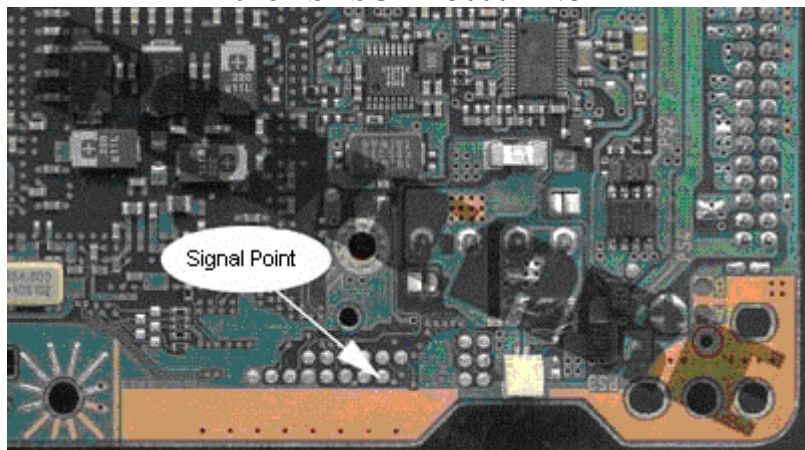
Euro PS2 SCPH-30004 "v4"

Euro PS2 SCPH-30004R "v5/6"

Adjust your oscilloscope and start measuring on the signal point for your board.

Set the scope at 20mV and 0.2us Sweep. The scope must be at least 20 MHz. When you connect the scope, you should se a clear "eye pattern" signal, like the one above. When you increase laser power, the amplitude (height) of the pattern will increase. Do not adjust to high, or the pattern will "clip" at the top and bottom. You will have to test with several different discs/media as all media have different reflectivity. Therefore, if you calibrate the laser so it will be just below clipping with cd-r media, it might "clip" when using originals. We recommend you take readings from a brand new PS2 to get reference levels. Normal values are 800mV peak to peak with DVD media and 640mV peak to peak with CD media.

Correct signal, nice round curves at the top and bottom.	Clipped signal at the top and bottom of the pattern.
"EYE-PATTERN" SIGNAL Scope settings : 20 mV/Sect 0.2 us/Sect	Distorted (overdriven) "EYE-PATTERN" Signal Scope settings : 20 mV/Sect 0.2 us/Sect
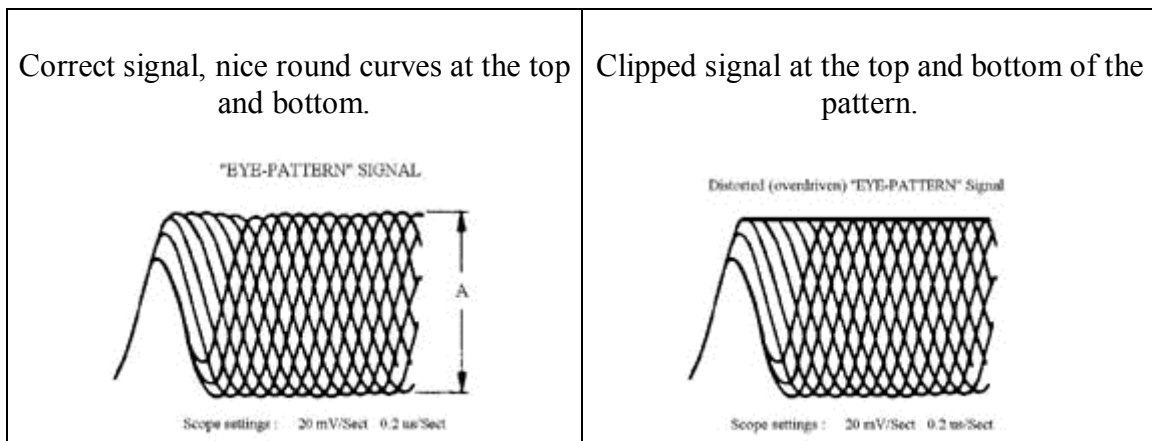
Clicking And Squeaking Explained

Clicking is most likely the laser unit moving back and forth trying to access a piece of data. If it cannot find that data it will move back and forth until it does. In the case of a DRE, since the PS2 never finds that data it will continue clicking until you receive the error.

In case clicking is loud, or you hear squeaking, it might be a good idea to clean the slide rods that the laser rides on, and then add some oil or grease.

Loud clicking can be the result of warped discs in the drive, check to see if your disc is warped if you get loud clicking.

Playstation 2 Fault Finder

Symptom: Will not play any discs at all; just get 'Disc read error'
Problem: If no modchip installation has been attempted then you need to try the above steps to clean or adjust the laser voltages. If however someone has attempted to fit a modchip then check for damaged components, tracks and stray solder or even for component pins being shorted by excess solder. Remove excess solder with some solder wick.
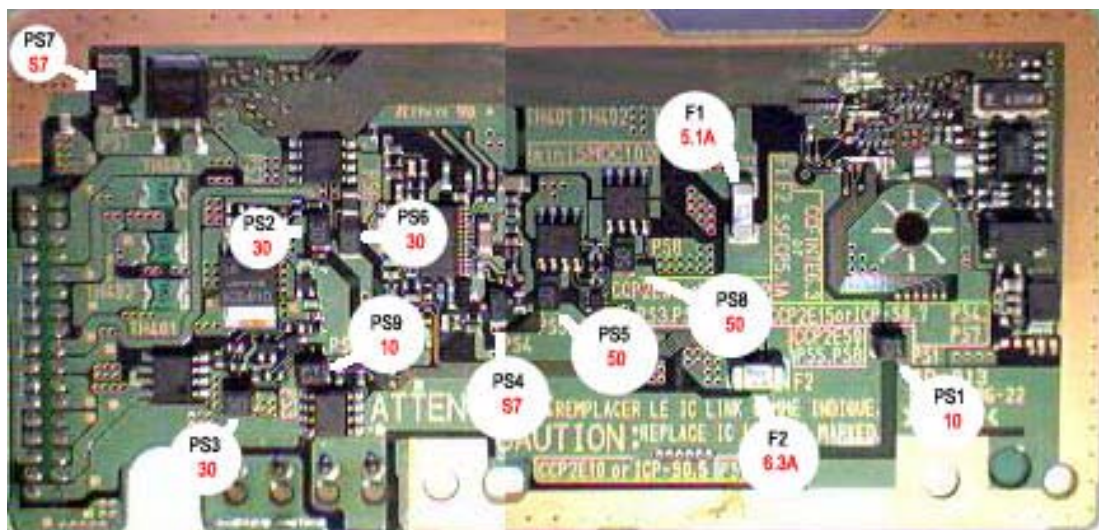
Symptom: CD draw will not open
Problem: Could be a few reasons for this. If it has been dropped, the cogs could be misaligned, you will need to take the CD unit apart and reassemble correctly. If someone has attempted to fit a modchip there could be damage around the part of the board where the wires for pins 5 & 6 are soldered. Check for damage to tracks and excess solder, it is also possible that the BA8510 or BA8515 chip has been damaged. In addition, it could be the flat flexible cable that connects the power/reset & eject buttons to the main board. Check for physical damage and replace if need be.
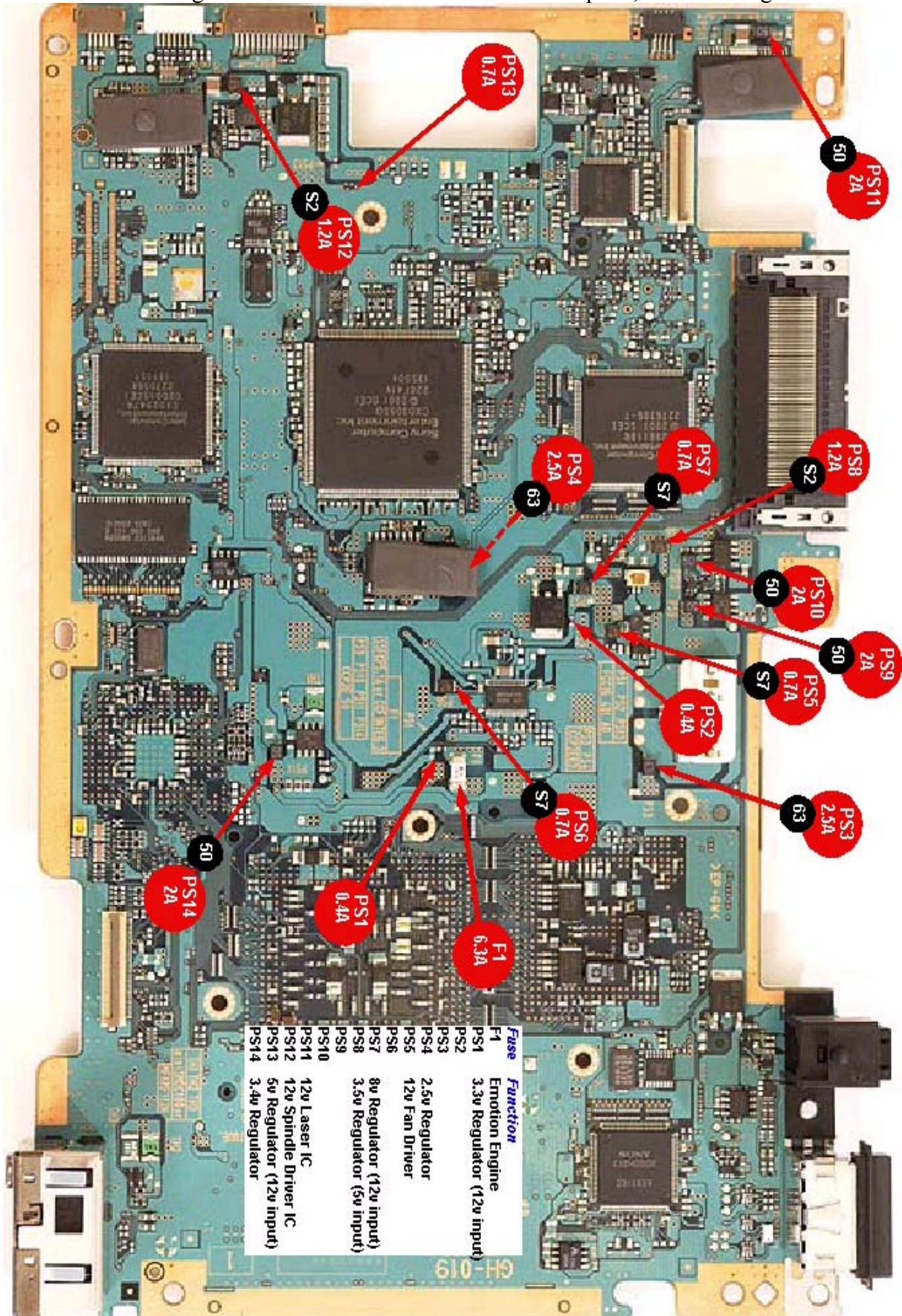
Symptom: There is no power
Problem: Either power supply problem or blown surface mount fuse on the main board. First, check all SMD fuses on the main board, and the fuse on the power supply board. If the fuse on the power supply board has blown, replace it and try again, if it blows again you need to replace the power supply. If the power supply seems OK then check all SMD fuses on the main board. There are seven on the V3 and about a dozen on the V4 / V5 / V6.

Below is a diagram of the bottom side of the separate V3 power board, which contains all the fuses. The references should be made to the V5/6 board table that follows, in order to locate which fuse controls which part. These fuses, when tested should be a short circuit and when they "blow", they go open-circuit, thus preventing the current from flowing. They should however only be replaced with one of a similar rating, otherwise the over current which caused the initial fuse to blow could cause some other part of the circuit to blow, which could be costly. Under **NO CIRCUMSTANCES** do I recommend just shorting these fuse points (as some other people have suggested) as this can cause irreparable damage the intricate circuitry.

The table in this diagram of the V5/6 board below shows the parts, which belong to each fuse.

Fuse	Function
F1	Emotion Engine
PS1	3.3v Regulator (12v input)
PS2	
PS3	
PS4	2.5v Regulator
PS5	
PS6	12v Fan Driver
PS7	8v Regulator (12v input)
PS8	3.5v Regulator (5v input)
PS9	
PS10	
PS11	12v Laser IC
PS12	12v Spindle Driver IC
PS13	5v Regulator (12v input)
PS14	3.4v Regulator

Symptom: I just get a black screen
Problem: Either a blown surface-mount fuse or damage done trying to install a modchip. Damage will be around the BIOS solder points. Check for excess solder, clean up with our de-solder wick. Also, check for damaged tracks. If it is not due to a mod then check all SMD fuses with a multimeter or continuity tester. They should conduct and have a resistance of zero. If this is not the case then replace with fuse of same or similar value.

Symptom: Joypad(s) don't work
Problem: This is most likely not a problem with the actual ports but another blown surface mount fuse on the main board or damaged flat flexible cable. Check the cable for physical damage. Replace with a replacement joypad / memory card port cable from an online store. If the cable checks out OK, then check the SMD fuses with a multimeter or continuity tester. They should conduct and have a resistance of zero. If this is not the case then replace with fuse of same or similar value. If the joypad port is damage, a replacement will have to be purchased online.

Previous eBay Recommendations

Just a few of my eBay recommendations.

Left by	Date	Item#	S/B
dooohhhh!!!!(13 ⭐)	29-Dec-03 16:01:34 GMT	3067259055	S
Praise : Good Guide, Most useful. Would use again. Many Thanks A+++++++++			
bob_fleming (4)	22-Dec-03 14:15:38 GMT	3065829669	S
Praise : fast & furious. top e-bayer. cheers mush!			
paul-s-r (5) 🔆	19-Dec-03 02:46:05 GMT	3064331444	S
Praise : fixed my ps2, well worth the money A+++++			
retro519 (7)	17-Dec-03 17:39:12 GMT	3059627073	S
Praise : Very quick delivery, good product, EXCELLENT SELLER !!!!			
vaygo (75 ⭐)	10-Dec-03 22:37:24 GMT	3059627073	S
Praise : a bit basic but ok,,,			
kwatktd (39 ⭐) 👥	08-Dec-03 21:35:55 GMT	3059627073	S
Praise : no problems, as described, promptly deliverd			
garry453212 (20 ⭐)	08-Dec-03 14:53:29 GMT	3060612410	S
Praise : Fast and efficient good ebayer thanks A++++			
cholland426 (40 ⭐)	05-Dec-03 02:22:03 GMT	3056799841	S
Praise : A+++++++++++ Seller- Will do business with again!			
green-mantle (144 ⭐)	04-Dec-03 22:44:00 GMT	3062615993	S
Praise : Great Transaction, very fast response, A pleasure to deal with, recommended A+++			
rae666 (34 ⭐)	02-Dec-03 22:01:05 GMT	3061011775	S
Praise : recieved, quick service			
alzi1967 (48 ⭐)	01-Dec-03 18:05:26 GMT	3062615993	S
Praise : RECEIVED SUPER FAST,THANKS,NO PROBLEMS HERE ,A++++++++++++++++			
Left by	Date	Item#	S/B