share some photos of the monster. The pad layout is different, this differences doesnt means that is imposible, in theory if all the signals are present it could be posible but is a big challengue

Feb 21, 2022 Report Like + Quote Reply

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RIP-Felix
Senior Member

Tutorial - Frankenstein Phat PlayStation 3

(How to Swap an unreliable 90nm RSX with a more reliable 65nn or 40nm)

This is not an upgrade! It's is a path forward for repair when your RSX dies! The process is EXTREMELY difficult and likely to cause damage to the motherboard. There is a high chance your motherboard will be destroyed in the attempt. So it's better to consider performing this ONLY to repair a MB that already has a dead RSX.

> RIP-Felix said:
>
> *Dr. Frankenstein reanimated the Dead. Only a Monster would kill the living*

Spoiler: DISCLAIMER

Spoiler: Backstory

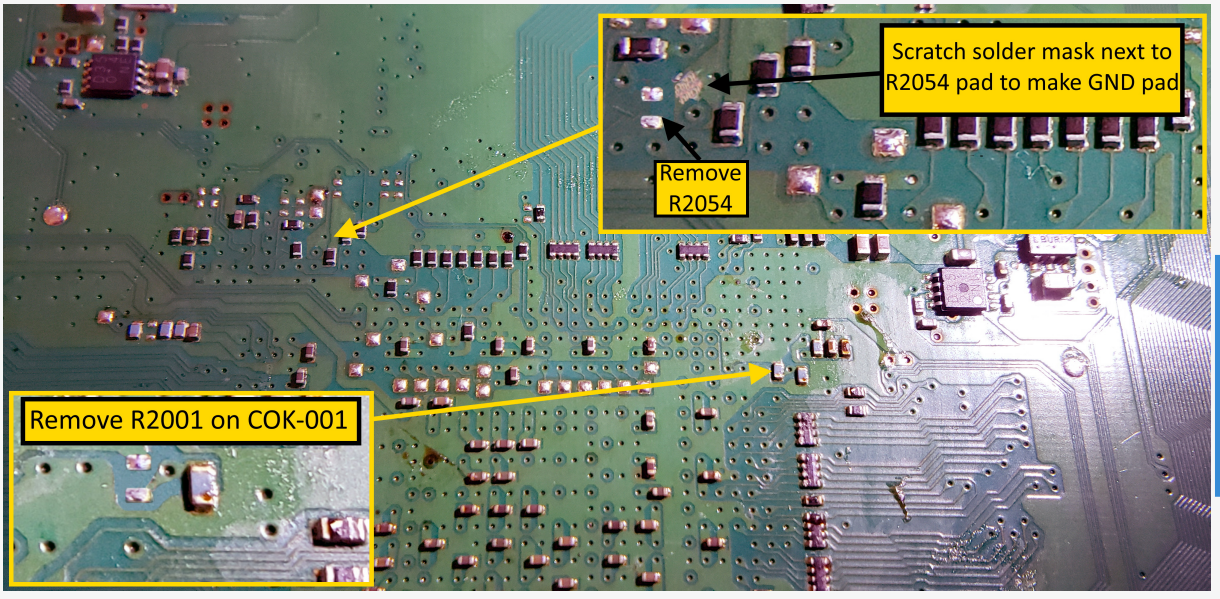
Note:

- I don't see the appeal of doing this mod to any console other than the Backwards compatible models, but if for some reason you want to install a 65nm or 40nm RSX on a non-BC model, you can. I'm just not familiar

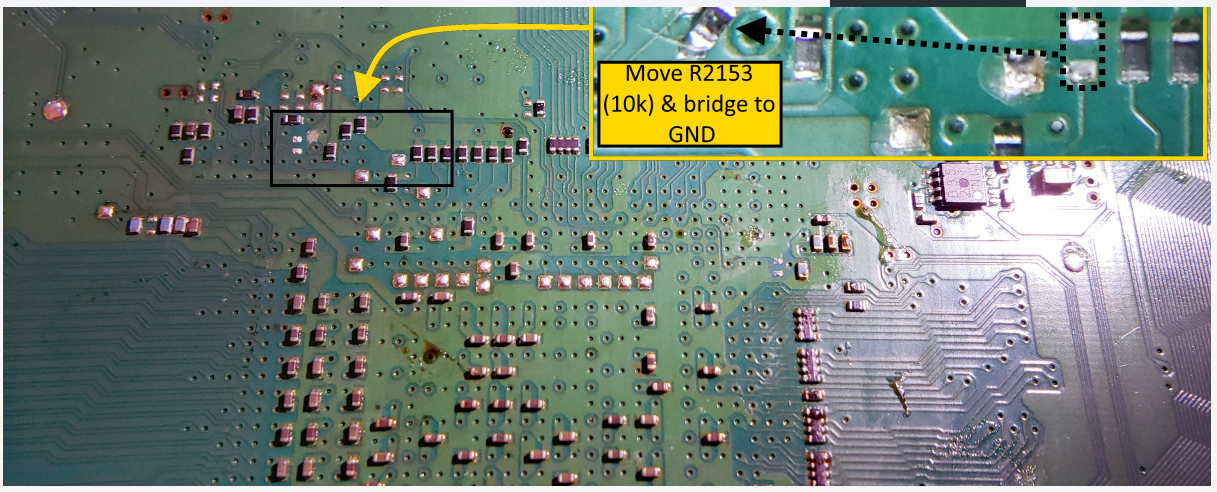
- The tutorial below is written for COK-001 and COK-002 Motherboards. You will need to adapt it for your model, if you choose to do it on a different model MB. You have been warned!

Spoiler: (Required) Resistor mod

1. Remove R2054 & R2001*. They are not needed anymore.
   - Note: R2001 is only present on COK-001 motherboards. It is not populated on a COK-002 Motherboard. If you have a COK-002 Motherboard, you don't have to do anything to R2001.
   - Note 2: In official SONY refirbs they replace R2002 (49.9 ohm) with a 47k resistor. However, I don't understand why. It works fine leaving the 49.9 ohm in place. Removing R2001 effectively cuts off +1.5V_RSX_VDDIO to CGCLKI. The only thing I can remotely think of is that they wanted to increase the resistance to GND from 49.9 to 47k. Perhaps to prevent noise or shorting? But then, why not just remove it entirely? IDK
2. Scratch the GND plane next to R2054 to expose bare copper. We will use this to attach R2153.



3. Move R2153 (10kΩ) to the lower pad of R2054. Solder it diagonally to the GND pad you made in step 2. Confirm with a multimeter that the



Spoiler: (Required) Replace RSX

1. Remove the 90nm RSX and replace with either a 65nm or 40nm RSX. This is a very difficult process and is only recommended for experts. It takes great skill and confidence in your equipment.

Spoiler: Pictures for those who like to see stuff

Spoiler: (Required) Training/Tricking SYSCON

The SYSCON is expecting the original Model RSX to be installed. You can replace the RSX with the same model no problem. The SYSCON sees the same model is there and will go about it's merry business. However, now that you have replaced it with a 65nm or 40nm RSX, it will see there's an incompatible RSX model and loose it's mind!

We have to convince the SYSCON to accept the new RSX. There are 2 ways to do this.

Spoiler: (Optional) ORBIS Modchip

Spoiler: (Optional) SYSCON EEPROM

The following sections contain the commands you will need to write to swap any 65nm or 40nm RSX into any motherboard revision. First, find the section that corresponds to the RSX you want to swap into your motherboard. Make sure your motherboard revision and SYSCON model number matches that section! Then write the commands listed there. Make note of the address where you need to fix the checksum. It's in the bullet point beneath each section.

There is an example of how to fix the checksum at the end.

PS3 Models: CECHAxx, CECHBxx, CECHCxx, CECHExx, CECHGxx, CECHHxx, CECHJxx, CECHKxx, DECR-1400
Motherboards: COK-001, COK-002, SEM-001, DIA-001, DIA-002, DEB-001
Syscons: CXR713120-201GB, CXR713120-202GB, CXR713120-203GB, CXR714120-301GB, CXR714120-302GB

65nm RSX Series (with IHS): CXD2982xxx, CXD2991xxx
w 3242 03 A2 03 B0 07 71 w 3254 21 E8 w 348B 88 w 34AF 88

40nm RSX Series (with IHS): CXD5300xxx, CXD5301xxx
w 3242 03 61 82 80 01 91 w 3254 21 EC w 348B 8B w 34AF 8B

40nm RSX Series (without IHS): CXD5302xxx
w 3242 03 61 82 80 01 91 w 3254 21 EC

- Fix checksums at addresses 32FE and 34FE
- Note: "w 3254 21 EC" may not work with all 40nm RSX's. If you still get an error, try "w 3254 21 EB."

PS3 Models: CECHLxx, CECHMxx, CECHPxx, CECHQxx, CECH-20xx
Motherboards: VER-001, DYN-001
Syscons: SW-301, SW-302, SW2-301

40nm RSX Series (with IHS): CXD5300xxx, CXD5301xxx
w 182 03 61 82 80 01 91 w 194 21 EC w 3AC 8B

40nm RSX Series (without IHS): CXD5302xxx
w 182 03 61 82 80 01 91 w 194 21 EB w 3AC 8B

- Fix checksum at address 7FE

PS3 Models: CECH-21xx
Motherboards: SUR-001
Syscons: SW2-302

40nm RSX Series (without IHS): CXD5302xxx
w 182 03 61 82 80 01 91 w 194 21 EB

- Fix checksum at address 7FE

Syscons: SW2-303, SW3-301

40nm RSX Series (without IHS): CXD5302xxx
w 224 21 EB

- Fix checksum at address 7FE

PS3 Models: CECH-40xx
Motherboards: MPX-001, MSX-001
Syscons: SW3-302

40nm RSX Series (with IHS): CXD5300xxx, CXD5301xxx
w 224 21 EC

- Fix checksum at address 7FE

Note: These changes will cause a checksum mismatch. You need to Fix the checksums at the addresses listed in the bullet point beneath each section above.

Here is an example of me fixing the checksum at address 32FE on a COK-001 after a 40nm swap :

>$ **eepcsum**
eepcsum
sum:0xee10
Addr:0x000**32fe** should be 0xffff**64a7**
Addr:0x000034fe should be 0x7115
Addr:0x000039fe should be 0x0f38
Addr:0x00003dfe should be 0x00ff
Addr:0x00003ffe should be 0x00ff

what your checksum should be and write that.

However, endian byte swapping requires us to write it "**a7 64**." They are just flipped around...

>$ **w 32fe a7 64**
w 32fe a7 64
w complete!
[mullion]$

I command I needed to write was "**w 32fe a7 64**." It completed successfully! I then used the **eepcsum** command again to see if there were any more checksum mismatches.

>$ eepcsum
eepcsum
Addr:0x000032fe should be 0x64a7
Addr:0x000034fe should be 0x7115
Addr:0x000039fe should be 0x0f38
Addr:0x00003dfe should be 0x00ff
Addr:0x00003ffe should be 0x00ff
>$

You can see this time the "sum:0xee10" line disappeared. That means I had no mismatches. I have successfully written the change to enable the new 40nm RSX and fixed the checksum so the console will boot. However, that's only because I didn't make any changes at address 34FE. You will need to repeat this procedure one more time for address 34FE to fix there checksum you change there. But the procedure is the same.

Note: You can choose either option, but you must choose 1 of the 2 methods or you will get a YLOD with SYSCON errors 3034/4002.

Spoiler: (Required) VDDR Voltage MOD

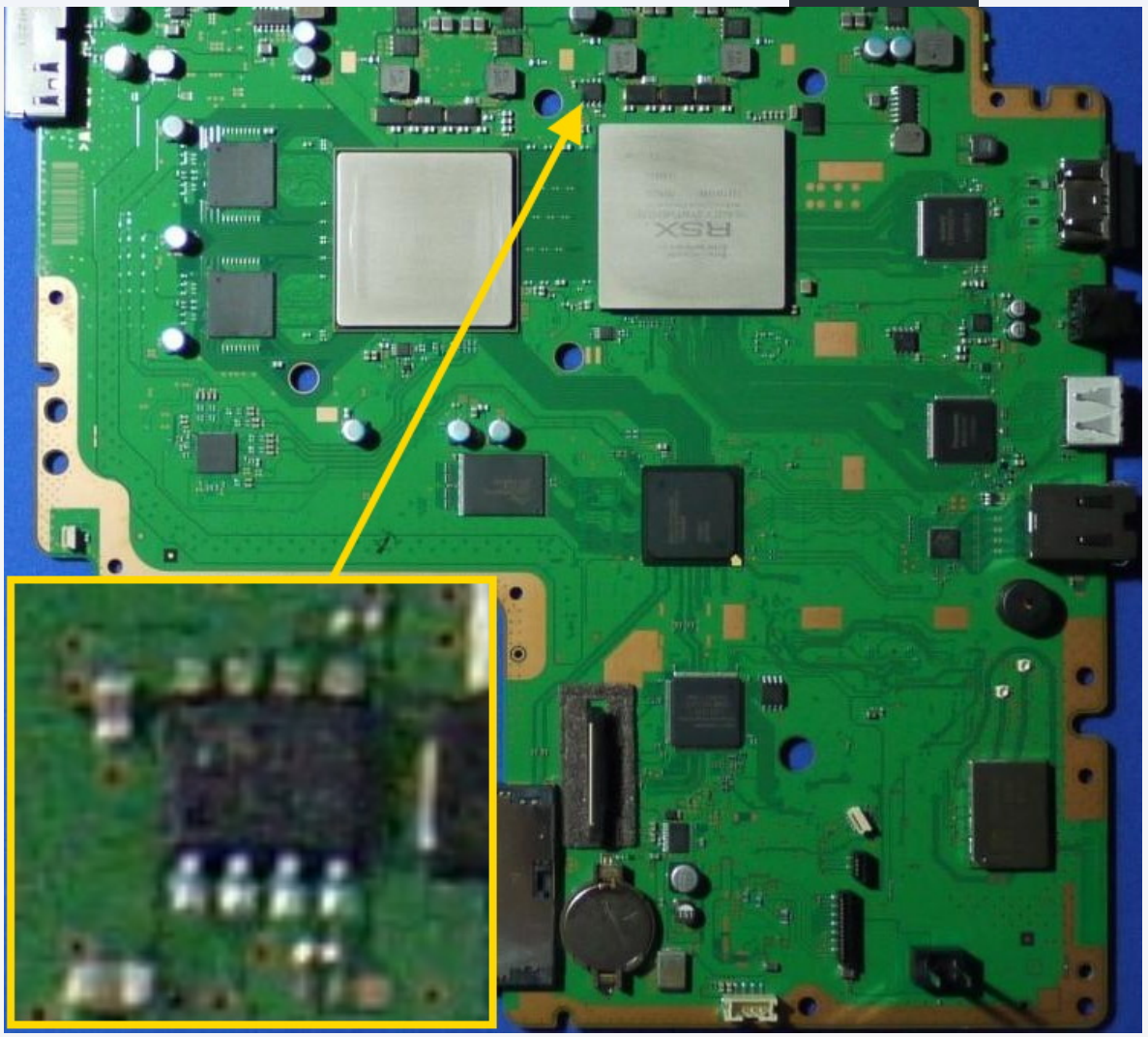
lifespan of the RSX to be as long as possible, that's the whole point! So you should do this.

There are 2 ways to accomplish this for the 40nm (1.2v --> 0.95v). For 65nm (1.2v --> 1.0v), you'll have to use option 2.

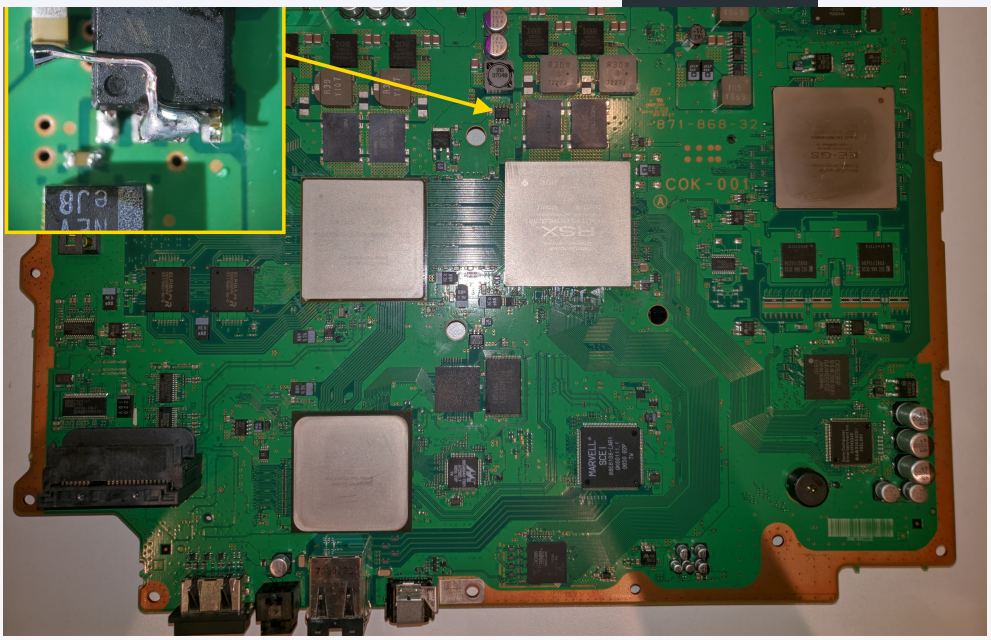
1. @botakompong's method works and is easier. But it's also hackier. It only works on 40nm RSX.

   Spoiler: 40nm Only

   We need to remove the Voltage regulator that supplies VDDR from a slim model that has a 40nm RSX. The Regulator you are looking for will be in the same location next to the RSX. It's the only one so you can't



1. Lift Pins 2, 3, and 4 so they will be floating.
2. Remove Q6200 from the phat and replace it with the Regulator you harvested from the slim. Pins 2, 3, & 4 should



3. Bridge Pins 2 & 3 and run a jumper wire to C6202 as seen in the image above. Pin 4 should be floating.
4. This will will reduce the voltage to 0.95V and extend the operating life of the 40nm RSX. But this IC only outputs 0.95v. I can't be used on a 65nm that needs 1.0v.

Note: This method dissconnects the SYSCON's control of this voltage. IC6200 is a MOSFET controller that drives Q6200 (The MOSFET you removed). SYSCON enables the controller, which in turn gates the MOSFET. By removing the MOSFET and replacing it with a Voltage regulator, the SYSCON in non the wiser. It's still connected to the controller and assumes all is fine.

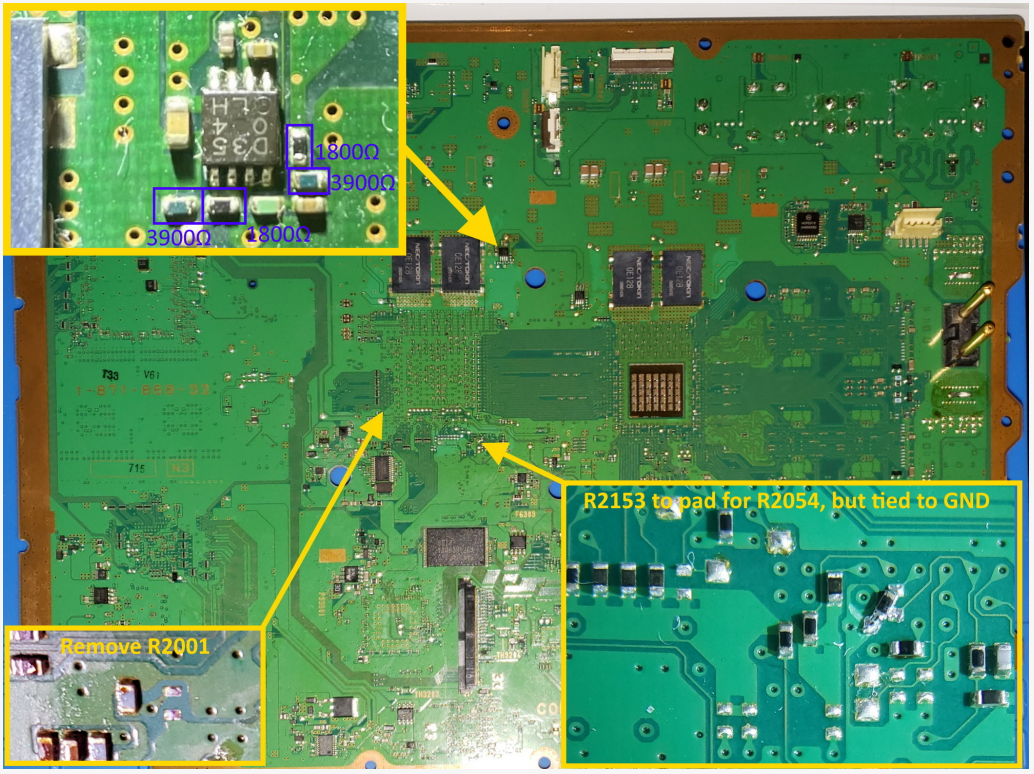
The Voltage regulator bypasses the controller. It doesn't wait to be turned on by the controller. It regulates as soon as it is powered. I have done some voltage testing and found that VDDR is one of the earliest voltages enabled. It turns on almost as soon as it's supply voltage is. So it just so happens that removing the control doesn't matter in this case. In general, it would be a bad idea, because voktages are supposed to be sequenced. Brought up in order. It just doesn't matter here.

That's what I mean by it works, but is hacky.

Forums

Spoiler: 40nm or 65nm

1. SONY's approach was to replace IC6200 (BD3520 N-Channel MOSFET controller) with a model that allows user selected output voltage using external resistors (BD3504). IC6200 drives MOSFET Q6200. So SONY's method is better because it doesn't circumvent the circuit protection and control. But it works for both the 40nm and 65nm RSX. You just need to use different resistors.



2. Here are where you can harvest BD3504's on a COK-00X motherboard. Also the locations of 3.9k, 2.2k, and 4.7k resistors for the voltage mods Myself and @DeadEnd calculated. They are not exactly equal to what SONY did, but they are close enough to not matter.

Spoiler: Part Locations

3. Replace BD3520 with BD3504 and populate a few resistors to Set Vout to approximately 0.95 Volts (for 40nm RSX) or 1.0v (for 65nm RSX).
    - Math:
        - R1 = R6216 (3900) = VFB/GND

- Vout = VFB ([R1' + R2] / R1'), where VFB is 0.65v.
  - **Vout 40nm RSX** = 0.65 ([3900+1800] / 3900) = **0.95v_VDDR**

    Spoiler: SONY's Resistor network

  - **Vout 65nm RSX** = 0.65 ([2100+1800] / 2100) = **1.00v_VDDR**

    Spoiler: SONY's Resistor Network

- SONY's method above works well, but you need to buy resistors for it to work, since 1.8k and 2.1k resistors can't be found on COK-00X motherboards. @DeadEnd and I have calculated the following resistor networks to come close, but with the added advantage that all the resistors can be harvested from COK-00X donor boards.
  - **Vout 40nm RSX** = 0.65 ([4.7k+2.2k] / 4.7k) = **0.951v_VDDR**

    Spoiler: DeadEnd's Resistor network

  - **Vout 65nm RSX** = 0.65 ([3.9k+2.2k] / 3.9k) = **1.02v_VDDR**

    Spoiler: RIP-Felix's Resistor Network

Spoiler: (Optional) Lowering Power Good Low Voltage Threshold

SONY Adjusted the Power Good Low Voltage Threshold in some of their Frankenstein Phat PS3s. My hypothesis is SONY did this to reduce the frequency of 1001 and 1002's errors, which can be caused by bad TOKINS (among other VRM related issues). That would explain why they did it to the buck controllers for both the CPU and GPU. A sort of admission of guilt that they either set it too aggressively or were compensating for bad NEC/TOKINs without replacing them.

triggering an error. Replacing aged bulk filter capacitors certainly works, but just because replacing NEC/TOKIN works doesn't mean that's the only way to prevent a YLOD.

Power good low voltage threshold protects the system from instability. Evidently, SONY repair technicians decided it was "preferable " (for them) to lower it in some of these officially refurbished consoles.

Vid pins VID0-5 on IC6201 and IC6103 (RSX & CELL Buck controllers respectively) form a 6-digit code corresponding to the Vout No load setpoint. Power Good Vmin and Vmax thresholds are relative to that set point. With the stock COK-00X (A - E models) voltage divider values (15K and 20k), Vmin = -163mV. Vmax is always +100mV. The Vout voltage cannot deviate more than that. If it does power good goes low and the SYSCON will error.

$$V_{LOWER} = \frac{V_{OUTNoLoad}}{2} \times \frac{R_1 + R_2}{R_2}$$

$$V_{UPPER} = V_{OUTNoLoad} + 100\,mV$$

In some official SONY refurbished consoles, new resistor values (27K and 10K) change Vmin = -400mV. So the Low Voltage threshold is now more than twice as low, allowing much more voltage ripple before it triggers an error.

It is my opinion this modification is harmful, not proper. Just because SONY authorized service center performed this "repair" doesn't mean it's a good idea. I think SONY technitions chose to go this route on some consoles, rather than replace the NEC/TOKINs. Perhaps because they were expensive or unavailable, but more likely because they are very difficult to replace without risking damage to the board.

I believe it is irresponsable to allow more ripple/noise before the SYSCON registers an error. That is lazy and will cause the console to die sooner! The real solution to bad capacitors is to REPLACE THEM!

Last edited: Jan 12, 2023

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