Also titled: are you sure it's the laser going bad?

Users of these fine machines and also related models using the same mechanism based on the KSS272A laser block, that have problems with their machines readong some discs, may find this of use:

Two problems that often crop up that look like the laser may be going bad, but are NOT laser related at all, so be sure to check:

1) One or more of the following happens:

- Inability to read the TOC, after which the CDP stops with '0' on the track count display and with the track display off. In these cases the CD may not respond to the keyboard any more until it's switched off and back on again. Sometimes the error goes away after the CDP sits switched off for a while.
- Sudden failure to red the disc (often with some prior skipping), if eject is pressed immediately, the disc will still be spinning and ends up 'grinding' on the tray.
- CDP starts skipping periodically but not at the same rate as the spinning of the disc. Ejecting may also produce the 'disc grinds in drawer' effect.

The cause of this problem are cold solder joints on the mechanism controller, the two-sided board fitted to the actual bottom of the mechanism. In particular, in most cases it's an intermittent contact in the small 2-pin connector, closest to the front panel. This carries the supply voltage for the BSL spindle motor driver chip. The actual symptom has to do with this chip losing one or both supplies resulting in uncontrolled spinning or failure to spin. It is not easy to spot until it really becomes bad because the servo system can correct this. At some point, it cannot any more and the motor either 'runs away' spinning like crazy - this is the 'CD spins in drawer' case - or stops completely - this is the 0 track, no track display

case. The motor is so silent even if it spins like mad that it's very hard to hear, unless the case is open and you can see it happen. In some cases it can even start spinning on it's own just sitting there without a disc, or with a disc but in a stopped condition.
The reason it happens is that the driver chip heats the PCB which results in cold solder joints on the connector nearby (even more susceptible because of the cble flexing when the disc is loaded or unloaded) and the chip itself. In these cases it is advisable to carefully re-solder the whole board and then wash it in isopropanol or PCB cleaning spray (resoldering requires putting liquid flux on the pins of the chips etc. and leaves a residue after it is done). Remember to check and resolder both sides of the board! This is a precision double-sided affair so be sure you know what you are doing. The laser head flat cable needs to be removed, careful, this is static sensitive!!!!!

The above problem pertains to all CDPs with the same mechanism, that would be CDP-X303, 339, 505, 559, 707, 779 and corresponding Japanese model designators.

The following problem is speciffic to the CDP-C779/707 (and Japanese market equivalents):

2) Nasty skipping on damaged discs that should normally be readable at most with sound degradation or muting, and are on other machines. In advanced cases it may skip backeards and just keep repeating the same part of the track ad infinitum.
The way to check for hard errors and susceptibility to them is to load the suspect disc and try to go fast-forward through it. In this case the servo system is more susceptible to losing the track, which can be seen in the time display - time is lost and more often, skips backwards a few times when a hard error is encountered, after a few times it can then skip forward by several or more seconds - this is common to most implementations using the CXD2500 decoder chip and Sony CPU to control it, the

CPU detects repeated problems and tries to skip 'over' the problem area. Repeated skipping backwards only to repeat it again is a sign you have this problem - in fact, it is highly probably all X779/707 have it, but doe to tolerances, it may be more or less visible.

The actual problem has to do with what must be a manufacturing flaw. In particular a resistor with a wrong value has been used on the digital PSU board. The reason the problem happens is instability of the Vee negative supply (incorrectly labeled as 1.7V in the service manual, corrected in a supplement, should be 3.7V) under load. It is easy to check for this problem by using a voltmeter between the chasis and the copper heatsink on the digital PSU board edge closer to the front panel, righ next to the filter cap. If you see 3.1-3.5V, your CDP has this problem. It is present in the 4 I have here, and because the wrong value of the resistor is clearly documented in the service manual, it is likely they all have it.

The Vee negative supply is generated by a simple linear regulator, 2 transistors and a zener diode for reference. The clue is that the zener diode D959 is rated at 4.3V but the voltage on it is usually below 4V. This is so because the resistor R961 feeding it is way too large at 4.7k - the current through the zener diode is far too low to establish proper zener diode operation. The result is that D959 operates at a working point where it's internal impedance is very high and unstable, making Vee very variable under load.
When the CDP encounters an error, it needs a much larger current to control the laser head, and demanding it from Vee results in collapse of the Vee. Because there are a number of circuits using Vee (including the spindle motor mentioned in the problem above!), a large amount of the drive electronics starts operating improperly at that moment, the servo circuits lose control of the head and reset, which incidentally makes the head skip uncontrolably backwards a bit, resulting in the nasty

skipping.

The solution is simple: change R961 from 4.7k to 820 ohms.

There are a few optional steps that can be taken to further improve things, including long term reliability:
Changing C963 from 2200uF/10V to say 4700uF/6.3V additionally improves Vee stiffness and stability. Often just doing that without the R961 fix reduces the skipping problem, clearly showing Vee is the culprit.
The 5V output is invariably a bit high, around 5.2 - 5.3V. It can be trimmed closer to 5.1V as stated in the manual by soldering a 27k resistor in parallel to R956, on the bottom side of the board. This is important because the laser head is supplied with this voltage, so overvolting is not at all desirable here. The 6V voltage (incorrectly labeled as 7V in the manual!) is not that critical and can be left alone.